

PLAN OF OPERATIONS
#03-12-02-006

RESOLUTION PRE-FEASIBILITY ACTIVITIES

Prepared for:

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1.0 INTRODUCTION

Resolution Copper Mining, LLC (Resolution or RCM), proposes to continue previously approved exploration operations and conduct various new activities associated with the planning stages for copper mining within Tonto National Forest (Forest Service). The Pre-feasibility Plan of Operations (POO #03-12-02-006) activities include:

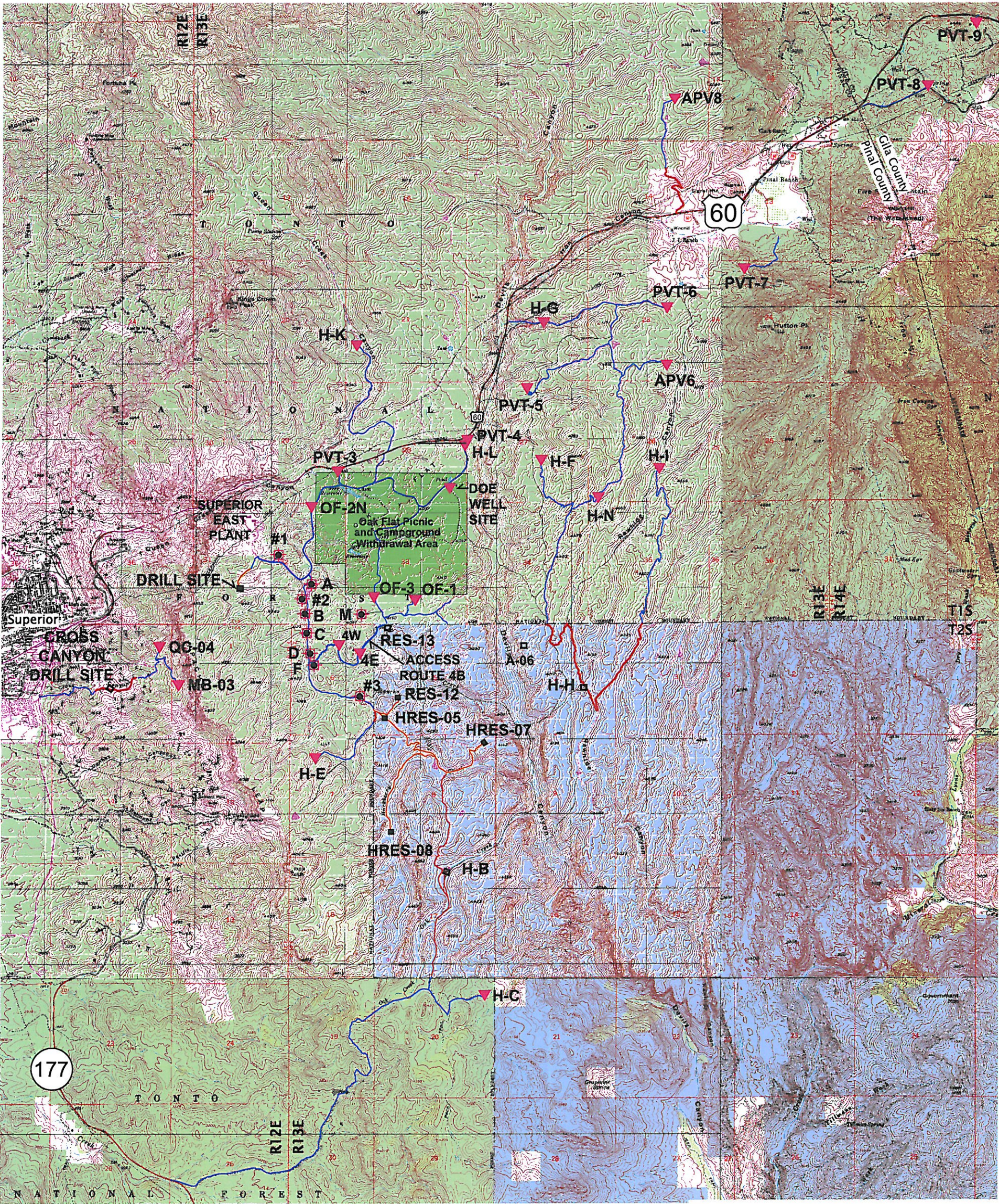
- 1) Constructing seven exploration drill sites that would impact approximately 1.81 acres and directional drilling on those sites;
- 2) Constructing eight drill sites to accommodate a total of three deep and six shallow groundwater testing and monitoring wells that would impact approximately 1.86 acres;
- 3) Constructing nine drill sites that would impact approximately 1.8 acres to accommodate a total of nine geotechnical characterization boreholes;
- 4) Continuing exploratory and monitoring activities at previously authorized drill sites that have impacted approximately 3.02 acres;
- 5) Completing necessary roadway improvements on approximately 16.67 miles of existing roads on National Forest System Lands that would impact approximately 29.51 acres;
- 6) Constructing 1.37 miles of new roads (1.23 miles on Forest System Lands and 0.14 on State Trust lands), that would impact 3.04 acres (2.69 acres on Forest System Lands and 0.35 on State Trust lands);
- 7) Completing road improvements on approximately 4.28 miles of existing roads that would impact approximately 5.75 acres on State Trust lands and on approximately 1.05 miles of existing roads that would impact approximately 2.48 acres on privately owned lands;
- 8) Constructing new drill sites and monitoring wells on three sites that would impact approximately 0.39 acre of State Trust lands and 0.18 acre of private lands; and
- 9) Road maintenance for access to previously authorized drill sites and the new drill sites on public lands administered by the Forest Service (National Forest System Lands), State Trust lands, and private lands.

The total area of construction activity, including existing road surfaces, is approximately 83 acres. Proposed new construction disturbance would occur on a total of 46.82 acres, of which 37.67 acres are on National Forest System Lands, 6.49 acres are on State Trust lands, and 2.66 acres are on privately held lands. The proposed new construction activities and the Previously Authorized Activities as described in the Pre-feasibility Plan of Operations are referred to as the Pre-feasibility Activities.

The Pre-feasibility Activities would be conducted in the western portion of the Pinal Mountains, east and south of the town of Superior, in Pinal and Gila Counties (Figure 1). The Pre-feasibility Activities area includes the locations of the proposed drill sites, previously authorized drill sites, existing roads that provide access to existing or proposed drill sites, and proposed new roads on National Forest System Lands, privately held lands, and State Trust lands (Pre-feasibility Activity Area [PAA], Figure 2). The majority of the PAA would be located east of the escarpment known as Apache Leap to the steeper terrain between Devils and Rawhide Canyons. The northern and easternmost limit of the PAA is located near the settlement known as Top of the World. An isolated western section of the PAA is located adjacent to the town of Superior where Cross Canyon intersects State Route 177 (S.R. 177). The southernmost portion of the PAA is located approximately 4 miles south of Superior.

Pre-feasibility Activities would occur in these non-contiguous areas of National Forest System Lands, State Trust lands, and privately held lands in the following townships, ranges, and sections of the Gila and Salt River Baseline and Meridian (Figure 2):

- Township 1 South, Range 13 East in portions of Sections 11, 13, 14, 21 through 24, 26 through 29, and 32 through 35;
- Township 1 South, Range 14 East in portions of Sections 5, 7, and 8;
- Township 2 South, Range 12 East in portions of Sections 1, 2, 3, and 25; and
- Township 2 South, Range 13 East in portions of Sections 3 through 8, 17, 19, 20, and 30.



LEGEND

Forest System and User-created Roads
Utilized for Pre-feasibility Activities

Roadway Improvements on State Trust &
Private Lands

Completed State Trust Land Roadway Improvements

Completed Drill Site on State Trust or Private Lands

Drill Site

Drill Site on State Trust or Private Lands

Previously Approved Drill Site

Oak Flat Picnic and Campground
Withdrawal Area

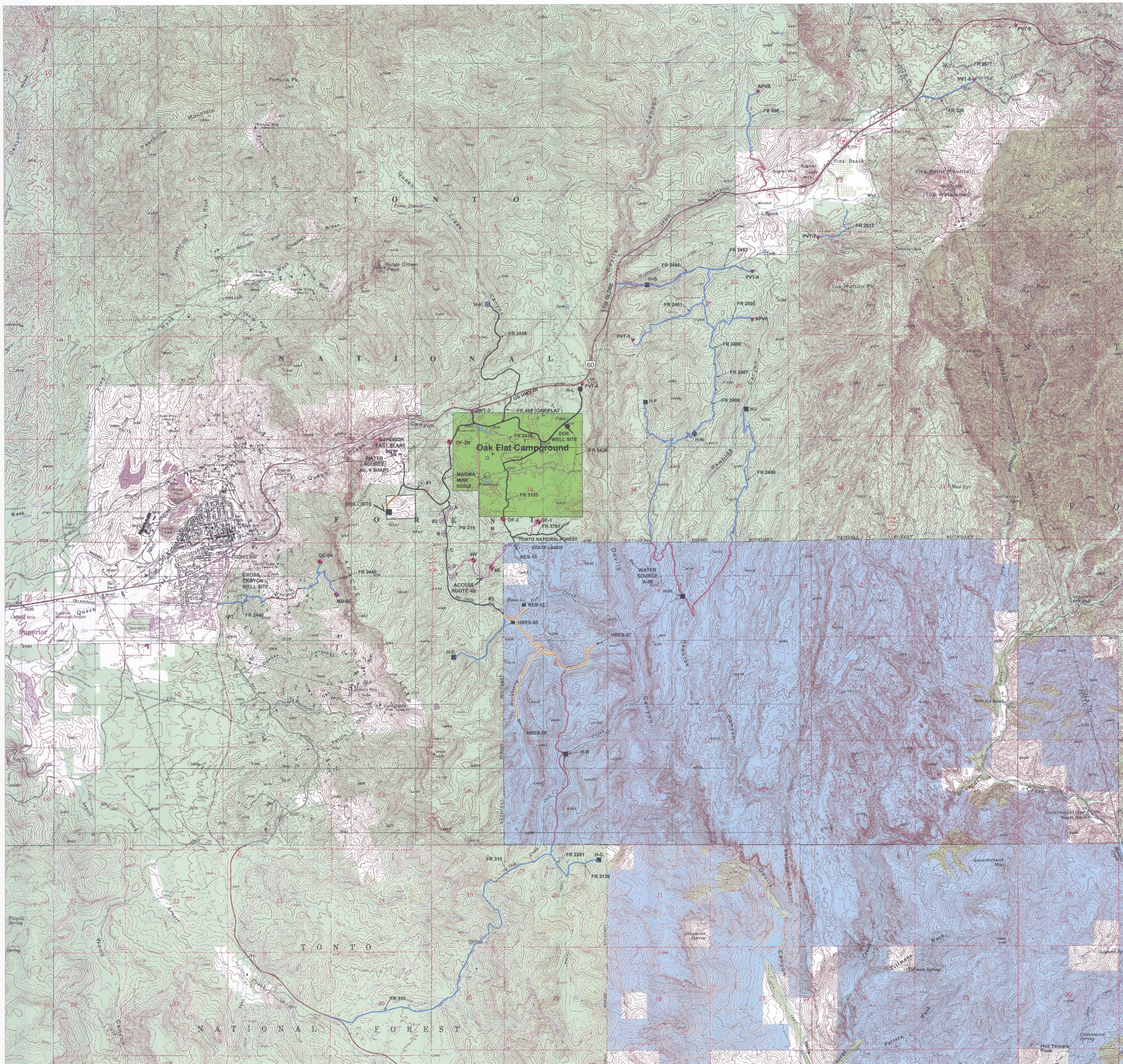
Tonto National Forest Land

State Trust Land

Private Land

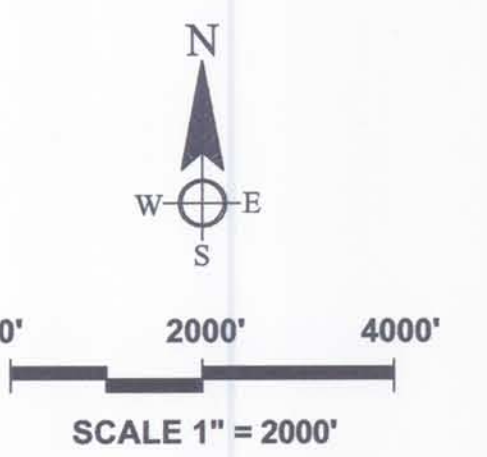
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Location Map
Figure 1



LEGEND

- Exploration Drill Site
- Tunnel Characterization Bore Hole
- Deep Hydrogeology Testing / Monitor Well
- Shallow Hydrogeology Well Site
- Previously Approved Drill Site
- Existing Access Road (To Be Improved)
- New Road
- Other Roadway Improvements
- Completed State Land Roadway Improvements
- Existing Road (To Be Maintained)
- Tonto National Forest
- State Trust Lands



Pinal County, Arizona
Superior, Pinal Ranch &
Teapot Mountain 7.5
USGS Maps

WestLand Resources Inc.
Engineering and Environmental Consultants

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PRE-FEASIBILITY ACTIVITIES OVERVIEW MAP

Figure 2

2.0 CONTACT AND OPERATOR INFORMATION

The operator of the pre-feasibility activities program is:

Resolution Copper Mining, LLC
Mr. Rich Heig, Vice President, Prefeasibility
102 Magma Heights
Superior, Arizona 85173
Tel: (520) 689-3338

or

Resolution Copper Mining, LLC
Ms. Victoria Peacey, Manager, Environmental Impact Assessments
102 Magma Heights
Superior, Arizona 85173
(520) 689-3431

The owners of the claims are:

Resolution Copper Mining, LLC
102 Magma Heights
Superior, Arizona 85173

3.0 DESCRIPTION OF ACTIVITIES

3.1 APPROVED OPERATIONS

In this Plan, activities previously approved by the Forest Service under POO #01-12-02-002 and associated amendments are identified. Approved activities include the continued use of nine sites for exploration and groundwater monitoring purposes (Figure 2), and the improvement and maintenance of roadways.

The previously approved areas of operation have been the subject of extensive resource investigations, and biological and cultural resources surveys have been completed in the previously approved activity areas within the parcel. Adverse effects to resources of concern would continue to be avoided as operations proceed.

Previously authorized exploration activities were approved by the Forest Service under the Resolution Project Exploratory Drilling Plan of Operations #01-12-02-002. The Previously Authorized Activities include: 1) nine combination exploration and groundwater monitoring well sites (drill sites A, B, C, D, F, M, #1, #2, and #3); 2) one groundwater monitoring well (HRES-3 on the DOE Well Site); 3) improvement and maintenance of six Forest Service System and user-created roads for drill site access; and 4) the placement of aboveground plastic pipe and tanks for potable water transfer and storage.

All the approved drill site construction, roadway improvements, and water system construction activities have been completed. The disturbance footprints for the constructed drill sites vary. Any additional drilling at these sites would be planned for completion by December 2014. Access for groundwater testing and monitoring wells would be maintained through 2025. Table 1 provides a summary of the location information associated with the drill sites established as part of the Previously Authorized Activities.

Table 1. Existing Approved Site Locations and Claim Information

Site Name	Northing	Easting	Section	Township	Range	Claim Name
A	3684055	494543	Sec. 32 SE $\frac{1}{4}$,NW $\frac{1}{4}$,SE $\frac{1}{4}$	1S	13E	Sun 9
B	3683664	494457	Sec. 32 SE $\frac{1}{4}$,SW $\frac{1}{4}$,SE $\frac{1}{4}$	1S	13E	Sun 12
C	3683405	494482	Sec. 6 NE $\frac{1}{4}$,NW $\frac{1}{4}$,NW $\frac{1}{4}$	2S	13E	Sun 14
D	3683134	494528	Sec. 6 NE $\frac{1}{4}$,SW $\frac{1}{4}$,NW $\frac{1}{4}$	2S	13E	Sun 18
F	3682976	494580	Sec. 6 NW $\frac{1}{4}$,SE $\frac{1}{4}$,NW $\frac{1}{4}$	2S	13E	Sun 19 & 21
M	3683654	495209	Sec. 33 SE $\frac{1}{4}$,SW $\frac{1}{4}$,SW $\frac{1}{4}$	1S	13E	Sun 37
#1	3684447	494103	Sec. 32 SE $\frac{1}{4}$,SE $\frac{1}{4}$,NW $\frac{1}{4}$	1S	13E	Sun 2 & 4
#2	3683859	494418	Sec. 32 NE $\frac{1}{4}$,SW $\frac{1}{4}$,SE $\frac{1}{4}$	1S	13E	Sun 10
#3	3682565	495190	Sec. 6 SW $\frac{1}{4}$,NE $\frac{1}{4}$,SE $\frac{1}{4}$	2S	13E	Sun 31
DOE	3685328	496381	Sec 28 NW $\frac{1}{4}$,SE $\frac{1}{4}$,SE $\frac{1}{4}$	1S	13E	NA

Note: Detailed claim information for proposed exploration drilling and associated access is provided in Appendix C.

A brief description of the Previously Authorized Activities drill sites follows.

Drill Site A. Drill site A is located along FR 315 in Township 1 South, Range 13 East, in the SE¼, NW¼, SE¼ of Section 32. Two pre-collar holes (RES-4 and RES-7) with multiple core holes and one deep groundwater testing well (DHRES-2) have been developed at this drill site. Future activities at this drill site would include construction of up to two new pre-collar holes, A-3 and A-4, each with multiple core holes and ongoing monitoring at DHRES-2. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill pad and no changes to the configuration of this drill site are proposed.

Drill Site B. Drill site B is located along FR 315 south of Magma Mine Road in Township 1 South, Range 13 East, in the SE¼, SW¼, SE¼ of Section 32. RES-3 is an exploration drill hole developed at this drill site and consists of a single pre-collar hole with multiple core holes. Future activities at this drill site would include construction of up to two new pre-collar holes, labeled B-2 and B-3, each with multiple core holes. RES-3 has been equipped with an electronic monitoring instrument for continual groundwater monitoring. New exploration pre-collar drill holes could be constructed within the footprint of the existing site and no changes to the configuration of this site are proposed.

Drill Site C. Drill site C is located along FR 315 south of Magma Mine Road in Township 2 South, Range 13 East, in a portion of Lot 3 in Section 6. Pre-collar exploration holes RES-2 and RES-17 have been constructed at the site and each has multiple core holes. Future activities at this drill site would include continued drilling of core holes at RES-2 and RES-17 and construction of one new pre-collar hole, labeled C-3, with multiple core holes. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill site and no changes to the configuration of this drill site are proposed.

Drill Site D. Drill site D is located along FR 315 south of Magma Mine Road in Township 2 South, Range 13 East, in a portion of Lot 4 in Section 6. Pre-collar exploration holes RES-1 and RES-14 have been developed at this site and each has multiple core holes. Planned activities would include continued drilling of core holes at RES-1 and RES-14 and construction of one new pre-collar hole, labeled D-3, with multiple core holes. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill pad and no changes to the configuration of this drill site are proposed.

Drill Site F. Drill site F is located along FR 315 south of Magma Mine Road in Township 2 South, Range 13 East, in portions of Lot 4 in Section 6. Planned activities include construction of one pre-collar hole, labeled F-1, with multiple core holes and one deep groundwater monitoring well. No changes to the configuration of this drill site are proposed.

Drill Site M. Drill site M is located south of the Oak Flat Withdrawal Area and east of FR 3153 in Township 1 South, Range 13 East, in the SE¼, SW¼, SW¼ of Section 33. Two exploration pre-collar holes (RES-5 and RES-15) with multiple core holes, one shallow groundwater testing and monitoring well (HRES-4), and one deep groundwater testing and monitoring well (DHRES-1) have been constructed

at this drill site. Groundwater testing and monitoring are ongoing. Planned activities would include continued drilling of core holes from RES-5 and RES-15 and construction of up to two new pre-collar holes, labeled M-3 and M-4, with multiple core holes. Groundwater monitoring and testing would continue at HRES-4 and DHRES-1. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill pad and no changes to the configuration of this drill site are proposed.

Drill Site #1. Drill site #1 is located southeast of the Superior East Plant Site north of Magma Mine Road in Township 1 South, Range 13 East, in the SE $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ of Section 32. Exploration drill hole RES-6 with multiple core holes has been developed at this drill site. Future activities would include continued drilling of core holes at RES-6 and construction of up to two new pre-collar holes, labeled #1-2 and #1-3, with multiple core holes. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill site and no changes to the configuration of this drill site are proposed.

Drill Site #2. Drill site #2 is located along FR 315 south of Magma Mine Road in Township 1 South, Range 13 East, in the NE $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 32. Exploration drill hole RES-9 with multiple core holes and shallow groundwater monitoring well HRES-2 have been developed at this site. Future activities would include continued drilling of multiple core holes at RES-9, continued groundwater testing and monitoring of HRES-2, and construction of a new pre-collar hole, labeled #2-2, with multiple deflection core holes. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill site and no changes to the configuration of this site are proposed.

Drill Site #3. Drill site #3 is located along FR 315 in Township 2 South, Range 13 East, in the SW $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 6. Exploration pre-collar holes RES-10 and RES-11 were failed attempts and have been abandoned per Arizona Department of Water Resources (ADWR) requirements. RES-16 has been constructed at this drill site. Planned activities would include drilling deflection core holes at RES-16 and construction of one new pre-collar hole, labeled #3-4, with multiple core holes. New exploration pre-collar drill holes could be constructed within the footprint of the existing drill site and no changes to the configuration of this drill site are proposed.

DOE Well Site. This drill site is located within the Oak Flat Withdrawal Area along FR 2438 in Township 1 South, Range 13 East, in the NW $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 28. The site contains two hydrology monitoring wells, HRES-3 (ADWR #55-201851) and DOE well (#USWUZP-5). HRES-3 and the DOE well are each completed into the Apache Leap tuff and neither hole is drilled deep enough to penetrate into the ore body. The DOE well is approximately 936 feet deep and HRES-3 is approximately 1,200 feet deep. Planned activities at this site are limited to groundwater testing and monitoring.

3.2 EXPLORATION DRILLING

3.2.1 Purpose and Location of Activity

Seven exploration drill sites are proposed as part of this Plan. Two of these sites, Sites MB-03 and QC-04, would be placed on previously disturbed lands. OF-2N would be constructed on previously undisturbed land. MB-03 and QC-04 would be placed on previously used drill pads along the west boundary of the

Resolution Parcel, and OF-2N would be placed within an area along Magma Mine Road. Sites 4E and 4W are located along a new access road, Access Route 4b (Figure 2; Table 2). Complete detailed descriptions of the proposed exploration activities are provided in Appendix A. Plan views of the proposed activities with 2007 aerial base mapping are provided in Appendix B.

Table 2. Exploration Site Locations and Claim Information

Drill Site	Northing	Easting	Elevation (ft)	Legal Description	Claim Name	Acres of Disturbance
QC-04	3683222	492518	3800	T2S, R12E NE ¼ NE ¼ of 2	Hard Rock #7 Hard Rock #12	0.26
MB-03	3682705	492777	3930	T2S, R12E NW ¼ SW ¼ of 1	Hard Rock #6 Apache Leap	0.25
OF-1	3683843	495926	4125	T1S, R13E SW ¼ SE ¼ of 33	Sun #40 Sun #41	0.18
OF-2N	3685084	494542	3925	T1S, R13E NW ¼ NE ¼ of 32	Oak No. 43 Oak No. 44	0.25
OF-3	3683885	495375	4100	T1S, R13E SW ¼ SW ¼ of 33	Sun #40 Sun #41	0.23
4E	3683133	495193	4125	T2S, R13E SE ¼ NE ¼ of 6	Sun #34	0.35
4W	3683249	494914	4045	T2S, R13E NW ¼ NE ¼ of 6	Sun #17	0.29

The purpose of drilling QC-04 and MB-03 is to intersect an important structure (West Boundary Fault) concealed beneath the cover rocks of Apache Leap. At present, there are only two pierce points to the north from underground drilling in the old Magma Mine. Two deflections would be drilled from each site in a rough fan shape toward the east at an angle between 20 and 30 degrees from vertical to depths between 3,600 and 4,300 feet. OF-1, OF-2N, OF-3, 4W, and 4E would be drilled for mineral exploration purposes.

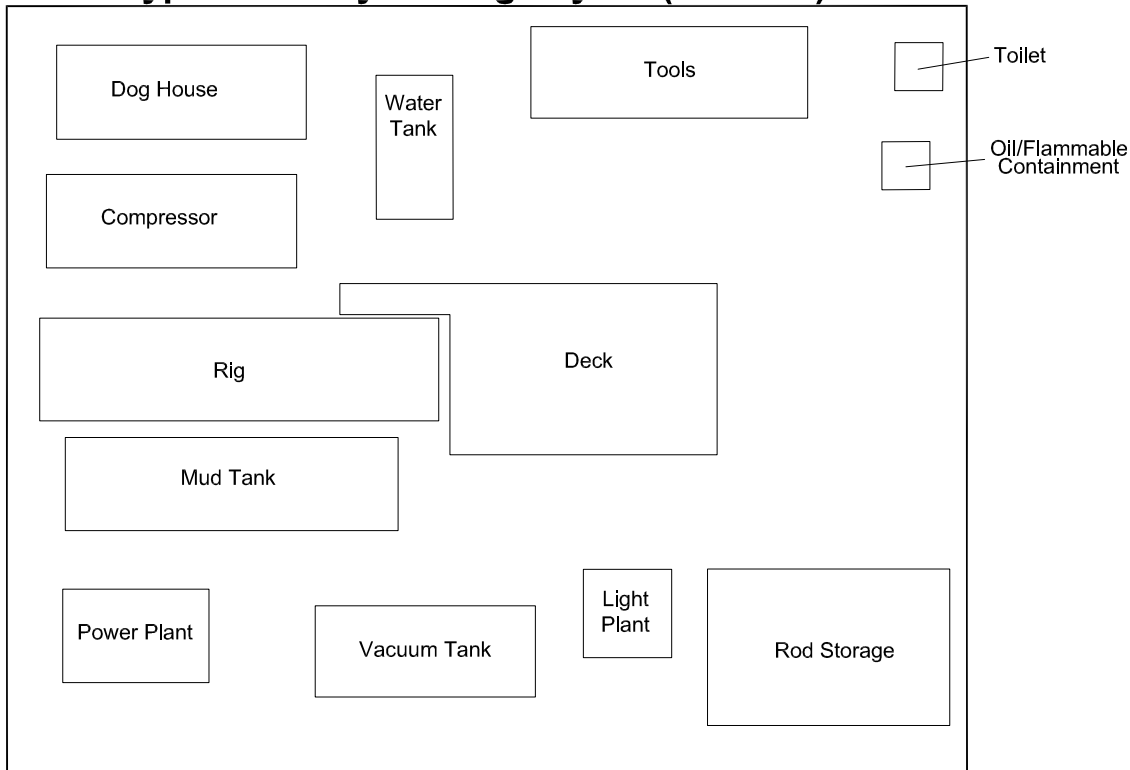
Roadway improvements required to gain access to the proposed exploration drill sites are identified in Figure 2 and Section 3.6.

3.2.2 Description of Drilling Operations

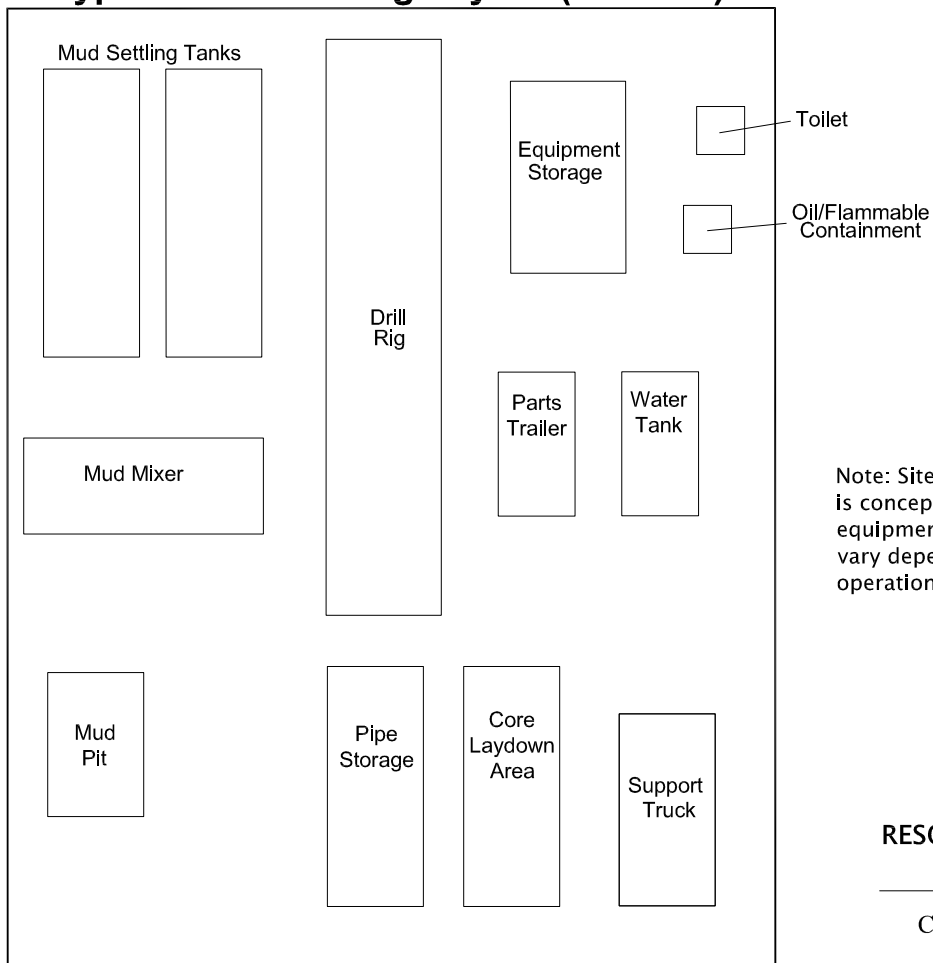
The exploration drill sites proposed as part of this Plan have an approximately 80- by 100-foot disturbance footprint. Figure 3 depicts a typical layout of the drill pad and associated equipment at a drill site. Some sites would require additional area for grading and fill slopes. The estimated disturbance for the placement of the proposed exploration drill sites is 2.5 acres on Forest System Lands.

At each exploration site, a trunk hole would be drilled to a depth of approximately 3,000 feet using the open-hole technique. The trunk hole is then deepened to 7,000 feet by diamond drilling. Multiple deflections would be drilled by motor/diamond drilling.

Typical Rotary Drilling Layout (100'x80')



Typical Core Drilling Layout (80'x100')



Note: Site configuration and equipment layout is conceptual. The actual site configuration and equipment layout used at each drill site will vary depending on site specific constraints and operational considerations.

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Conceptual Drill Site Layout

Figure 3

Temporary structures for equipment storage may be used by the drillers for shelter at each active rig (Figure 3). In addition, a portable toilet would be placed at each active drill site and would be serviced periodically by a contractor (Figure 3).

A typical equipment list for the proposed fault drilling operations is provided in Section 3.4 of this Plan.

The estimated disturbance area for each individual site is identified in Section 3.11 of this Plan. Each drill site is discussed in more detail below.

Drill Site QC-04. QC-04 would be located on previously disturbed National Forest System Lands along the west side of Apache Leap in Township 2 South, Range 12 East, in the SE $\frac{1}{4}$, NE $\frac{1}{4}$, NE $\frac{1}{4}$ of Section 2. Up to four exploration boreholes would be drilled at this site to collect geologic information about the West Boundary Fault. The total estimated surface disturbance for the construction of this drill site is 0.26 acre. QC-04 would be accessed from FR 2440 and an existing user-created road that continues to the drill site. FR 2440 would require improvements on approximately 0.9 mile¹ of existing road on National Forest System Lands and an approximately 0.4-mile portion on privately held lands. The existing user-created road from FR 2440 to QC-04 would require an additional 0.1 mile of improvements.

Drill Site MB-03. MB-03 would be located on previously disturbed National Forest System Lands along the west side of Apache Leap in Township 2 South, Range 12 East, in the NW $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ of Section 1. Up to four exploration boreholes would be drilled at this site to collect geologic information about the West Boundary Fault. The estimated surface disturbance for the construction of this drill site is 0.25 acre. MB-03 would be accessed from FR 2440 (on National Forest System Lands and privately held lands as described for QC-04) and approximately 0.4 mile of additional improvements would be required for this road beyond the turn-off for QC-04.

Drill Site OF-1. OF-1 would be located on previously undisturbed National Forest System Lands south of the Oak Flat Withdrawal Area in Township 1 South, Range 13 East, in the NW $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 33. Up to three pre-collar rotary holes would be drilled within the footprint of disturbance and multiple core holes would be drilled from each of the pre-collar holes. A long-term groundwater monitoring well may be established within one of the core holes. The estimated surface disturbance for the construction of this drill site is 0.18 acre. OF-1 would be accessed from FR 315, turning east along a new access road (4b), turning north on FR 3153, and then traveling 0.2 mile north along a proposed new access road segment.

Drill Site OF-2N. OF-2N would be located on undisturbed land west of the Oak Flat Withdrawal Area along Magma Mine Road in Township 1 South, Range 13 East, in the SE $\frac{1}{4}$, NW $\frac{1}{4}$, NE $\frac{1}{4}$ of Section 32. Up to three pre-collar rotary holes would be drilled within the footprint of this drill pad and multiple core holes would be drilled from each of the pre-collar holes. A long-term groundwater monitoring well may

¹ Note: Lengths of roadway improvements were originally calculated in AutoCAD in feet. They have been presented in text here rounded to the nearest 1/10th or 1/100th of a mile.

be established within one of the core holes. The estimated surface disturbance for the construction of this drill site is 0.25 acre. OF-2N would be accessed from Magma Mine Road. An access road from Magma Mine Road to the site already exists but would require approximately 75 feet of roadway improvements. Access road improvements are included in the acreage calculation for drill site disturbance.

Drill Site OF-3. OF-3 would be located west of OF-1 and south of the Oak Flat Withdrawal Area on undisturbed National Forest System Lands in Township 1 South, Range 13 East, in the NE $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ of Section 33. Up to three pre-collar rotary holes would be drilled within the footprint of this drill site and multiple core holes would be drilled from each of the pre-collar holes. A long-term groundwater monitoring well may be established within one of the core holes. The estimated surface disturbance for the construction of this drill site is 0.23 acre. OF-3 would be accessed from FR 315, turning east on a new access road (4b), and then turning north on FR 3153. OF-3 is located immediately adjacent to FR 3153.

Drill Site 4W. 4W would be located on previously undisturbed National Forest System Lands in Township 2 South, Range 13 East, in the NW $\frac{1}{4}$, NE $\frac{1}{4}$ of Section 6. Up to four pre-collar rotary holes would be drilled within the footprint of disturbance and multiple core holes would be drilled from each of the pre-collar holes. A long-term groundwater monitoring well may be established within one of the core holes. The estimated surface disturbance for the construction of this drill site is 0.29 acre. 4W would be accessed from FR 315 by turning east onto a new road (4b) and traveling approximately 0.25 mile.

Drill Site 4E. 4E would be located on previously undisturbed National Forest System Lands in Township 2 South, Range 13 East, in the SE $\frac{1}{4}$, NE $\frac{1}{4}$ of Section 6. Up to four pre-collar rotary holes would be drilled within the footprint of disturbance and multiple core holes would be drilled from each of the pre-collar holes. A long-term groundwater monitoring well may be established within one of the core holes. The estimated surface disturbance for the construction of this drill site is 0.35 acre. 4E would be accessed from FR 315 by turning east onto a new road (4b) and traveling approximately 0.5 mile.

3.3 HYDROGEOLOGIC TESTING AND MONITORING WELLS

3.3.1 Purpose and Location of Activity

Eight hydrogeologic testing and monitoring well sites H-C, H-E, H-F, H-G, H-I, H-K, H-L, and H-N would be drilled for hydrogeologic testing on National Forest System Lands. Three sites, H-B, H-H, and the Cross Canyon drill site, would be drilled on State Trust and privately held lands (Figure 2 and Table 3).

Geologic and hydrologic data to be obtained from the monitoring wells would include: 1) depth to groundwater level; 2) lithology of drill cuttings; 3) aquifer hydraulic parameters, including transmissivity, hydraulic conductivity, and storage coefficients; and 4) chemical quality of groundwater.

Roadway improvements required to gain access to the proposed deep hydrogeologic testing wells are identified in Figure 2 and Section 3.6.

Table 3. Estimated Disturbance Area for New Groundwater Testing and Monitoring Drill Sites. The typical work area dimension for groundwater testing and monitoring drill sites is 80 feet by 100 feet (0.18 acre). Because of topographic constraints, some drill sites would have a larger footprint than others. The area of disturbance for each proposed drill site is based upon the mapping provided in Appendix B.

Drill Site	Northing	Easting	Elevation (ft)	Legal Description	Claim Name	Acres of Disturbance
National Forest System Lands						
H-C	3678575	496860	3850	T2S, R13E, Sec 20 SE ¼ NE ¼ NE ¼	--	0.27
H-E	3681030	494375	4450	T2S, R13E, Sec 7 SW ¼ NE ¼ NW ¼	Dan 15 Dan 16 Dacite No. 12 Dacite No. 13	0.18
H-F	3685660	497525	4300	T1S, R13E, Sec 27 SW ¼ NW ¼ SE ¼	Margaret #261 Margaret #263	0.25
H-G	368727	497628	4240	T1S, R13E, Sec 22 NE ¼ NW ¼ SE ¼	Margaret #162 Margaret #163	0.20
H-I	3685580	499150	4280	T1S, R13E, Sec 26 SW ¼ NW ¼ SE ¼	LD No. 5 LD No. 6	0.18
H-K	3687219	495111	4140	T1S, R13E, Sec 21 SW ¼ NW ¼ SW ¼	Kay 148 Kay 150	0.30
H-L	3685909	496582	1250	T1S, R13E, Sec 28 NE ¼ NE ¼ SE ¼	Sun #58 Sun #68	0.15
H-N	3685230	498370	1378	T1S, R13E, Sec 26 SW ¼ SW ¼ SW ¼	Margaret #275	0.35
Subtotal – National Forest System Lands						1.88
State Trust and Privately Held Lands						
H-B	3680223	496347	3960	T2S, R13E, Sec 17 SW ¼ NW ¼ NE ¼	--	0.22
H-H	3682678	498175	3985	T2S, R13E, Sec 4 NE ¼ NW ¼ SE ¼	--	0.17
Cross Canyon Drill Site			3325	T2S, R12E, Sec 2 NE ¼ NE ¼ SW ¼	--	0.18
Subtotal – State Trust and Privately Held Lands						0.57
Total						2.45

A description of each of the groundwater testing and monitoring drill sites follows.

Drill Site H-B. H-B would be developed for groundwater monitoring and testing and would be located along FR 315 on State Trust lands in Township 2 South, Range 13 East, in the SW¼, NW¼, NE¼ of Section 17. The estimated surface disturbance for this site is 0.22 acre. H-B would be accessed from FR 315 on State Trust lands, which would be maintained to accommodate long-term groundwater testing and monitoring.

Drill Site H-C. H-C would be developed for groundwater monitoring and testing and would be located along FR 3139 on undisturbed National Forest System Lands in Township 2 South, Range 13 East, in the SE¼, NE¼, NE¼ of Section 20. Shallow groundwater testing and monitoring well HRES-C would be drilled at H-C. The total estimated surface disturbance for the construction of this drill site is 0.27 acre. H-C would be accessed from S.R. 177 by turning onto FR 315, turning north onto FR 2261, and then traveling east along FR 3139. FR 315 and FR 2261 would require 3.6 miles and 0.3 mile of

improvements, respectively. Improvements would also be necessary along a 0.4-mile segment of FR 3139. These roads would be maintained to accommodate long-term groundwater testing and monitoring.

Drill Site H-E. H-E would be developed for groundwater monitoring and testing and would be located adjacent to a user-created road on undisturbed National Forest System Lands in Township 2 South, Range 13 East, in the SW $\frac{1}{4}$, NE $\frac{1}{4}$, NW $\frac{1}{4}$ of Section 7. Shallow groundwater testing and monitoring well HRES-E would be drilled at H-E. The estimated surface disturbance for the construction of this drill site is 0.18 acre. H-E would be accessed from Magma Mine Road by turning south on FR 315 and then turning to the southwest onto an existing user-created road shortly after crossing over on State Trust land. Approximately 0.8 mile of the user-created road would need to be improved.

Drill Site H-F. H-F would be developed for groundwater monitoring and testing and would be located adjacent to a user-created road on undisturbed National Forest System Lands, southeast of U.S. Highway 60 and east of Devils Canyon in Township 1 South, Range 13 East, in the SW $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 27. Shallow groundwater testing and monitoring well HRES-F would be drilled at H-F. The total estimated surface disturbance for the construction of this drill site would be 0.25 acre. H-F would be accessed from U.S. Highway 60 by turning south on FR 2466 and then turning northwest on an existing user-created road. Approximately 4.2 miles of roadway improvements would be required along FR 2466 and approximately 0.7 mile of improvements would be required for the user-created road to gain access to the drill site.

Drill Site H-G. H-G would be located adjacent to FR 2466, east of U.S. Highway 60 and Devils Canyon on undisturbed National Forest System Lands in Township 1 South, Range 13 East, in the NE $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 22. Shallow groundwater monitoring well HRES-G would be drilled at H-G. The estimated surface disturbance for the construction of this drill site would be 0.20 acre. H-G would be accessed from FR 2466. The access from U.S. Highway 60 would be improved by relocating the existing cattle guard on FR 2466 just east of U.S. Highway 60 to allow large trucks to pull completely off the highway while gaining access to FR 2466. FR 2466 would be maintained through the duration of groundwater testing and monitoring activities to provide access to this site and other groundwater monitoring well sites accessed from FR 2466.

Drill Site H-H. H-H would be developed for groundwater monitoring and testing and would be located along FR 2466 on State Trust lands in Township 2 South, Range 13 East, in the NE $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 4. Shallow groundwater monitoring well HRES-H would be drilled at H-H. The estimated surface disturbance for this site is 0.17 acre. H-H would be accessed from FR 2466 on State Trust lands, which would be maintained to accommodate long-term groundwater testing and monitoring.

Drill Site H-I. H-I would be located on undisturbed National Forest System Lands adjacent to Rawhide Canyon along FR 2469 in Township 1 South, Range 13 East, in the SW $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 26. Shallow groundwater testing and monitoring well HRES-I would be drilled at H-I. The total estimated surface disturbance for the construction of this drill site would be 0.18 acre. H-I would be accessed from U.S. Highway 60 by turning south on FR 2466, crossing onto State Trust land, going past drill site H-H, and then turning north onto FR 2469.

Drill Site H-K. H-K would be located on undisturbed National Forest System Lands adjacent to FR 2458 in Township 1 South, Range 13 East, in the SW $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ of Section 21. Shallow groundwater testing and monitoring well HRES-K and a deep groundwater testing and monitoring well, DHTW-02, would be drilled at site H-K. The total estimated surface disturbance for the construction of this drill site would be 0.30 acre. H-K would be accessed from U.S. Highway 60 by turning north on FR 2458. Two new access road segments, one approximately 150 feet long and the other approximately 175 feet long, would be constructed from FR 2458 to H-K.

Drill Site H-L. H-L would be located on previously disturbed National Forest System Lands between the Oak Flat Withdrawal Area and U.S. Highway 60 in Township 1 South, Range 13 East, in the NE $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 28. Deep groundwater testing monitoring well DHTW-01 would be drilled at H-L to establish deep aquifer characteristics. The total estimated surface disturbance for the construction of this drill site would be 0.18 acre. H-L would be located on an existing user-created road accessed from FR 2438 in the Oak Flat Withdrawal Area. No road improvements would be required for access to this drill site.

Drill Site H-N. H-N is located on previously disturbed National Forest System Lands adjacent to FR 2466 east of Devils Canyon in Township 1 South, Range 13 East, in the SW $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ of Section 26. Deep groundwater testing and monitoring well DHTW-03 would be drilled at H-N. The total estimated surface disturbance for the construction of this drill site would be approximately 0.35 acre. H-N would be accessed from U.S. Highway 60 by turning south on FR 2466. Roadway improvements to FR 2466 would be required to access H-N and other nearby drill sites. Two short segments of new access road, each approximately 75 feet in length, would be constructed from FR 2466 to H-N. These segments would approach the site from the east and west and the disturbances associated with these two access points are included in the drill site disturbance acreage calculation.

Cross Canyon Drill Site. The Cross Canyon drill site is located on privately held lands adjacent to FR 2440 east of Superior in Township 2 South, Range 12 East, in the NE $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$ of Section 2. A deep groundwater testing and monitoring well would be drilled at the Cross Canyon drill site. The total estimated surface disturbance for the construction of this drill site would be approximately 0.18 acre. The Cross Canyon drill site would be accessed from S.R. 177 by turning east on FR 2440. Roadway improvements to FR 2440 would be required to access this drill site and exploration drill sites MB-03 and QC-04.

Deep Hydrogeologic Testing and Monitoring Well Drilling

The deep hydrogeologic testing and monitoring well sites proposed as part of this Plan have an approximately 80- by 100-foot disturbance footprint. Figure 3 depicts the typical layout of the drill pad and associated equipment at the site. Some sites would require additional area for grading and fill slopes. The estimated disturbance area for each individual site is identified in Section 3.11 of this Plan.

Complete descriptions of proposed deep hydrogeologic testing and monitoring activities are provided in Appendix A. Plan views of proposed activities with 2007 aerial base mapping and 10-foot contour intervals are provided in Appendix B.

Four deep groundwater testing and monitoring wells are proposed. Well DHTW-01 would be located at drill site H-L, well DHTW-02 would be located at drill site H-K, and well DHTW-03 would be located at drill site H-N. The fourth well would be located at the Cross Canyon drill site on privately held lands. The purpose of the deep groundwater testing and monitoring wells is to obtain geologic and groundwater data, including: 1) depth to groundwater level; 2) lithology of drill cuttings; 3) aquifer hydraulic parameters, including transmissivity, hydraulic conductivity, and storage coefficients; and 4) chemical quality of groundwater. Drilling and well construction is expected to take from 6 to 8 weeks.

Construction of each deep groundwater testing and monitoring well would begin with a 16-inch-diameter hole that would be drilled to a minimum of 20 feet followed by the placement of a 12-inch-diameter steel surface casing that would be set and cemented into place. Once the surface casing is established, a vertical 12 $\frac{7}{8}$ -inch-diameter borehole would be drilled to a depth of 1,476 to 4,600 feet using the reverse-circulation air-drilling technique. When drilling is complete, a 7-inch steel casing would be installed. A specialized grout mixture would be used to fix four to six vibrating wire piezometers between the 7-inch casing and the borehole wall. The location of the vibrating wire piezometers would be determined by inspecting the geophysical logs. Once the grout is cured, rotary drilling would resume and a 6 $\frac{3}{4}$ -inch borehole would be drilled to a depth of approximately 7,000 feet. Upon completion of the geophysical logging of this lower segment of the monitoring well, a 4-inch blank and slotted casing would be installed. The depths of the slotted casing would be based on the geophysical logging. Electronic monitoring instruments to monitor depth to groundwater would be installed in the lower portion of the deep groundwater testing and monitoring wells. Figure 4 depicts a vertical cross-section for the deep groundwater testing and monitoring wells. A 3- by 3-foot concrete pad would be constructed around the monitoring well surface casing once well construction is completed.

During drilling and well construction, careful observation of any formation water entering the borehole would be made. Drilling may be paused periodically to evaluate the quantity and quality of the groundwater entering the borehole. Airlift pumping would be used to raise the water to the surface to be evaluated. A hydrologist would monitor the drilling operations and a full suite of geophysical well logs would be documented before the casing is installed. As part of the well development process, open borehole airlift operations would provide: 1) development of the borehole to reduce impacts of the drilling process; 2) specific capacity of the well prior to well construction; 3) an estimate of aquifer transmissivity based on constant-rate pumping and recovery analysis; and 4) an opportunity for collection of representative water samples for chemical analysis.

Well construction and development activities are not expected to exceed 9 months for each well. Construction of the three deep groundwater testing and monitoring wells on Forest System Lands would be completed by December 2014. Monitoring activities would be completed by December 2025.

Shallow Hydrologic Monitoring Well Drilling

The shallow monitoring well sites proposed as part of this Plan have an approximately 80- by 100-foot disturbance footprint (Figure 3). Some sites would require additional area for grading and fill slopes. The estimated disturbance area for each individual site is identified in Section 3.11 of this Plan.

Complete detailed descriptions of the proposed shallow hydrologic monitoring activities are provided in Appendix A and plan views of the proposed activities with 2007 aerial base mapping are provided in Appendix B.

Construction of each shallow groundwater testing and monitoring well would begin with a 16-inch-diameter hole that would be drilled to a minimum 20-foot depth followed by the placement of a 12-inch-diameter steel surface casing that would be set and cemented into place. Once the surface casing is established, a 9 7/8-inch borehole would be drilled to a depth of approximately 1,500 feet. Upon completion of geophysical logging, a 4-inch blank and slotted steel casing would be installed to the depth of each well. Determination of the interval(s) for placement of the slotted casing would be based on the geophysical logging and the results of well development testing. Well development would be conducted in the same manner as the deep groundwater testing and monitoring wells. A 3- by 3-foot concrete pad would be constructed around the monitoring well surface casing once well construction is complete. Monitoring activities would be completed by December 2025. Figure 4 depicts a typical vertical cross-section of a shallow groundwater testing and monitoring well.

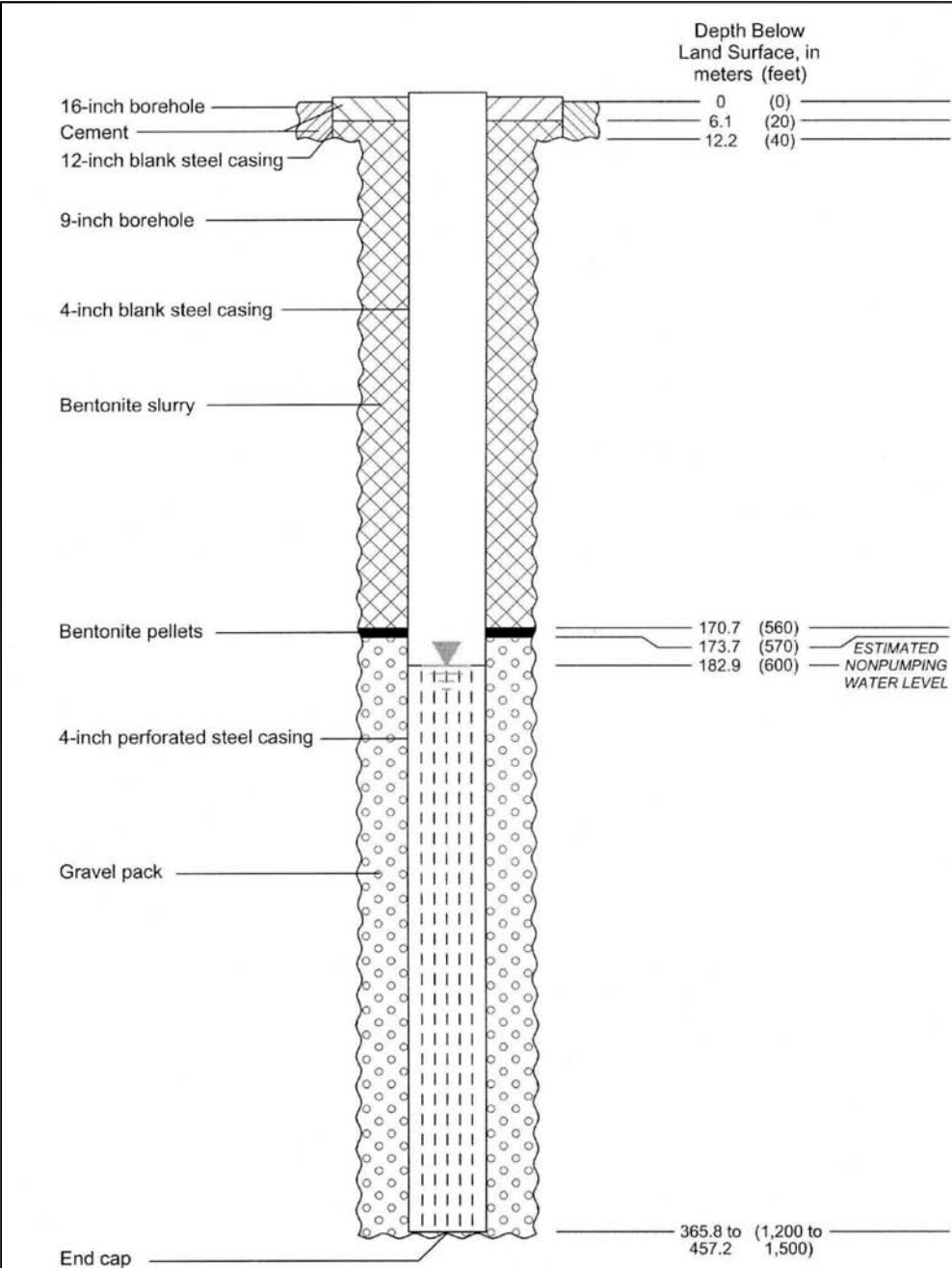
Well construction and development activities are expected to take 6 to 9 weeks. Construction of the six shallow groundwater testing and monitoring wells on National Forest System Lands would be completed by December 2014.

A typical equipment list for the proposed shallow groundwater monitoring well drilling is provided in Table 4.

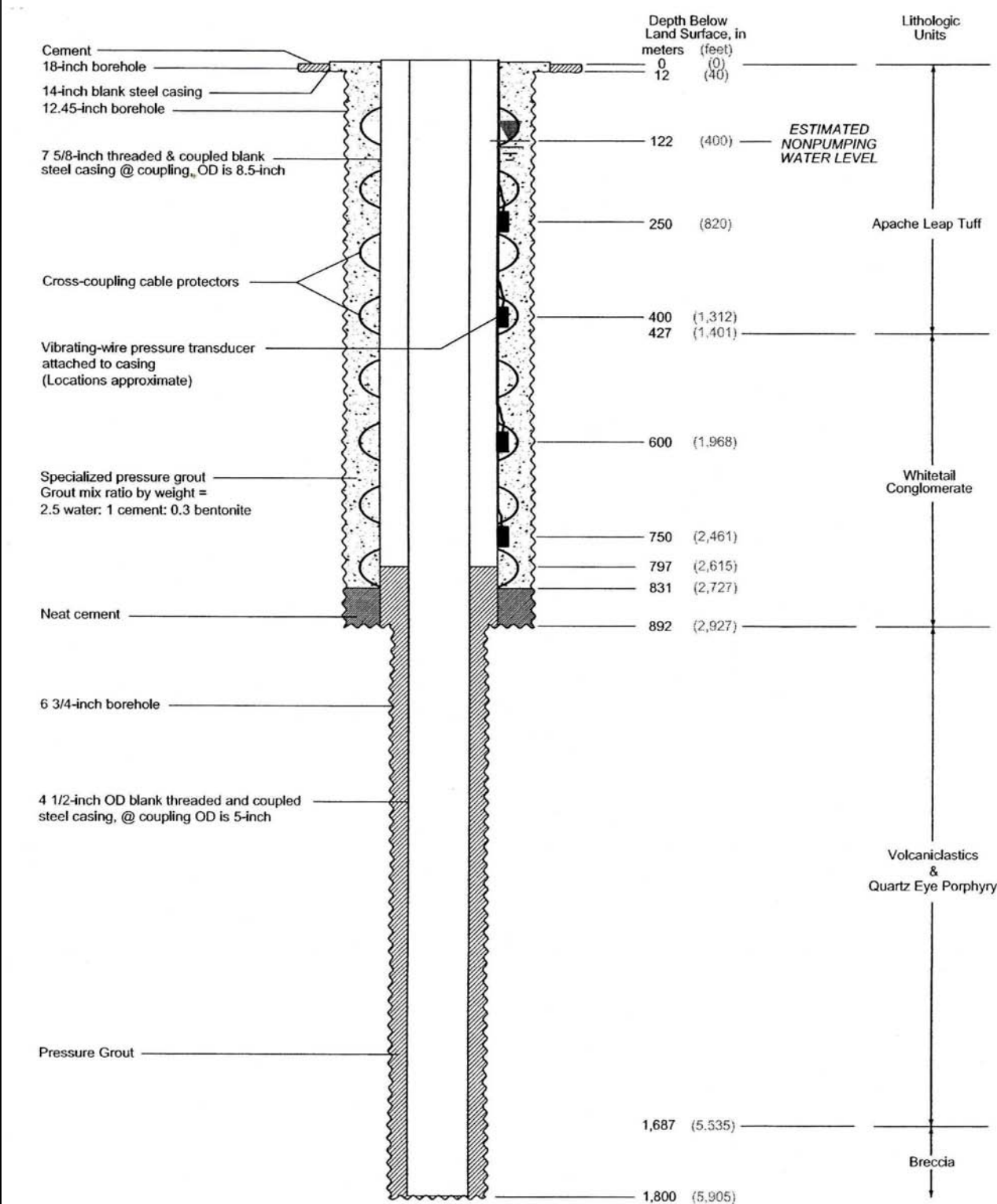
3.4 HYDROLOGIC TESTING SEQUENCE

After drilling boreholes to total depth, geological and geophysical logging (e.g., televiewer, resistivity, and sonic) would be conducted to identify zones of frequent rock fractures. After logging, open borehole airlift operations would be conducted for development of the borehole prior to casing and for preliminary indication of specific capacity (a measure of discharge rate and maximum groundwater level drawdown during pumping). Development is a term used to indicate procedures used by drillers for maximizing groundwater yield. Objectives of development are to repair well borehole damage caused by drilling processes by smearing clays on the borehole wall, to remove fines in the aquifer caused by drill cuttings, and to enhance the physical characteristics of the borehole to allow free movement of groundwater.

After completing open borehole airlift operations, blank and perforated steel casing would be installed to isolate fracture intervals. Annular bentonite seals would be installed between the borehole wall and blank steel casing at isolated fracture intervals and perforated casing strings would allow for hydraulic testing and monitoring of isolated fractured rock intervals. The hydraulic testing program would be preceded by composite testing of multiple fracture zones intersected within the well and detailed hydrologic characterization testing of isolated fracture zone(s) using inflatable packers.



SCHEMATIC DIAGRAM OF SHALLOW HYDROLOGIC MONITORING WELL



SCHEMATIC DIAGRAM OF DEEP HYDROGEOLOGY TESTING AND MONITORING WELL

**RESOLUTION COPPER MINING
PLAN OF OPERATIONS**

Schematic Diagram of Deep & Shallow
Groundwater Testing and Monitoring Wells

Table 4. A Typical Equipment List

Quantity	Equipment	Size
Exploratory Drilling Operations		
1	UDR-5000 Core Drill Rig or equivalent	10 ft × 58 ft
1	CP-50 Core Drill Rig or equivalent	10 ft × 58 ft
1	Schram 685 Rotary Drill Rig or equivalent	10 ft × 40 ft
1	LF-90 Rotary Drill Rig or equivalent	10 ft × 40 ft
2	Mud Tank (associated with active drill rigs)	9,500-gallon
2	Pipe Truck	10 × 35 ft
1	Water Storage Tank (associated with active drill rigs)	1,000-gallon
2	Generators associated with drill rigs	8 ft × 15 ft
1	Cat Bulldozer	D-9
1	Track Hoe	10 ft × 20 ft
1	Tracked Jaw Crusher	10 ft × 20 ft
1	Water Truck	10 ft × 30 ft
Deep Hydrologic Well Drilling		
1	UDR-5000 Core Drill Rig or equivalent	10 ft × 58 ft
1	UDR-1500 Core Drill Rig or equivalent	10 ft × 58 ft
1	Lang LM-200 Series Tophead Rotary Rig or equivalent	10 ft × 40 ft
1	Schram 685 Rotary Drill Rig or equivalent	10 ft × 40 ft
2	Mud Tank (associated with active drill rigs)	9,500-gallon
2	Pipe Truck	10 × 35 ft
1	Water Storage Tank (associated with active drill rigs)	1,000-gallon
2	Generators associated with drill rigs	8 ft × 15 ft
1	Cat Bulldozer	D-9
1	Track Hoe	10 ft × 20 ft
1	Tracked Jaw Crusher	10 ft × 20 ft
1	Water Truck	10 ft × 30 ft
Shallow Hydrologic Well Drilling		
1	Lang LM-200 Series Tophead Rotary Rig or equivalent	10 ft × 40 ft
2	Mud Tank (associated with active drill rigs)	9,500-gallon
2	Pipe Truck	10 × 35 ft
1	Heavy duty air compressor	
1	Water Storage Tank (associated with active drill rigs)	1,000-gallon

Table 4. A Typical Equipment List

Quantity	Equipment	Size
2	Generators associated with drill rigs	8 ft × 15 ft
1	Front End Loader	10 ft × 30 ft
1	Backhoe	10 ft × 20 ft
1	Tracked Jaw Crusher	10 ft × 20 ft
1	Water Truck	10 ft × 30 ft
Tunnel Characterization Boreholes		
1	Lang LM-200 Series Tophead Rotary Rig or equivalent	10 ft × 40 ft
1	UDR-1500 Core Drill Rig or equivalent	10 ft × 58 ft
1	Schram 685 Rotary Drill Rig or equivalent	10 ft × 40 ft
2	Mud Tank (associated with active drill rigs)	9,500-gallon
2	Pipe Truck	10 × 35 ft
1	Water Storage Tank (associated with active drill rigs)	1,000-gallon
2	Generators associated with drill rigs	8 ft × 15 ft
1	Cat Bulldozer	D-9
1	Track Hoe	10 ft × 20 ft
1	Tracked Jaw Crusher	10 ft × 20 ft
1	Water Truck	10 ft × 30 ft
Access Road Construction and Improvement		
1	Track Hoe	10 ft × 20 ft
1	Hammer Hoe	10 ft × 20 ft
1	Front End Loader	10 ft × 30 ft
1	Water Truck	10 ft × 30 ft

A normal test sequence for hydrologic testing would include the following elements:

Open Borehole Airlift Operations. These operations would provide: 1) development of the borehole to reduce impacts of drilling process; 2) specific capacity of the well prior to well construction; 3) an estimate of aquifer transmissivity based on constant-rate pumping and recovery analysis; and 4) an opportunity for collection of representative water samples for chemical and isotopic analysis.

Constant-Rate Pumping Tests (Drawdown). Drawdown data obtained during constant-rate pumping tests would be used to diagnostically evaluate operative aquifer conditions (e.g., leaky aquifer or unconfined aquifer), and detect the presence of nearby hydrogeologic features (e.g., boundaries such as faults or surface water). Pumping tests also would provide opportunities for the collection of representative water samples for detailed hydrochemical and isotopic analysis, which are useful for assessing the source and origin of groundwater and evaluating hydrologic connection with surface water sources.

Constant-Rate Pumping Tests (Recovery). Analysis of groundwater level recovery data would provide corroborative information (i.e., to drawdown response) during the constant-rate pumping test.

A packer assembly would be used to isolate fracture intervals in the well opposite perforated casing. The packer assembly would help determine vertical hydraulic gradient in the well, testing of isolated fracture sets, and obtaining groundwater samples to identify hydrochemistry. Normal procedures with the packer assembly would include:

Packer Inflation. The test tool would be positioned and packers would be inflated to isolate the test interval.

Pressure Stabilization. The down hole shut-in tool would be closed and pressure would be monitored to establish the static formation pressure.

Constant-Rate Pumping Test. A constant-rate pumping test would be conducted to determine aquifer parameters for the discrete fracture interval open in the well to pumping.

Prior to pumping tests, short-duration pre-tests would routinely be conducted. Pre-testing would be conducted primarily for additional well development and for determining pumping rates for the constant-rate discharge test.

3.5 TUNNEL CHARACTERIZATION BOREHOLES

3.5.1 Purpose and Location of Activity

A total of nine cored boreholes are proposed on Forest Service lands (Figure 2, Table 5) along two potential tunnel alignments. These boreholes are required to further define rock conditions along a planned conveyor tunnel alignment. All boreholes would be logged for geology and rock mass properties by a competent rock mechanics engineer, geological engineer, or engineering geologist.

Roadway improvements required to gain access to the tunnel characterization boreholes are identified in Figure 2 and Section 3.6.

Table 5. Tunnel Characterization Borehole Locations, Dimensions

Drill Site	Northing	Easting	Elevation (ft)	Legal Description	Tunnel Elevation	Depth (m)	Tilt	Acres of Disturbance	Claim Information
PVT-3	3685533	494897	1201	T1S, R13E, SE1/4, NE1/4, SE1/4 Section 29	900	301	-90	0.14	Oak 40A
PVT-4	3685900	496630	1286	T1S, R13E, SW1/4, SW1/4, NW1/4 Section 27	930	356	-90	0.15	Sun 68
PVT-5	3686712	497417	1329	T1S, R13E, NW1/4, NW1/4, NE1/4 Section 27	945	384	-90	0.20	Margaret 237
PVT-6	3687667	499292	1413	T1S, R13E, SE1/4, SW1/4, NE1/4 Section 23	960	453	-70	0.18	LD 1 Amended
PVT-7	3688152	500363	1478	T1S, R13E, NW1/4, NE1/4, NW1/4 Section 24	970	508	-90	0.30	Eric 293
PVT-8	3690714	502741	1440	T1S, R14E, NW1/4, NE1/4, SE1/4 Section 7	990	450	-90	0.24	Wiley Bill 37
PVT-9	3691544	503389	1490	T1S, R14E, NE1/4, NW1/4, NW1/4 Section 8	1000	490	-90	0.16	Wiley Bill 58
APV-6	3686990	499270	1437	T1S, R13E, NE1/4, SW1/4, SE1/4 Section 23	960	477	-90	0.14	LD 3 Amended
APV-8	3690549	499378	1440	T1S, R13E, SE1/4, NW1/4, SE1/4 Section 11	970	470	-90	0.29	Eric 175

Note: Detailed claim information for the tunnel characterization boreholes and associated access is provided as Appendix C.

3.5.2 Tunnel Characterization Borehole Drilling

The tunnel characterization sites proposed as part of this Plan have an approximately 60- by 100-foot disturbance footprint. This disturbance footprint provides required space for the placement of drill pads and associated equipment and mud pits (Figure 3). Some sites would require additional area for grading and fill slopes. The estimated disturbance for the placement of the proposed tunnel characterization sites is 1.8 acres. The estimated disturbance area for each individual site is identified in Section 3.11 of this Plan.

Complete detailed descriptions of the proposed tunnel characterization activities are provided in Appendix A. Plan views of the proposed activities with 2007 aerial base mapping and 10-foot contour intervals are provided in Appendix B.

Boreholes would be core drilled to depths between 990 feet and 1,600 feet, depending on collar elevation (Table 5). Tunnel characterization boreholes would be core drilled with the same method used at the proposed exploration holes.

Temporary structures for equipment storage may be used by the drillers for shelter at each active rig (Figure 3). In addition, a portable toilet would be placed at each active drill site and would be serviced periodically by a contractor (Figure 3). A typical equipment list for the proposed tunnel characterization borehole drilling is provided in Section 3.4 of this Plan.

A description of each of the tunnel characterization drill sites follows.

Drill Site PVT-3. PVT-3 would be located on partially disturbed National Forest System Lands adjacent to, but outside, the northern boundary of the Oak Flat Withdrawal Area in Township 1 South, Range 13 East, in the SE¼, NE¼, SE¼ of Section 29. Geotechnical borehole PVT-3A would be drilled at PVT-3 and the disturbance from construction of this drill site would be approximately 0.14 acre. PVT-3 would be accessed from Magma Mine Road and an existing user-created road. No improvements are proposed for these access roads.

Drill Site PVT-4. This drill site would be located on partially disturbed National Forest System Lands northeast of Oak Flat and south of U.S. Highway 60 in Township 1 South, Range 13 East, in the SW¼, SW¼, NW¼ of Section 27. Geotechnical borehole PVT-4A would be drilled at PVT-4 and the disturbance from construction of this drill site would be approximately 0.15 acre. PVT-4 would be accessed via Magma Mine Road by turning east on FR 2438 in the Oak Flat Withdrawal Area and then north onto an existing user-created road. No improvements are proposed for these roads.

Drill Site PVT-5. This drill site would be located on partially disturbed National Forest System Lands east of U.S. Highway 60 and Devils Canyon in Township 1 South, Range 13 East, in the NW¼, NW¼, NE¼ of Section 27. Geotechnical borehole PVT-5A would be drilled at PVT-5 and the disturbance from construction of this drill site would be approximately 0.20 acre. PVT-5 would be accessed from U.S. Highway 60 by turning east on FR 2466 then turning west on FR 2461 to a proposed new access road. Approximately 0.9 mile of FR 2461 would require improvements and approximately 330 feet of new access road would need to be constructed.

Drill Site PVT-6. This drill site would be located on previously disturbed National Forest System Lands southeast of U.S. Highway 60 and approximately 1.25 miles east of Devils Canyon in Township 1 South, Range 13 East, in the SE¼, SW¼, NE¼ of Section 23. Geotechnical borehole PVT-6A would be drilled at PVT-6 and the disturbance from construction of this drill site would be approximately 0.18 acre. PVT-6 would be accessed from U.S. Highway 60 by turning east on FR 2466 then continuing east on FR 2463 where FR 2466 turns to the south. Approximately 0.5 mile of FR 2463 would require improvements to access this drill site.

Drill Site PVT-7. This drill site would be located on partially disturbed National Forest System Lands south of Pinal Ranch and approximately 0.5 mile south of U.S. Highway 60 in Township 1 South, Range 13 East, in the NW¼, NE¼, NW¼ of Section 24. Geotechnical borehole PVT-7A would be drilled at PVT-7 and the disturbance from construction of this drill site would be approximately 0.30 acre. Approximately 0.5 mile of improvements to FR 2511 would be required for access to this drill site. Drilling equipment would be transported to PVT-7 via FR 2511 and a newly constructed access road from privately owned lands on Pinal Ranch. If access through Pinal Ranch cannot be secured, equipment would be transported to the site via helicopter. Crew and service equipment would reach the site by helicopter or by an improved trail from privately owned lands on JI Ranch located west of PVT-7. The improved trail would achieve the management standards of a Level 1 Forest Service road and would be maintained for high-clearance four-wheel-drive vehicles moving at low speeds. The road would not be suitable for passenger cars and would be closed to the public. The impacts associated with helipad construction, if

necessary, are included in the calculation of impacts for improvements along FR 2511. If access is secured from Pinal Ranch, approximately 0.21 acre would be impacted on National Forest System Lands through the construction of an access road to FR 2511. If the trail from JI Ranch is improved for crew and service equipment access, approximately 0.40 acre would be impacted on National Forest System Lands.

Drill Site PVT-8. This drill site would be located on disturbed National Forest System Lands east of U.S. Highway 60 and northeast of Top of the World at the intersection of FR 320 and FR 2577 in Township 1 South, Range 14 East, in the NW $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 7. Geotechnical borehole PVT-8A would be drilled at PVT-8 and the disturbance from construction of this drill site would be approximately 0.24 acre. PVT-8 would be accessed from U.S. Highway 60 by turning east on FR 320. Approximately 0.59 mile of FR 320 would require improvement to provide access for equipment to this drill site.

Drill Site PVT-9. PVT-9 would be located on previously disturbed National Forest System Lands south of U.S. Highway 60 and northeast of Top of the World in Township 1 South, Range 14 East, in the NE $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$ of Section 8. Geotechnical borehole PVT-9A would be drilled at PVT-9 and the disturbance from construction of this drill site would be approximately 0.16 acre. PVT-9 would be accessed from U.S. Highway 60 turning south on an existing user-created road. Approximately 0.1 mile of this short road would require minor improvements.

Drill Site APV-6. This drill site would be located on previously disturbed National Forest System Lands approximately 1.25 miles east of Devils Canyon in Township 1 South, Range 13 East, in the NE $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 23. Geotechnical borehole APV-6A would be drilled at APV-6 and the disturbance from construction of this drill site would be approximately 0.14 acre. APV-6 would be accessed from U.S. Highway 60 by turning east on FR 2466 and then turning west on FR 2505. Approximately 0.5 mile of FR 2505 and the intersection of FR 2505 and FR 2466 would require improvements to gain access to this drill site.

Drill Site APV-8. This drill site would be located on previously disturbed National Forest System Lands north of U.S. Highway 60 and east of Devils Canyon in Township 1 South, Range 13 East, in the SE $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ of Section 11. A geotechnical borehole, APV-8A, would be drilled at APV-8 and the disturbance from construction of this drill site would be 0.29 acre. APV-8 would be accessed from U.S. Highway 60 by turning north on FR 898, crossing a portion of privately held lands, and then east on an existing user-created road. Approximately 0.7 mile of FR 898 and 0.1 mile of the user-created road would require improvements to access this drill site.

3.6 ACCESS

Access to proposed drilling operations would generally be gained from either US 60 or S.R. 177 through Forest Service lands. Within Forest Service lands, approximately 16.67 miles (29.51 acres) of existing road are proposed for improvement (Table 6.1). Approximately 1.37 miles (3.04 acres) of new access road are planned on Forest Service, State, and private lands (Tables 6.2 and 6.3), of which 1.23 miles (2.69 acres) are on Forest Service lands. Access Route 4B will be constructed to allow access to drill sites 4W, 4E, OF-1, and OF-3 and will result in approximately 2.45 total acres (1.04 miles) of disturbance, of which 0.35 acre (0.14 mile) is on State Trust lands.

Table 6.1. Proposed Improvements to Existing Roads within National Forest System Lands. All distances are distances within National Forest System Lands.

Level 1 (Basic Custodial Care) roads may be of any type, class or construction standard, and may be managed at any other maintenance level during the time they are open for traffic; however, while maintained at Level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

Level 2 (High-clearance Vehicles) roads are open for use by high-clearance vehicles and have low traffic volume and speed. These roads typically are local and connect collector roadways; have at-grade drainage treatment; are not subject to the requirements of the Highway Safety Act; do not provide surface smoothness; and are not suitable for passenger cars.

Level 3 (Suitable for Passenger Cars) roads typically have low speed and a single lane with turn-outs and spot surfacing. These roads have low to moderate traffic volume, typically connect to arterial and collector roads, and may include some dispersed recreation roads.

Level 4 (Moderate Degree of User Comfort) roads provide a moderate degree of user comfort and convenience at moderate travel speeds. These roads typically may connect to county roads; are usually considered collector roads; can be double-lane, aggregate-surfaced and dust-abated; and have culverts for drainage treatment.

Level 5 (High Degree of User Comfort) roads provide a high degree of user comfort and convenience. These roads provide the highest traffic volume and speeds, are usually arterial or collector roadways, and are normally double-lane, paved facilities. Some may be aggregate-surfaced and dust-abated.

Road	Forest Service Road Maintenance Level ^{1, 2}	Planned Road Condition During Pre-feasibility Plan of Operations Implementation ²	Area of Disturbance ^{4, 5}	
			Linear Feet	Acres
FR 315	Level 4 – Moderate Degree of User Comfort	Repair and maintain road segments that currently meet the Moderate Degree of User Comfort standard if they are damaged or adversely affected by planned activities and improve road segments where their condition is not sufficient to provide required access. When necessary, degraded road segments would be brought up to a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	18,966	5.05
FR 320	Level 2 – High-clearance Vehicles	Repair and maintain road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	3,244	0.45
FR 898	Level 2 – High-clearance Vehicles	Repair and maintain road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	3,011	0.76
Existing Road from FR 898 to APV-8	User-created ³	Improve road segment to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	548	0.08

Table 6.1. Proposed Improvements to Existing Roads within National Forest System Lands (cont.)

Road	Forest Service Road Maintenance Level ^{1,2}	Planned Road Condition During Pre-feasibility Plan of Operations Implementation ²	Area of Disturbance ^{4,5}	
			Linear Feet	Acres
FR 2261	Level 2 – High-clearance Vehicles	Repair and maintain road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	1,527	0.55
FR 2440	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	6,515	4.36
FR 2461	Level 2 – High-clearance Vehicles	Repair and maintain road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	1,971	1.27
Existing Extension of 2461	User-created ³	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,562	0.59
FR 2463	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,454	0.51
FR 2466 (and small portion of FR 2467)	Level 2 – High-clearance Vehicles	Repair and maintain road segments that currently meet the Level 2 maintenance standard if they are damaged or adversely affected by planned activities and improve road segments where this current condition is not met to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	22,234	8.17
FR 2469	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	8,679	3.59
FR 2505	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,543	0.48
FR 2511	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,634	1.06
FR 3139	Level 1 – Basic Custodial Care	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	2,229	0.76
FR 3153	Level 2 – High-clearance Vehicles	Improve road segments to generally achieve a Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	351	0.18

Table 6.1. Proposed Improvements to Existing Roads within National Forest System Lands (cont.)

Road	Forest Service Road Maintenance Level ^{1,2}	Planned Road Condition During Pre-feasibility Plan of Operations Implementation ²	Area of Disturbance ^{4,5}	
			Linear Feet	Acres
Existing Road from FR 315 to H-E	User-created ³	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	3,733	0.65
Existing Road from FR 2440 to QC-04	User-created ³	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	451	0.06
Existing Road from FR 2466 to H-F	User-created ³	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	3,440	0.73
Existing Road from U.S. Highway 60 to PVT-9	User-created ³	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	345	0.13
Existing Road from Magma Mine Road to Private Holding	User-created ³	Improve road segments to generally achieve the Level 2 maintenance standard suitable to provide access for the equipment required to accomplish planned activities.	561	0.08
Total			87,998	29.51

¹ Data provided as a shape file by the TNF on December 4, 2007 (Globerd_rds.shp). These are transportation management designations and do not necessarily reflect the current condition or drivability of the specific road segment.

² Forest Service Transportation Management Maintenance Standards are defined in FSH 7709.58, 10, 12.3.

³ User-created is the Forest Service terminology for roads that were not created and maintained under the Forest Road management plan. In all cases these roads existed prior to Resolution activities in the region.

⁴ These values reflect an estimate of the linear distance of Forest Roads that would be used to access the PAA. As indicated on Sheets 1 to 55 in Appendix B of the Plan, various levels of improvement would be needed along these road segments. Improvements would range from minor dressing and maintenance activities to relatively extensive reconstruction to achieve the desired condition required to provide access for Pre-feasibility Activities. These reconstruction and maintenance levels are referred to as Levels A, B, and C.

⁵ In addition to the proposed access improvements on the TNF, approximately 5.3 miles of existing roads would be improved on State Trust and privately owned lands to access proposed activities on National Forest System Lands.

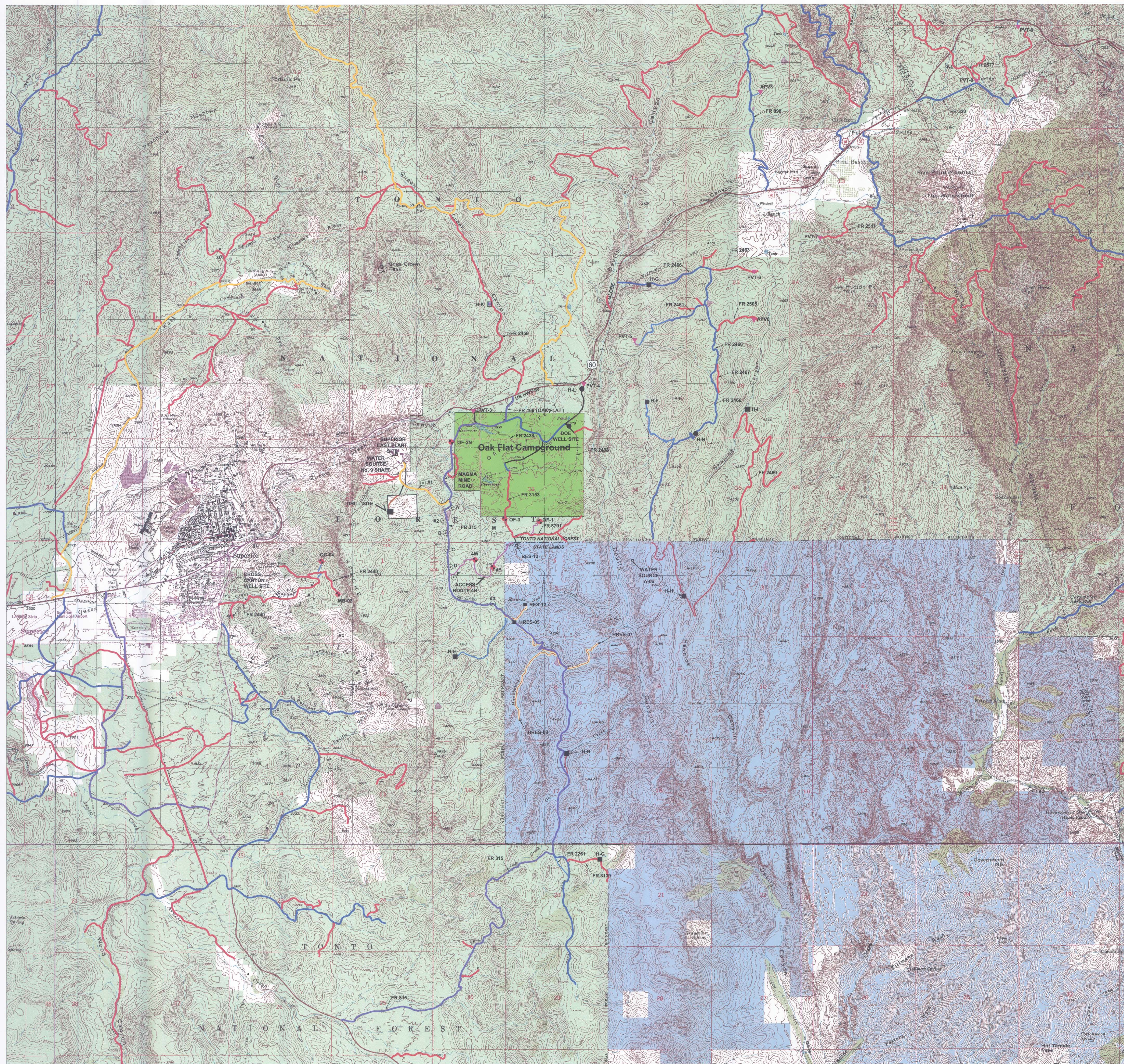
Table 6.2. New Access Roads within Tonto National Forest

Road	Road Management Classification	Planned Road Condition During Pre-feasibility Plan of Operation Activities	Length/Area of Disturbance	
			Feet	Square Feet
Two New Access Roads from FR 2458 to Drill Site H-K	No Classification	Improve road segments to generally achieve the High-clearance Vehicles management standard suitable for the equipment required to accomplish planned activities.	177	2,655
	No Classification	Improve road segments to generally achieve the High-clearance Vehicles management standard suitable for the equipment required to accomplish planned activities.	151	2,265
New Access from FR 2461 to Drill Site PVT-5	No Classification	Improve road segments to generally achieve the High-clearance Vehicles management standard suitable for the equipment required to accomplish planned activities.	330	4,950
New Access from FR 3153 to Drill Site OF-1	No Classification	Improve road segments to generally achieve the High-clearance Vehicles management standard suitable for the equipment required to accomplish planned activities.	1,069	16,035
New Access Road 4B	No Classification	Improve road segments to generally achieve the High-clearance Vehicles management standard suitable for the equipment required to accomplish planned activities.	4,757	91,476
Total Length of New Access			6,484 (1.23 miles)	117,381 (2.69 acres)

In addition, approximately 8.23 miles of the proposed access road improvements would traverse state and privately owned lands that are adjacent to Tonto National Forest (Table 6.3). The current Forest Service Road Maintenance Levels within the proposed activity areas are shown on Figure 5.

Table 6.3. Impacts Associated with Access Road Improvements on State Trust and Privately Held Lands

Activity Name	Disturbance					Total Acres
	Level A		Level B		Level C Acres	
	Linear Feet	Square Feet	Linear Feet	Square Feet		
FR 315	5,801	34,807	5,502	55,024	0.06	2.13
Extension of FR 898	3,359	20,156	0	0	1.05	1.51
Extension of FR 2440	2,179	13,072	0	0	0.67	0.97
Extension of FR 2466 and FR 2469	8,310	49,859	2,965	29,651	1.79	3.62
New Access Road 4B	0	0	0	0	0.35	0.35
Total	19,649	117,894	8,467	85,675	3.92	8.58



LEGEND

- Exploration Drill Site
- Tunnel Characterization Bore Hole
- Deep Hydrogeology Testing / Monitor Well
- Shallow Hydrogeology Well Site
- Previously Approved Drill Site
- Existing Access Road (To Be Improved)
- New Road
- Other Roadway Improvements
- Completed State Land Roadway Improvements
- Existing Road (To Be Maintained)
- Tonto National Forest
- State Trust Lands

Forest Service Transportation Management Maintenance Levels:

- Level 1-Basic Custodial Care (closed)
- Level 2-High Clearance Vehicles
- Level 3-Suitable for Passenger Cars
- Level 4-Moderate Degree of User Comfort
- Level 5- High Degree of User Comfort (Not found on this map)

Forest Service Transportation Management Maintenance Levels are defined in FSH 7708.58, 10, 12, 3:

Level 1 (Basic Custodial Care), roads may be of any type, class or construction standard, and may be managed at any other maintenance level during the time they are open for traffic; however, while maintained at Level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

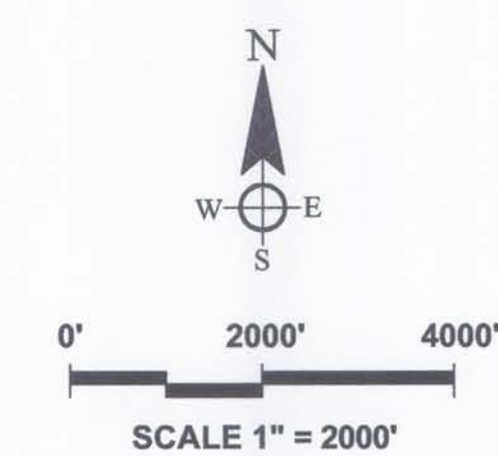
Level 2 (High Clearance Vehicles), roads are open for use by high clearance vehicles and have low traffic volume and speed. These roads typically are local and connect collector roadways, have at-grade drainage treatment, are not subject to the requirements of the Highway Safety Act, do not provide surface smoothness, and are not suitable for passenger cars.

Level 3 (Suitable for Passenger Cars), roads typically have low speed and a single lane with turnouts and spot surfacing. These roads have low to moderate traffic volume, typically connect to arterial and collector roads, and may include some dispersed recreation roads.

Level 4 (Moderate Degree of User Comfort), roads provide a moderate degree of user comfort and convenience at moderate travel speeds. These roads typically may connect to county roads, are usually considered collector roads, can be double-lane, aggregate surfaced, and dust-abated, and can have culverts for drainage treatment.

Level 5 (High Degree of User Comfort), roads provide a high degree of user comfort and convenience. These roads provide the highest traffic volume and speeds, are usually arterial or collector roadways, and are normally double-lane, paved facilities. Some may be aggregate surfaced and dust-abated.

Note: No Convert Use or Decommission Roads occur within the view of this map.



Pinal County, Arizona
Superior, Pinal Ranch &
Teapot Mountain 7.5'
USGS Maps

WestLand Resources Inc.
Engineering and Environmental Consultants

RESOLUTION COPPER MINING
PLAN OF OPERATIONS

LOCATION MAP WITH FOREST
SERVICE ROAD CLASSIFICATIONS
Figure 5

Since the terrain is rocky within the proposed activity areas, boulders may narrowly constrict some portions of the road or the curve radii may be too small for the long drill rigs. The use of dozers, hammer-hoes, or track hoes would be required to modify these constrictions. Access road improvements would be minimized to the greatest extent practicable. Based on the current understanding of conditions along the proposed access routes, cuts and fills would be balanced onsite in a manner that minimizes disturbance. Complete detailed descriptions of proposed access within Forest Service lands are provided in Appendix A and plan views of proposed access route improvements with 2007 aerial base mapping are provided in Appendix B. Access to PVT-7 is either via private land or, if private land access is not possible, by helicopter. A helicopter-supported scenario would be from along FR 2511 (Figure 2).

Public access of proposed activity areas would be managed by crew members during roadway construction and improvements. To the extent practicable, roadway activities proposed as part of this Plan would be conducted in a manner that would allow continued use by the public. Although no permanent road closures are planned, temporary road closures causing limited access may occur for short periods. Traffic-control signage would be posted to identify, when possible, detour routes for public access. To the extent practicable, turn-outs would be provided along roadways to allow the public to pass construction areas. All closures, restrictions, and signing for access management would comply with the guidelines in the Manual on Uniform Traffic Control Devices (FSM 7103.3) for signs and markers. The contractor will provide a traffic management plan and coordinate with the Department of Public Safety for access to Forest roads from any state or federal highway to ensure public safety.

3.7 MAGMA MINE ROAD MAINTENANCE

Magma Mine Road is an existing paved road with deteriorating pavement. Road repairs and maintenance will occur to allow continuation of ongoing activities. In accordance with Mitigation Measure EA-23, Resolution will be responsible for the maintenance and care of Magma Mine Road. In order to improve visibility for the transport of heavy equipment along this roadway, the vegetation immediately adjacent to the paved roadway would be cleared and brushed regularly, as has been the practice in prior years. A Maintenance and Care Plan for Magma Mine Road is located in Appendix H.

3.8 EQUIPMENT REQUIRED FOR PROPOSED OPERATIONS

A list of equipment is displayed in Table 4 (page 19) (similar equipment may be used, depending on which drilling contractor is selected). Equipment lists for each individual site are also provided in Appendix A.

3.9 WATER MANAGEMENT

The Pre-feasibility Activities require water for dust suppression and drilling processes. Water for these activities would be obtained from the following sources:

- Superior East Plant Site No. 9 Shaft (ADWR #59-524492)
- Superior West Plant Site
- Well A-06 (ADWR #55-214967) on State Trust lands (T2S, R13E, NW1/4 of Section 4)
- Arizona Water Company

Drill sites are served or will be served by:

- 2-inch above-ground polyethylene waterlines from the No. 9 Shaft, or
- Tank and water truck combinations filled with water from the No. 9 Shaft, or
- Tank and water truck combinations filled with water from the Superior West Plant Site, or
- Tank and water truck combinations filled with water purchased from the Arizona Water Company, or
- From water pumped from Well A-06.

Within the Phoenix Active Management Area, Resolution will monitor and report its industrial water uses annually to the ADWR in accordance with their established reporting requirements.

The quantity of water needed for Pre-feasibility Activities varies by activity type. The shallow groundwater testing and monitoring wells would use an air drill, and water would only be required for dust control of cycloned rock fragments from drilling activities and other miscellaneous site needs. At the beginning of each drilling cycle for shallow groundwater testing and monitoring wells, approximately 500 to 2,000 gallons per day of water will be required for drilling. After two to three days of drilling, water will be recycled and supplemental water will not be required. The deep groundwater testing and monitoring wells, the geotechnical boreholes, and the exploration drill holes would require both rotary and core drilling techniques and would use, on average, 6,000 gallons of water per day at each active drill site. This water would be provided by water “made”² during the drilling process and supplemented with water from one of the appropriate water sources described above. On average, one 5,000-gallon water-truck trip per day would be required to support an active drill rig. During peak periods of Pre-feasibility Activities, eight active drill rigs plus water for dust control will result in an estimated 0.42 acre-feet per day of water being used by the Pre-feasibility Activities.

Drill rigs use drilling mud to cool and lubricate the rods and diamond bit and to help carry cuttings to the surface. Drilling mud would be collected in large storage tanks (9,500- to 22,000-gallon capacities) and/or in settling pits constructed within the footprint of each drill site. The mud tanks and/or settling pits would be used during drilling operations to hold drilling mud that is re-circulated down the borehole. Resolution would collect excess cuttings and drilling mud generated during drilling activities and remove them from National Forest System Lands. These materials would be disposed of in accordance with applicable Arizona law.

If excessive mud is produced, the mud pits may be pumped out and the contents properly disposed of in accordance with applicable Arizona law. Because of the in-place system of evaporation and infiltration pits, any discharges would be in compliance with the Arizona Department of Environmental Quality’s (ADEQ’s) Arizona Pollutant Discharge Elimination System (AZPDES) De Minimus General Permit for well development activities. Water bars and straw bales would be used as needed to prevent erosion.

² Minor amounts of water generated during drilling activities.

The Forest Service would be provided with any information gathered concerning the levels or formations where groundwater is encountered, and flow rates if known or determined.

3.10 BEST MANAGEMENT PRACTICES

A construction Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the regulations of the AZPDES Stormwater Construction General Permit (CGP) is provided in Appendix F. Sediment control features, such as silt fencing, would be used at the downgradient toe of fill slopes in order to catch sediment and keep it from entering drainages. Road engineering would avoid drainage channel bottoms to the greatest extent possible. Water bars would be provided to minimize erosion on steep sections of roadway. If maintenance is necessary, personnel may periodically grade the road surface. The cross slope, stormwater system design, erosion-control features, and limited maintenance constitute Best Management Practices (BMPs) for the roadways.

The drilling operations would be conducted around-the-clock and notices would be posted along the access road in accordance with Forest Service guidelines.

For fire prevention measures, the Resolution 2007 Fire Restriction Response Plan (Appendix D) would be posted and implemented at each drill site. Resolution employees and their contractors would take care to always thoroughly extinguish all smoking materials. Litter would be cleared from around any ignition sources.

3.11 TOTAL ESTIMATED DISTURBANCE ACRES

The total area of construction activity, including existing road surfaces, is approximately 83 acres. Proposed new construction disturbance would occur on a total of 46.82 acres, of which 37.67 acres are on National Forest System Lands, 6.49 acres are on State Trust lands, and 2.66 acres are on privately held lands.

An estimated 37.67 acres on National Forest System Lands would be disturbed for proposed drilling operations, new access roads, and existing access road improvements (Table 7). The proposed new activities would require disturbance of approximately 5.47 acres for the placement of drill pads on new and existing drill sites, approximately 0.59 acre for the construction of approximately 0.33 mile of new access road segments, approximately 2.1 acres associated with the construction of a new access road (4b), and approximately 29.51 acres for the improvement of approximately 16.67 miles of existing roads for access. Areas of disturbance provided here are based on conservative estimates of the maximum area that would be required for the proposed activities.

Table 7. Estimated Disturbance Acres

	Disturbance Area	Description of Disturbance	Estimated Acres of Disturbance
National Forest System Lands			
Drill Sites	QC-04	80-ft × 100-ft drill pad plus grading/fill area	0.26
	MB-03	80-ft × 100-ft drill pad plus grading/fill area	0.25
	OF-1	80-ft × 100-ft drill pad plus grading/fill area	0.18
	OF-2N	80-ft × 100-ft drill pad plus grading/fill area	0.25
	OF-3	80-ft × 100-ft drill pad plus grading/fill area	0.23
	4W	80-ft × 100-ft drill pad plus grading/fill area	0.29
	4E	80-ft × 100-ft drill pad plus grading/fill area	0.35
Subtotal			1.81
Deep Hydrogeology Testing/Monitor Wells	H-L	80-ft × 100-ft drill pad plus grading/fill area	0.15
	H-K	80-ft × 100-ft drill pad plus grading/fill area	0.3
	H-N	80-ft × 100-ft drill pad plus grading/fill area	0.35
Shallow Hydrologic Monitor Wells	H-C	80-ft × 100-ft drill pad plus grading/fill area	0.27
	H-E	80-ft × 100-ft drill pad plus grading/fill area	0.16
	H-F	80-ft × 100-ft drill pad plus grading/fill area	0.25
	H-G	80-ft × 100-ft drill pad plus grading/fill area	0.20
	H-I	80-ft × 100-ft drill pad plus grading/fill area	0.18
	H-K	80-ft × 100-ft drill pad plus grading/fill area	*0.00
Subtotal			1.86
Conveyor Tunnel Boreholes	PVT-3	60-ft × 100-ft drill pad plus grading/fill area	0.14
	PVT-4	60-ft × 100-ft drill pad plus grading/fill area	0.15
	PVT-5	60-ft × 100-ft drill pad plus grading/fill area	0.20
	PVT-6	60-ft × 100-ft drill pad plus grading/fill area	0.18
	PVT-7	60-ft × 100-ft drill pad plus grading/fill area	0.30
	PVT-8	60-ft × 100-ft drill pad plus grading/fill area	0.24
	PVT-9	60-ft × 100-ft drill pad plus grading/fill area	0.16
	APV-6	60-ft × 100-ft drill pad plus grading/fill area	0.14
	APV-8	60-ft × 100-ft drill pad plus grading/fill area	0.29
Subtotal			1.8
Existing Access Road Improvements**		Road dressing/improvement along 16.67 miles	29.51
New Access Road ***		Grading/clearing for new road construction	2.69
State Trust and Privately Held Lands			
Drill Sites	H-B	80-ft × 100-ft drill pad plus grading/fill area	0.22
	H-H	80-ft × 100-ft drill pad plus grading/fill area	0.17
	Cross Canyon	80-ft × 100-ft drill pad plus grading/fill area	0.18
	Subtotal		0.57
Existing Access Road Improvements		FR 315, FR 898, FR 2440, FR 2466/2469****	8.23
New Access Road		Portion of 4b on State Trust lands	0.35
Total Disturbance			46.82

* Site H-K has both a shallow and a deep hydrogeologic testing/monitoring well; therefore, the acreage is counted only once in the deep well category.

** Roadway improvements would be conducted along portions of approximately 16.67 miles of existing access roads. The maximum area of this disturbance for existing road improvements was estimated using roadway profiles created with 2007 aerial imagery and 10-foot contour intervals.

*** The maximum area of disturbance for 0.3 mile of new road segments and Access Road 4b was estimated using roadway profiles created with 2007 aerial imagery and a maximum disturbance width of 15 feet.

**** Extension of Forest Service roads on State Trust and privately held lands.

3.12 SCHEDULE OF ACTIVITIES

Activities would be scheduled generally based on their proximity to major access routes that serve the area, US Highway 60, S.R. 177, and Magma Mine Road (Table 8). The proposed schedule for phasing and abandonment of each site and associated access routes is provided in Appendix A. This schedule is based on the current understanding of the planned activities.

Table 8. Pre-feasibility Activities Proposed Duration and Authorization Period. Note that reclamation activities would commence at the end of the authorization period.

Pre-Feasibility Activity	Drill Site Activity and Occupancy Periods	Authorization Period
Exploration Drilling (OF-1, OF-2N, OF-3, MB-03, QC-04, 4E, and 4W)	Continuous occupancy throughout the authorization period for all exploration drill sites with multiple re-occupancy allowed. However, occupancy for MB-03 and QC-04 is proposed for one continuous period that would not exceed 9 months.	December 31, 2014
Exploration Drilling (A, B, C, D, F, M, #1, #2, #3) (previously authorized)	Continuous occupancy throughout the authorization period for all exploration drill sites with multiple re-occupancy allowed.	December 31, 2014
Deep Groundwater Testing and Monitoring Well Construction (H-L, H-K, H-N)	Approximately 6 to 9 weeks of drilling activity during a maximum 9-month continuous occupancy period for each well.	December 31, 2014
Shallow Groundwater Testing and Monitoring Well Construction (H-C, H-E, H-F, H-G, H-I, H-K)	Approximately 6 to 9 weeks of drilling activity during a maximum 9-month occupancy period for each well.	December 31, 2014
Tunnel Characterization Geotechnical Borehole Drilling (PVT-3, PVT-4, PVT-5, PVT-6, PVT-7, PVT-8, PVT-9, APV-6, APV-8)	Approximately 3 to 5 weeks of drilling activity during a maximum 6-month occupancy period for each geotechnical borehole.	December 31, 2016
Groundwater Testing and Monitoring Activities	Throughout the authorization period for testing and monitoring purposes.	December 31, 2025
Deep and shallow groundwater testing (A, F, M, #2, DOE) (previously authorized)	Throughout the authorization period for testing and monitoring purposes.	December 31, 2025
Road and Drill Site Construction for Exploration and Deep and Shallow Groundwater Monitoring Wells	N/A	December 31, 2014
Road and Drill Site Construction for Tunnel Characterization Boreholes	N/A	December 31, 2016
Road Maintenance for Groundwater Testing and Monitoring	N/A	December 31, 2025

4.0 ENVIRONMENTAL PROTECTION MEASURES

RCM has identified certain environmental protection measures as part of its proposed action. These are presented below under the applicable heading. In addition, and in response to public and agency comments on the Pre-feasibility Activities and Forest Service review and evaluation of project impacts, a list of mitigation and monitoring measures was developed which is herein incorporated into the proposed action. The Environmental Assessment (EA) reference number is shown for each of the mitigation and monitoring measures. All mitigation and monitoring measures from the EA and the Decision Notice are in Appendix I.

4.1 AIR QUALITY

Minimal impacts to air quality are expected due to light travel along the existing and newly constructed dirt roads. The following practices would reduce impacts:

- Dust-suppression techniques, such as applying water and DusTreat DC9112 (Appendix E) during road construction activities, would be used.
- Water would be used in the drilling process at all times, nearly eliminating any dust production from the drill.
- Service vehicles would drive slowly on the dirt roads and adjust their speed depending on conditions to avoid creating a dust tail.

Mitigation measures developed in the EA to address concerns about air quality are as follows:

- EA-1) **Dust Emissions along Access Roads.** To minimize dust, unpaved roads will be watered as necessary during periods of regular use by RCM employees or contractors. If dust problems are noted, a watering schedule will be developed and implemented by RCM, or RCM will propose a dust palliative program for review and approval by the Forest Service; and upon approval will implement that program. In addition, as necessary, RCM will minimize land disturbance during site preparations, cover trucks when hauling any soil, minimize soil track-out by washing or cleaning truck wheels before leaving construction sites, create windbreaks, and revegetate disturbed land not used.
- EA-2) **Air Emissions at Drill Sites.** Drill rigs and other mobile and stationary sources of air emissions at drill sites must be operated consistently with past practices to limit oxides of nitrogen emissions from Pre-feasibility Activities to peak estimated emission levels. Using readily available data, RCM will document its conformance with this requirement annually to the Forest Service.
- EA-3) **RCM Vehicle Traffic.** To the extent practical and consistent with the efficient and safe implementation of Pre-feasibility Activities, RCM will reduce vehicle traffic on National Forest System Lands.

4.2 WATER QUALITY

Water would come into contact with bentonite drilling mud and ground rock at depth. It would be treated after it is pumped back out of the hole by evaporation and by allowing the solids to settle out in excavated mud pits at each drill site. If excess material cannot be managed in the mud pits, the material would be pumped and disposed of at a permitted facility. Resolution will obtain authorization under the AZPDES De Minimus General Permit from ADEQ for well development activities.

Resolution has developed a construction SWPPP (Appendix F) to be implemented in accordance with state regulations. The effects of erosion and sediment discharge into offsite drainages would be mitigated through the use of water bars on the steeper sections of roadway and silt fences or other BMPs below fill slopes and elsewhere, as appropriate.

The strategic installation of bentonite seals and professional drilling practices would minimize potential impacts of the drilling program to the existing groundwater aquifer system.

Specific mitigation measures developed in the EA to address water quality concerns are as follows:

- EA-4) **Erosion Control.** Prior to the implementation of any ground-disturbing activities, a SWPPP will be provided to the Forest Service for review and approval (Appendix F).
- EA-5) **Water Quality.** RCM will provide the Forest Service with copies of all applicable water quality permits required for well development and testing prior to ground-disturbing activities at drill sites. Future compliance with Clean Water Act regulations and permitting requirements will be required of RCM throughout the life of the project. Additionally, RCM will be required to demonstrate compliance with State of Arizona Surface and Aquifer water quality standards for the four water sources identified for dust suppression on roads and drilling activities. A Notice of Intent (NOI) for De Minimus Discharge will be filed with ADEQ for all wells that will or may discharge to land surface. Typically, the NOI is submitted 30 days before completion of any well which will be used to conduct pumping tests or discharge during development. All of these activities will be completed under the required AZPDES De Minimus General Permit.
- EA-7) **Temporary and Interim Reclamation Measures.** RCM will be required to develop both temporary shutdown and interim reclamation plans for review and approval by the Forest Service. These plans will address periods of non-activity at exploration drill sites and partial reclamation of drill sites that are transitioning from active drilling phases to groundwater monitoring phases. Upon approval by the Forest Service, these plans will be incorporated into the Pre-feasibility Plan of Operations. Final reclamation will be conducted on all sites not selected for groundwater monitoring immediately after the completion of drilling activities.

4.3 SOLID WASTES

Solids from drilling (e.g., rock and drilling mud) may be pumped and disposed of in accordance with applicable Arizona law or may be allowed to dry out in the excavated pits. When all drilling is completed, the material contained in the pits would be removed from the Forest Service Lands and disposed of in accordance with applicable laws and regulations. During reclamation activities, these pits would be covered over, graded, and revegetated. All other wastes, such as paper and food waste, would be stored in garbage sacks and removed from the site each day. A portable toilet would be placed at each active drill site and serviced periodically by a contractor.

4.4 SCENIC VALUES /RECREATIONAL ACTIVITIES AT OAK FLAT

Scenic values would be protected by good housekeeping practices, minimizing disturbance, and implementation of timely reclamation.

Specific mitigation measures developed in the EA to address concerns regarding recreational activities on and around Oak Flat, including visual, noise, and safety, are as follows:

- EA-9) **Rock Riprap and Aggregate Surfacing Material.** Riprap or aggregate used during road preparation will be angular, and the color will match native soil. Non-native aggregate surfacing placed on drill sites will be removed or buried at closure.
- EA-14) **Well and Borehole Abandonment.** All wells and boreholes will be abandoned in accordance with State of Arizona well abandonment rules (Arizona Administrative Code Rule R12-15-816). Copies of Arizona Well Drill Reports, Well Log Forms, and Well Abandonment Completion Reports will be provided to the Forest Service annually.
- EA-15) **OF-2N Drilling Equipment.** The drilling equipment at the OF-2N drill site will be configured so that the power pack, or the engine of the drill if it is integral to the rig, is oriented away from the Boulder Campsite to minimize noise impacts to recreational users at that campsite.
- EA-16) **Visual Screening.** An assessment of the need for screening will be made by the Forest Service following drill setup. RCM will place camouflage netting materials on exploration drill sites OF-1 and OF-3 where they face the Oak Flat Campground if screening from existing boulders or vegetation is not sufficient. The material will be placed so that views of the drill equipment to a maximum height of 15 feet from the Oak Flat Withdrawal Area will be blocked.
- EA-17) **Existing Boulders at Drill Site OF-3.** At exploration drill site OF-3, RCM will leave the large boulders along the eastern edge of the proposed exploration drill pad nearest the road. These boulders could provide some screening from the road and facilitate reclamation efforts upon completion of exploration drilling at this location.

- EA-18) **Boulders at Drill Site H-N.** At drill site H-N, RCM will leave the large boulders along the eastern edge of this drill site nearest the road to provide some screening from the road and facilitate reclamation efforts.
- EA-19) **Rock Treatment.** Annually, RCM will work with the Forest Service to 1) identify any disturbed areas associated with the construction of new roads, improvements to existing roads, and construction of drill sites and 2) develop a rock staining (simulated desert varnish) implementation plan for the following year to reduce visual impacts.
- EA-20) **Nightlight Effects to Recreational Areas.** Lights used for night work and safety at drill sites will be directed or shielded to minimize nightlight effects to recreational areas.
- EA-21) **Boulders for Reclamation.** RCM will, to the extent practical, collect and set aside suitable boulders within the footprint of the proposed disturbance area for later use at drill sites or other reclamation activities. When used for closure and reclamation, salvaged boulders will be placed in a fashion or pattern that mimics boulder configuration in adjacent undisturbed areas.
- EA-22) **Administrative Traffic Controls.** RCM will work with the Forest Service to develop and implement an administrative access control plan to address safety concerns identified during public scoping. Specific items that could be addressed in the plan include, but may not be limited to: 1) signage, 2) training programs and documentation, 3) performance standards and specific policies to identify problems and discipline offenders, 4) plans for limiting traffic during periods of high-use public events, 5) plans to incorporate traffic safety issues into regular “lunch box” safety meetings on site, 6) a traffic monitor when and where appropriate, and 7) a collection agreement to fund Forest Service oversight of the traffic monitor. In response to concerns that were raised regarding possible effects to Tribal traditions and practices, RCM will ensure Tribal members will continue to have safe access to the area for those purposes during this project. RCM will be required to inform the San Carlos and White Mountain Apache Tribes of their scheduled activities and to coordinate with the Tribes to resolve any potential conflicts arising from needs for access for particular activities. The Forest Service is committed to continuing government-to-government consultation with Tribes related to the implementation of the exploratory drilling and facilitating RCM’s collaboration in the consultations.
- EA-23) **Magma Mine Road.** RCM will be responsible for the maintenance and care of Magma Mine Road.
- EA-24) **Roads within the Oak Flat Withdrawal Area.** With the incorporation of Alternative 5, the West Access Route 4b, RCM will restrict its use of roads within the Oak Flat Campground area to the Magma Mine Road, FR 2438, and those portions of Old U.S. Highway 60 that are used to access drill sites PVT-3, PVT-4, and H-L. Use of other roads within the Oak Flat Withdrawal Area will only be allowed for emergency vehicle access

and emergency evacuation from the drill sites south of the Oak Flat Campground area. RCM will also limit the time of year that drilling activities will occur at drill sites PVT-3, PVT-4, and H-L. Drilling activities at these sites will not be allowed from October 1 through March 31 of the following calendar year, the primary season of use at the Oak Flat Campground. There will be no seasonal limitation for access to groundwater testing and monitoring well sites for testing and monitoring purposes. Drill sites OF-1, OF-3, M, and RES-13 will not be reoccupied for drilling activities until this alternative access route is constructed.

EA-25) **Oak Flat Withdrawal Boundary.** RCM will conduct a cadastral survey at proposed drill sites adjacent to the Oak Flat Withdrawal Area to ensure that exploration activities do not encroach on the withdrawal lands. Annual drilling information will be provided to the Forest Service for exploration drill holes in the vicinity of the Oak Flat Withdrawal Area that is of sufficient detail to document that directional drilling activities do not extend under the Oak Flat Withdrawal Area.

EA-26) **Travel Management.** No roads are being proposed under this analysis for changes in designation. Travel management is expected to be complete before completion of the proposed actions of RCM. Those roads whose status is not changed through consideration under travel management will be returned to their original condition (or in the case of user-created roads, obliterated) when they are no longer in use for this project.

4.5 FISH AND WILDLIFE

A site-wide Biological Assessment and Evaluation (BA&E) was conducted for the affected areas and a species-specific survey for the Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*), a listed endangered species, was conducted over the proposed disturbance areas, with negative results.

All proposed activity areas were surveyed for the endangered Arizona hedgehog cactus in July and September 2007; January, February, and March 2008; and April and May 2010. This cactus occurs near portions of the proposed activities. Detailed plan views of proposed activities that identify Arizona hedgehog cacti locations with respect to ground-clearing activities were submitted to the Forest Service. All Arizona hedgehog cacti that occur in the proximity of ground-disturbing activities will be avoided. Clear-limit fencing and cactus guards will be used when necessary and a biological monitor will be present at the time clearing takes place.

Potential Sonoran Desert Tortoise shelters (a Forest Service Sensitive species that has the potential to occur in the areas of proposed activities) will be examined during fieldwork for the project. If encountered, the desert tortoise would be handled according to Arizona Game and Fish Department protocols. A copy of the tortoise protocol is on file at the drilling operations office located at the Resolution Core Facility.

Noxious weed surveys will be conducted within construction areas prior to ground disturbance and in accordance with Forest Service guidelines. Additional mitigation may be required depending on the results of the survey.

Open mud pits at unoccupied drill sites would be covered to prevent wildlife from becoming trapped. Drilling operations are anticipated to be continuous, however, and wildlife would not likely approach active rigs.

Specific mitigation measures developed in the EA to address concerns regarding impacts to wildlife are:

- EA-8) **Minimize Vehicle Safety Pull-out Size.** RCM will coordinate with the Forest Service prior to the construction of any safety pull-outs identified in the Pre-feasibility Plan of Operations to ensure that the size of the pull-out is minimized to the extent practical.
- EA-10) **Water Quantity.** If RCM wishes to use water from existing well A-06 for dust control or drilling activities, RCM must first prove, through appropriate pump test and monitoring procedures, that the pumping of this well will not affect nearby groundwater-dependent ecosystems.
- EA-12) **Fire Plan.** Fire restrictions and provisions of the Tonto National Forest Fire Plan will be incorporated into the Pre-feasibility Plan of Operations. This may include shutdown to comply with red-flag conditions unless measures to minimize the risk of fire are employed and agreed to prior to fire seasons.
- EA-13) **Noxious Weeds.** All seed mixes to be used in reclamation are required to be certified weed free of seeds listed on the TNF weed list. All equipment must be cleaned prior to use on the project. Cleaning will remove all dirt, plant parts, and material that could carry noxious weed seeds. Only equipment cleaned and inspected will be allowed to operate in the PAA, and RCM must provide an annual record of this activity to the Forest Service. Cleaning must occur off National Forest System Lands. This requirement does not apply to service vehicles used for transportation to and from the reclamation sites.

Specific mitigation measures developed in consultation with the US Fish and Wildlife Service (USFWS) in accordance with Section 7 of the Endangered Species Act regarding impacts to the Arizona hedgehog cactus, an endangered species, are:

- EA-11) **Arizona Hedgehog Cactus (AHC) Conservation Measures.** A number of mitigation measures have been developed by the Forest Service to further avoid, minimize, and mitigate for potential adverse impacts to AHC. Conservation measures incorporated into the Resolution Pre-feasibility Activities Plan of Operations Biological Assessment and Evaluation (August 2009) were refined during formal Section 7 consultation with the USFWS. These conservation measures are summarized below.

- **AHC Conservation Measure 1: Transplant.** Two AHC occur in close proximity to existing roads proposed for improvements as part of the Pre-feasibility Activities. The Forest Service has determined that these plants will need to be moved as a precautionary measure. A biological monitor, the Boyce Thompson Arboretum, or other Forest Service-approved entity shall transplant these AHC and any other AHC identified during the resurvey required by AHC Conservation Measure 2 that cannot be avoided during construction of the Pre-feasibility Activities. The transplanted plants will be relocated to the Boyce Thompson Arboretum. RCM shall be responsible for preparing an initial transplant report that documents the origin and new location of each transplanted AHC. Location information provided by RCM to the Forest Service shall include U.S. Geological Survey (USGS) map(s) that depict the origin and transplant location of each transplanted AHC, UTM coordinates of the origin and transplant locations in NAD 83, and a sketch of the transplant location with a photograph of the plant. If an AHC is relocated to the Boyce Thompson Arboretum, the origin location data will be provided in the transplant report, but detailed transplant location information, other than indicating its relocation to the Arboretum, will not be required. With the exception of the initial transplant data, RCM shall not be responsible for annual transplant monitoring or submittal of annual monitoring data for any AHC relocated to the Boyce Thompson Arboretum. If more than 20 AHC are impacted as a result of the proposed action (i.e., harmed, transplanted, or relocated to the Boyce Thompson Arboretum), the Forest Service will reinitiate consultation with the USFWS.
- **AHC Conservation Measure 2: Resurvey Prior to Construction, Road Repair, and Reclamation Activities.** The survey and monitoring protocols included in the EA (April 2009) shall be expanded to include all areas of the proposed Pre-feasibility Activities that contain AHC habitat or potential habitat for AHC. If the area of proposed construction has been surveyed within the past year as part of the required monitoring efforts (Conservation Measure 5), resurvey is not required prior to construction. Resurvey will be completed no later than one month prior to the planned implementation of road improvement activities authorized by the final Pre-feasibility Plan of Operations. In the event that the planned activities would result in potential unanticipated impacts to known AHC or may impact any newly identified AHC, the biological monitor in conjunction with the Forest Service and RCM will evaluate site-specific conditions and modify the proposed improvement activity to avoid impact. If avoidance is not possible, the AHC in question would be transplanted in accordance with AHC Conservation Measure 1 prior to the initiation of Pre-feasibility Activities in the vicinity of that AHC. Road repair refers to unplanned maintenance activities beyond routine maintenance and could include activities required to address natural erosion or other degradation that extends outside the road footprint.

- **AHC Conservation Measure 3: Measures to Protect Plants During Construction.** All AHC detected during resurvey will be clearly delineated with T-post and wire fencing to establish the limits of surface disturbance and protect the microhabitat associated with each plant. Fencing will be placed as generally depicted in the Pre-feasibility Plan of Operations. In circumstances where additional screening is determined necessary by the biological monitor or the Forest Service, additional screening or protection measures will be implemented. When appropriate, and as determined by the biological monitor and/or Forest Service, concrete jersey barriers or a suitable equivalent will be used where plants are close to proposed road construction activities and additional protection from vehicle traffic is warranted. A jersey barrier shall be placed in a manner that protects the microhabitat of the AHC to the extent practical without causing significant impact to safe vehicle passage.
- **AHC Conservation Measure 4: Coordination with Construction Crews.** Prior to the start of each phase of construction activities, the biological monitor shall inform construction crews of the presence and location of all known AHC proximate to the new proposed construction activities and the procedures required to avoid adverse impact. The biological monitor shall have the authority to stop work in the event that the monitor believes that an AHC would be affected by the action. Work shall not proceed until one or more of the mitigation measures outlined in AHC Conservation Measures 1 and 3 have been implemented to minimize adverse impacts to AHC to the maximum extent practicable.
- **AHC Conservation Measure 5: Long-Term Monitoring of AHC.** AHC within the Action Area³ will be monitored every 2 years beginning in 2010 through the period authorized for the Pre-feasibility Activities. Biennial monitoring surveys shall occur in April and May to coincide with the flowering period of the AHC. Biennial monitoring will occur along all roads proposed for improvement or used for the Pre-feasibility Activities that occur within AHC habitat or potential habitat. Biennial monitoring efforts will include resurveys of road corridors and drill site buffers within the Action Area following the procedures and protocols used for the original survey effort (WestLand 2009b). During surveys, special attention will be given to the condition of the road and the maintenance activities that are more than minimal that may require work outside the existing disturbance footprint such as erosion rills or larger erosional features that are forming. These areas shall be identified and the Forest Service and RCM shall develop specific actions to correct these conditions. The location of each AHC detected during biennial monitoring surveys shall be recorded on a USGS map or aerial photograph, UTM coordinates of each AHC or cluster of AHC will be recorded in NAD 83, and each AHC will be photographed and appropriately tagged in the field to facilitate long-term monitoring efforts. Data collected for each of the detected AHC

³ Action Area as defined in the Biological Opinion issued by the USFWS (USFWS 2010).

during the biennial monitoring surveys will include photographs, measurements of growth activity (tubercles and secondary stem production), measurement of plant size, assessment of plant health, evidence of reproduction, and an assessment of site integrity. One final monitoring survey will be required at the end of the authorization period for the proposed Pre-feasibility Activities or at the cessation of Pre-feasibility Activities by RCM, whichever occurs first. The biennial monitoring report will be submitted to the Forest Service by RCM on or before December 1 of each monitoring year.

- **AHC Conservation Measure 6: Protection of Downgradient Plants.** Known AHC that occur downhill from the Pre-feasibility Activities will be protected by rock guards when deemed necessary by the biological monitor and the Forest Service. Rock guards will be painted white to minimize potential heat-loading effects. The guards shall be properly pinned to maximize their effectiveness. In the event a guard cannot be properly pinned and the AHC is transplantable,⁴ the biological monitor would recommend transplant if, in the biological monitor's opinion, the potential risk to the plant from rock fall is greater than the risk of transplant. All transplant activities, data recording, and monitoring of transplants will be done in accordance with AHC Conservation Measure 1.
- **AHC Conservation Measure 7: Use of Native Plants in Reclamation.** RCM would include native vegetation common to AHC habitat in reclamation and closure plans for the Pre-feasibility Activities. The Forest Service will develop this seed mix.
- **AHC Conservation Measure 8: Reintroduction of AHC Individuals via Seed/Seedlings.** Seeds and/or seedlings would be obtained from previously transplanted AHC housed at the Boyce Thompson Arboretum and/or the Carlota Copper Project AHC test plot. A propagation and monitoring technique plan could be cooperatively developed between the TNF, USFWS, Boyce Thompson Arboretum, RCM, and any other agency and/or individual determined to be appropriate by the TNF and USFWS. Reintroduction areas could include, but may not be limited to, "safe areas" as identified in the Tonto National Forest Conservation Assessment and Plan for AHC. Introductions of seeds and/or seedlings would occur within 2 years after project initiation. Frequency and duration of propagation and monitoring, reintroduction areas, and task responsibilities would be delineated in the propagation and monitoring technique plan developed. Propagations occurring outside the Action Area may require additional Section 7 consultation.
- **AHC Conservation Measure 9: Closure of User-created Roads.** User-created roads are defined as those roads on National Forest System Lands that were not created and

⁴ Plants may not be transplantable because of poor health, rock or other physical constraint, or the size of the plant.

are not maintained by the TNF. User-created roads within potential AHC habitat or AHC habitat would be proposed for closure. These user-created roads would then be surveyed by RCM to establish the presence/absence of AHC. Closure would be the responsibility of RCM and accomplished through the construction of a gate, berm, or other adequate means as determined by the Forest Service. Road closures would serve to limit/reduce adverse impacts from various activities.

4.6 CULTURAL RESOURCES

A Class III cultural resources survey was conducted on a portion of the affected lands in 2003. A Class III survey was conducted within the remaining proposed Pre-feasibility Activities in 2007 and 2008. A Class III cultural resources survey report was completed and has been submitted to the Forest Service under separate cover. Detailed plan views of proposed activities that identify eligible cultural resources site locations with respect to ground-clearing activities were submitted to the Forest Service.

Ground-disturbing activities associated with drilling activities and obtaining access to drill sites would occur within some register-eligible cultural resource sites as part of this Plan (Table 9). To the extent practicable, impacts to cultural resource sites would be avoided. Field visits with a certified archaeologist were made to define the boundaries of those cultural sites that occur within the proximity of proposed vegetation clearing and an archaeological monitor would be present during vegetation clearing within or adjacent to any register-eligible cultural resource site boundaries.

Mitigation measures developed to address impacts to cultural resources and Native American religious practices are:

- EA-22) **Traffic Conflicts.** In response to concerns that were raised regarding possible effects to Tribal traditions and practices, RCM will ensure Tribal members will continue to have safe access to the area for those purposes during this project. RCM will be required to inform the San Carlos and White Mountain Apache Tribes of their scheduled activities and to coordinate with the Tribes to resolve any potential conflicts arising from needs for access for particular activities. The Forest Service is committed to continuing government-to-government consultation with Tribes related to the implementation of the exploratory drilling and facilitating RCM's collaboration in the consultations.
- EA-27) **Archaeological Monitor.** During construction of the road improvements for West Access Route 4b, the PVT-8 access route, the PVT-7 access route, and drill site construction pad improvements for H-C and PVT-8, RCM will provide a qualified archaeologist who will be present to ensure that the limits of construction are established and maintained during construction.
- EA-28) **Outfall Structure.** A cultural resource site is located adjacent to drill site H-C. The outfall structure for this well will be placed along the opposite wall of the drill pad to avoid water flow over the cultural resource site. Expelled water will flow along an eastward gradient from this location and will be intercepted by an existing livestock watering tank.

Table 9. Class III Cultural Resource Survey Review and Planned Approach for Avoiding Impacts to Register-Eligible Cultural Resource Sites

Disturbance Area	Within Register-eligible Site?	Approach for Avoidance
Exploration Drill Pads		
QC-04	No	Located outside any register-eligible cultural resource sites.
MB-03	Yes AR-03-12-02-1517 (AZ U:12:173)	This drill pad is located within a register-eligible site consisting of historic mining features dating from the early to mid-1900s. No features or artifacts were discovered within the area proposed for vegetation clearing. An archaeologist will monitor site construction.
OF-1	Yes AR-03-12-02-125 (AZ U:12:26)	This site is located within a 1930s Civilian Conservation Corps register-eligible site. No features or artifacts were discovered within the area proposed for vegetation clearing. An archaeologist will monitor site construction.
OF-2N	No	Located outside any register-eligible cultural resource sites.
OF-3	No	Located outside any register-eligible cultural resource sites.
4W	No	Located outside any register-eligible cultural resource sites.
4E	No	Located outside any register-eligible cultural resource sites.
Deep Hydrogeologic Testing/Monitoring Wells		
H-L	Yes AR-03-12-02-1077 (AZ V:2:101)	No features or artifacts were discovered within the area proposed for vegetation clearing. An archaeologist will monitor site construction.
H-K	No	Located outside any register-eligible cultural resource sites.
H-N	No	Located outside any register-eligible cultural resource sites.
Shallow Hydrologic Monitoring Wells		
H-C	No	A prehistoric register-eligible site (AR-03-12-02-1720) is located in the proximity of this well site. A site visit was made with a certified archaeologist and the drill pad was relocated to the extent practicable to avoid impacts to this site. An archaeological monitor will be present for clearing activities associated with this site.
H-E	No	Located outside any register-eligible cultural resource sites.
H-F	No	Located outside any register-eligible cultural resource sites.
H-G	No	Located outside any register-eligible cultural resource sites.
H-I	No	Located outside any register-eligible cultural resource sites.
H-K	No	Located outside any register-eligible cultural resource sites.

Table 9. Class III Cultural Resource Survey Review and Planned Approach for Avoiding Impacts to Register-Eligible Cultural Resource Sites (cont.)

Disturbance Area	Within Register-eligible Site?	Approach for Avoidance
Tunnel Characterization Boreholes		
PVT-3	Yes AR-03-12-02-125 (AZ U:12:26) and AR-03-12-02-1077 (AZ V:2:101)	PVT-3 is located on the early 1920s alignment of US 60. This portion of the historic site is considered a non-contributing element to the eligibility of the site. This site is also located within a Civilian Conservation Corps register-eligible site; however, no features or artifacts were discovered within the area proposed for vegetation clearing. An archaeologist will monitor site construction. No adverse impact is anticipated.
PVT-4	Yes AR-03-12-02-1077 (AZ V:2:101)	PVT-4 is located within the historic site as mapped on AZSITE. However, this drill site is located just west of the historic highway and would not impact it. An archaeologist will monitor site construction. No adverse impact is anticipated.
PVT-5	No	Located outside any register-eligible cultural resource sites.
PVT-6	No	Located outside any register-eligible cultural resource sites.
PVT-7	No	Located outside any register-eligible cultural resource sites.
PVT-8	No	Located outside any register-eligible cultural resource sites. A prehistoric register-eligible site (AR-03-12-02-1714 [AZ V:9:534]) occurs in the proximity of PVT-8. Site construction would not impact this site. An archaeologist will monitor site construction.
PVT-9	No	Located outside any register-eligible cultural resource sites.
APV-6	No	Located outside any register-eligible cultural resource sites.
APV-8	No	Located outside any register-eligible cultural resource sites.
Access Road Improvements		
FR 315	No	Located outside any register-eligible cultural resource sites.
FR 320	Yes AR-03-12-02-1077 (AZ V:2:101)	FR 320 is located within the 1920s alignment of US 60. No adverse impact would occur to the site due to the implementation of the following procedures: <ul style="list-style-type: none"> • Fill potholes will fill dirt. • Use only rubber-tire vehicles. • Cleanly remove ramps used to access drill pad. • Keep vegetation removal to a minimum. An archaeologist will monitor site construction.
FR 898	No	Located outside any register-eligible cultural resource sites.
FR 2261	No	Located outside any register-eligible cultural resource sites.

Table 9. Class III Cultural Resource Survey Review and Planned Approach for Avoiding Impacts to Register-Eligible Cultural Resource Sites (cont.)

Disturbance Area	Within Register-eligible Site?	Approach for Avoidance
FR 2440	Yes AR-03-12-02-1517 (AZ U:12:173)	Access road improvements along FR 2440 for exploration sites QC-04 and MB-03 occur within a register-eligible cultural resource site. No features or artifacts were discovered within areas proposed for vegetation clearing. An archaeologist will monitor site construction.
FR 2461	No	Located outside any register-eligible cultural resource sites.
FR 2463	No	Located outside any register-eligible cultural resource sites.
FR 2466 (and small portion of FR 2467)	No	Located outside any register-eligible cultural resource sites.
FR 2469	No	Located outside any register-eligible cultural resource sites.
FR 2505	No	Located outside any register-eligible cultural resource sites.
FR 2511	No	Located outside any register-eligible cultural resource sites.
FR 3139	No	Located outside any register-eligible cultural resource sites.
FR 3786	Yes AR-03-12-02-1517 (AZ U:12:173)	Access road improvements along FR 3786 for exploration site MB-03 occur within a register-eligible cultural resource site. No features or artifacts were discovered within the area proposed for vegetation clearing. An archaeologist will monitor site construction.
Existing road from FR 315 to H-E	No	Located outside any register-eligible cultural resource sites.
Existing Road from FR 2438 to DHTW-01	Yes AR-03-12-02-125 (AZ U:12:26)	The DHTW-01 access road is located within a register-eligible cultural resource site and there are archaeological features (checkdams) near the proposed disturbance area. An archaeologist will monitor site construction.
Existing Road from FR 2440 to QC-04	No	Located outside any register-eligible cultural resource sites.
Existing Road from FR 2466 to H-F	No	Located outside any register-eligible cultural resource sites.
Existing Road from US Highway 60 to PVT-9	No	Located outside any register-eligible cultural resource sites.
Existing Road from Magma Mine Road to private inholding	No	Located outside any register-eligible cultural resource sites.
New Access Roads		
New Access from FR 2458 to H-K	No	Located outside any register-eligible cultural resource sites.
New Access from FR 2458 to DHTW-02	No	Located outside any register-eligible cultural resource sites.
New Access from FR 2461 to PVT-5	No	Located outside any register-eligible cultural resource sites.
New Access from FR 3791 to OF-1	Yes AR-03-12-02-125 (AZ U:12:26)	A small stretch of new access road to OF-1 is located within a register-eligible cultural resource site. No features or artifacts were discovered within the area proposed for vegetation clearing. An archaeologist will monitor site construction.

- EA-29) **Unidentified Cultural Resources.** If previously unidentified cultural resources are encountered during construction activities, work will cease at that location and Forest Service archaeologists will be contacted for instruction before work continues at that location.
- EA-30) **Early 1920s Superior-Miami Highway.** This existing road segment will be used to access a drill site. RCM will fill the numerous existing potholes within this road with clean fill material to slow erosion of the historic highway.

4.7 HAZARDOUS SUBSTANCES / PETROLEUM PRODUCTS / DRILLING MATERIALS

Resolution has revised the project's Spill Prevention, Control, and Countermeasures (SPCC) Plan (Appendix G) to include additional proposed drill sites for submittal to the Forest Service. The SPCC Plan details good engineering practices used to prevent releases when handling and storing petroleum products.

No extremely hazardous substances, as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Superfund Amendments Reauthorization Act (SARA), and Emergency Planning and Community Right-To-Know Act (EPCRA), would be used in any of the activities described in this Plan. At the active drill sites, small secondary containment structures would be used to store one or two 5-gallon containers of hydraulic oil, a 5-gallon container of diesel, two 5-gallon containers of gasoline, tubes of grease, a 5-gallon bucket of grease, and other miscellaneous small containers, such as spray lubricants, typically found on drill sites. Fifty-gallon drums for storing used oil and oily rags would be placed in secondary containment structures within the drill site. Large quantities of fuel associated with the rig and mud-mixing equipment would be held in fuel tanks, all within secondary containment structures. An adequate supply of fire extinguishers would be placed at these containment structures, and each active rig would maintain enough spill supplies for any incidental releases. During drilling operations, drill rigs would be parked on top of plastic sheeting overlain by absorbent material. Plastic and absorbent materials would also be used under other gas or diesel motors, or other equipment that may leak oil, as needed. Refuse containers designated for disposal of the absorbent materials would be located at each drill rig. This material would be disposed of offsite in accordance with applicable laws and regulations.

Although already required and identified by RCM, the following mitigation measure is reiterated in the EA to address concerns about hazardous substances:

- EA-6) **Spill Prevention, Control, and Countermeasure Plan.** Exploration and Pre-feasibility Activities would not result in the release of any hazardous or nuisance substances to the environment and, if such release occurs, immediate corrective actions will be taken by RCM. An SPCC plan will be prepared in accordance with ADEQ regulations and incorporated into the Pre-feasibility Plan of Operations prior to ground-disturbing activities.

5.0 RECLAMATION

5.1 DRILL SITES

Resolution would notify the Forest Service prior to the commencement of reclamation activities. Following the completion of drilling, all materials, including aggregate base, equipment, pipe, lubricants and other products, portable restrooms, core, plastic sheeting, and any other supplies, will be removed from the site. Aggregate base may be placed on Forest System roads per Forest Service direction. Solids and desiccated drilling muds in the mud pits will be excavated and removed from the site. These inert materials will be disposed of in accordance with applicable laws and regulations. The mud pits would then be returned to natural grade with a track hoe using rocks and soil set aside during site construction and mud pit excavation. Following the mud pit rehabilitation, the level of further site reclamation will be discussed with the Forest Service. For sites that will be abandoned, the boreholes will be closed in accordance with ADWR protocols and requirements (Section 5.3). Then, each drill site will be ripped to reduce compaction, recontoured, and seeded in accordance with Forest Service guidance using approved seed mixes of certified native weed-free species. If the initial seeding effort is unsuccessful, up to two additional seedings will be attempted. Signage will be removed. For sites that will continue to be used long-term for scheduled groundwater monitoring, it may be possible to reclaim a portion of the drill site while still maintaining access to and parking at the monitor well. The same procedure will be followed for partial site reclamation as describe above, except that the borehole (monitor well) will not be closed. At the time of closure of the monitor well, the borehole will be abandoned in accordance with ADWR regulations and the remainder of the site will be reclaimed.

Stormwater BMPs, such as water bars, culverts, and erosion-control features, would be repaired or removed as necessary and as specified by the Forest Officer.

5.2 ROADS

Table 10 identifies the current Forest Service Road Maintenance Level for each segment of access roadway and describes the proposed reclamation and post pre-feasibility study condition of the roadways based on the Forest Service Travel Management Guidelines for Road Maintenance Levels.⁵

As determined by the Forest Officer, the sections of the existing access roads that are to be “Reclaimed” would generally be reclaimed by ripping/roughing and seeding (up to three times) with an appropriate seed mix and placement of rocks or other protective materials. All new access roads would be reclaimed and closed through the placement of an earthen berm. Areas of re-seeding would be scarified (ripped) prior to seeding to break up compaction. Road-surfacing material, if any, may need to be removed and potentially redeposited on Forest System roads, as determined by the Forest Officer. Stormwater BMPs, such as water bars, culverts, and erosion-control features, would be repaired or removed as necessary and as specified by the Forest Officer. Roads that are slated to be “Closed” will be blocked with an earthen berm or boulders at each access point. For certain roads that are gated, gates will be removed at the direction of the Forest Officer.

⁵ USDA Forest Service. 2005. Guidelines for Road Maintenance Levels. USDA Forest Service Technology and Development Program. December 2005.

Table 10. Road Reclamation and Post Pre-feasibility Study Management Designation Based on TNF's Travel Management Guidelines

Road	Current Forest Service Road Maintenance Level	Post Pre-feasibility Study Forest Service Road Maintenance Level and Reclamation Activities
FR 315	Level 4 – Moderate Degree of User Comfort	Repair and maintain
FR 320	Level 2 – High Clearance Vehicles	Repair and maintain
FR 898	Level 2 – High Clearance Vehicles	Repair and maintain
Existing Road from FR 898 to APV-8	User Created	Reclaim
FR 2261	Level 2 – High Clearance Vehicles	Repair and maintain
FR 2440	Level 1 – Basic Custodial Care	Close
FR 2461	Level 2 – High Clearance Vehicles	Repair and maintain
Existing Extension of 2461	User Created	Reclaim
FR 2463	Level 1 – Basic Custodial Care	Close
FR 2466	Level 2 – High Clearance Vehicles	Repair and maintain
Small portion of FR 2467	Level 2 – High Clearance Vehicles	Close
FR 2469	Level 1 – Basic Custodial Care	Close
FR 2505	Level 1 – Basic Custodial Care	Close
FR 2511	Level 1 – Basic Custodial Care	Close
FR 3139	Level 1 – Basic Custodial Care	Close
FR 3153	Level 1 – Basic Custodial Care	Close
FR 3786	Level 1 – Basic Custodial Care	Close
Existing Road from FR 315 to H-E	User Created	Reclaim
Existing Road from FR 2440 to QC-04	User Created	Reclaim
FR 2466 to H-F	User Created	Reclaim
HWY 60 to PVT-9	User Created	Reclaim
Magma Mine Road to Private Inholding	User Created	Repair and maintain
Magma Mine Road	Level 5 – High Degree of User Comfort	Repair and maintain
Magma Mine Road to Plant Site	User Created	Reclaim
Magma Mine Road to Site 1	User Created	Reclaim
Magma Mine Road to PVT-3	User Created	Reclaim
From (but not on) FR 2438 to FR 3153 (east)	Level 2 – High Clearance Vehicle	Reclaim
Route from (but not on) FR 2438 to FR 3153	User Created	Reclaim
FR 2438 to H-L	User Created	Reclaim
FR 2438 to PVT-4	User Created	Reclaim
FR 3153 South to OF-1	Level 2 – High Clearance Vehicle	Reclaim
FR 2458 to H-K	No Classification	Reclaim
FR 2461 to PVT-5	No Classification	Reclaim
FR 3153 to OF-1	No Classification	Reclaim

5.3 DRILL HOLES

Drilling and drill hole abandonment would be conducted in accordance with Arizona Administrative Code (AAC) R12-15 and Arizona Revised Statutes (ARS) Title 45, Chapter 2, Article 10, as administered by the ADWR. In general, the procedures for each type of drill hole are provided in Table 11.

Table 11. Resolution Copper Mining Drill Hole Abandonment Procedures

Type	Purpose	Abandonment Timing	Abandonment Procedures
Exploration	Delineation of major structures and resource modeling	Holes would be abandoned when they have reached their reasonable limit of deflections based on current technology – selected holes may be converted to hydrological monitoring wells (ADWR) if in critical areas for pre-feasibility studies	Drill hole abandonment would be conducted in accordance with AAC R12-15 and ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. In general, this procedure includes the following steps: <ul style="list-style-type: none"> • After completion of each deflection, that portion of the hole would be filled with bentonite mud of sufficient density to prevent movement of groundwater between any aquifers. • After completion of all deflections, the cased trunk holes would be filled with bentonite mud and a cement grout plug would be placed extending from 2 feet below grade to a minimum of 20 feet below grade.
Deep Hydrogeology	Characterization of deep regional aquifer	Intended for long-term monitoring of vertical K in the Whitetail conglomerate and flow/water quality in the deep aquifer	Wells completed to specifications would be maintained as long-term monitoring locations. In the event of a lost hole or insufficient data from a well, the selected well would be abandoned in accordance with the same procedures (ADWR) as the Resolution exploration holes.
Tunnel Characterization	Geotechnical and hydrological characterization of proposed tunnel alignment	After initial testing, drill holes that are not necessary for pre-feasibility studies would be abandoned according to plan	Once selected for abandonment, these holes would be abandoned in accordance with ADWR standards similar to the exploration holes with slight modifications due to the relatively shallow depth and absence of deflections. <ul style="list-style-type: none"> • A bentonite cement plug would be placed in the bottom 40 feet of the hole. • Bentonite grout would fill the entire hole with the exception of the top 20 feet. • A cement plug would be placed from 2 feet below grade to a minimum of 20 feet below grade.
Shallow Hydrology	Monitor of Apache Leap Tuff aquifer	Intended for long-term monitoring / dry wells will be abandoned according to plan	Wells completed to specifications will be maintained as long-term monitoring locations. In the event of a lost hole or insufficient data from a well, the selected well would be abandoned in accordance with the same procedures (ADWR) as the tunnel characterization holes.

6.0 FOREST SERVICE EVALUATION AND SIGNATURES

6.1 FOREST SERVICE EVALUATION OF THE PLAN OF OPERATIONS

6.1.1 Required Changes/Modifications/Special Mitigation

1. RCM will comply with all terms/conditions/specifications stipulated in the Plan of Operations No. 03-12-02-006, dated October 1, 2010, and associated reclamation bond calculation specifications. The Plan of Operations will be bonded in phases, only those activities covered by the current bond will be approved for implementation. Any changes or modifications made to the Plan of Operations are subject to review and approval by the Forest Service.
2. RCM will contact and coordinate upcoming schedules with personnel at the Globe Ranger District office, (928) 402-6200. Information to be coordinated with the Forest Service may include but is not limited to the following: construction of drill sites, mobilization to and from drill sites, road improvements/construction, mitigation measure implementation, well testing, and reclamation.
3. RCM will be responsible for the installation and maintenance of a gate on Forest Road 2458 (Omya Road) north of drill site H-K. The gate will be built to specifications indicated by the Forest Service. Additionally, RCM will coordinate with the Forest Service and Omya (Arizona) Inc. regarding gate installation and use; road use and timing; and gate security methods.
4. RCM will provide the Forest Service with a road design/plan for development of the West Access Route 4b for review. This design/plan must receive Forest Service approval prior to any road construction activity.
5. RCM will complete an archaeological survey immediately after brushing occurs at Rawhide Canyon, for access to site H-I and use of Forest Road 2469, and inform the Forest Service of findings. In the event that the resurvey has positive results, an Archaeological Survey and Treatment Plan will be submitted to the Forest Service for review and approval prior to the commencement of any activities.
6. In the event of helicopter use which involves landing on National Forest System Lands (i.e., access to site PVT-7), RCM must submit to the Forest Service a Flight Operations Notification Plan for Deconfliction (Flight Plan) prior to any flights. The Forest Service will provide guidance on required content of Flight Plans.
7. RCM will provide the Forest Service with a Maintenance and Care Plan for the Magma Mine Road for review and approval, prior to conducting any activity. The Maintenance and Care Plan will reflect the Forest Service's road management objectives and maintenance prescriptions for the Magma Mine Road. The Maintenance and Care Plan will include the type and extent of tasks, location, frequency, identification of necessary future work, traffic control and will follow any relevant mitigation measures previously agreed upon (EA, DN/FONSI, BAE, etc.).

8. The reclamation bond will be reviewed annually and adjusted at the discretion of the Forest Service to compensate for completed reclamation work, changes in equipment rental rates, increased scope of the operations, etc.
9. RCM will provide a project-specific SWPPP to the Forest Service for review and approval.
10. RCM will continue coordination with the Forest Service to complete and finalize the Initial Phase Reclamation Bond Calculation by December 31, 2010. The bond calculation will be considered complete when approved by the Forest Service.

6.1.2 Bond

Reclamation of disturbances connected with this Plan of Operations is covered by Reclamation Performance Bond No. 8219-35-81, dated September 17, 2010, signed by Resolution Copper Mining LLC (Principal) and Federal Insurance Company (Surety), for the penal sum of \$2,000,000.00.

This bond covers all disturbances connected with the initial phase of activities; this initial phase includes all activities described in Plan of Operations #03-12-02-006 with the following exclusions/changes:

1. No construction/development of any of the tunnel drill sites / boreholes,
2. No road improvements associated with access to the tunnel drill sites,
3. Only 48 exploration trunk holes will be developed.

Only those activities covered by the current bond will be approved for implementation.

This Reclamation Performance Bond is a guarantee of faithful performance with the terms and conditions listed below, and with the reclamation requirements agreed upon in the Plan of Operations. This Reclamation Performance Bond also extends to and includes any unauthorized activities conducted in connection with this operation.

The bond amount for this Reclamation Performance Bond was based on a bond calculation worksheet. The bond amount may be adjusted during the term of this proposed Plan of Operations in response to changes in the operations or to changes in the economy. Both the Reclamation Performance Bond and the bond calculation worksheet are attached to and made part of this Plan of Operations (Appendix J).

6.2 TERMS AND CONDITIONS

- A. If a bond is required, it must be furnished before approval of the Plan of Operations.
- B. Information provided with this Plan marked confidential will be treated in accordance with the agency's laws, rules, and regulations.
- C. Approval of this Plan does not constitute certification of ownership to any person named herein and/or recognition of the validity of any mining claim named herein.
- D. Approval of this Plan does not relieve me of my responsibility to comply with other applicable state or federal laws, rules, or regulations.

- E. If previously undiscovered cultural resources (historic or prehistoric objects, artifacts, or sites) are exposed as a result of operations, those operations will not proceed until notification is received from the Authorized Officer that provisions for mitigating unforeseen impacts as required by 36 CFR 228.4(e) and 36 CFR 800 have been complied with.
- F. This Plan of Operations has been approved for the following periods:

Exploration Drilling and associated road and drill site construction	Authorized through December 31, 2014
Deep and Shallow Well Construction and associated road and drill site construction	Authorized through December 31, 2014
Tunnel Borehole Drilling and associated road and drill site construction	Authorized through December 31, 2016
Groundwater Testing/Monitoring and associated road maintenance	Authorized through December 31, 2025

A new or revised Plan must be submitted in accordance with 36 CFR part 228, subpart A, if operations are to be continued after the above-referenced time periods.

6.3 OPERATING PLAN ACCEPTANCE

I/We have reviewed and agreed to comply with all conditions in this Plan of Operations including the required changes, modifications, special mitigation, and reclamation requirements.

I/We understand that the bond will not be released until the Authorized Officer in charge gives written approval.

RICH A. HELG
(Name)

VP-Pre-feasibility Studies
(Title)

R. A. Helg
Signature of Operator (or Authorized Representative)

10/4/10
(Date)
(mm/dd/yy)

6.4 OPERATING PLAN APPROVAL

Gene Blankenbaker
(Name)

Tonto National Forest
Forest Supervisor
(Title)

Gene Blankenbaker
Signature of (Authorized Officer)

10/4/10
(Date)
(mm/dd/yy)

APPENDIX A

RESOLUTION PLAN OF OPERATIONS DESCRIPTION OF PROPOSED ACTIVITIES

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
Exploration Boreholes								
QC-04	Exploration	T2S, R12E, SE ¼ NE ¼ NE ¼ Section 2	Forest Service	Yes	0.26 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 core holes drilled to 1,500mTrunk hole deepened to 7,000ft by diamond drillingPotential for drilling multiple deflections by motor/ diamond drilling	1 LF-90 Rotary Drill Rig 1 Schram 685 Rotary Drill Rig 1 mud tank 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Cleared areas will be ripped and seeded with Forest Service-approved mix.
MB-03	Exploration	T2S, R12E, NW ¼ NW ¼ SW ¼ Section 1	Forest Service	Yes	0.25 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 core holes drilled to 1,500mPotential for drilling multiple deflections by motor/ diamond drilling	1 LF-90 Rotary Drill Rig 1 Schram 685 Rotary Drill Rig 1 mud tank 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Cleared areas will be ripped and seeded with Forest Service-approved mix.
OF-1	Exploration	T1S, R13E, NW ¼ SW ¼ SE ¼ Section 33	Forest Service	No	0.18 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 3 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Cleared areas will be ripped and seeded with Forest Service-approved mix.
OF-2N	Exploration	T1S, R13E, NE ¼ NW ¼ NE ¼ Section 32	Forest Service	Yes	0.25 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 3 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Cleared areas will be ripped and seeded with Forest Service-approved mix.
OF-3	Exploration	T1S, R13E, NE ¼ SW ¼ SW ¼ Section 33	Forest Service	No	0.23 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 3 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Cleared areas will be ripped and seeded with Forest Service-approved mix.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
4-W	Exploration	T2S, R13E, SW ¼ NW ¼ NE ¼ Section 6	Forest Service	No	0.29 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
4-E	Exploration	T2S, R13E, NW ¼ SE ¼ NE ¼ Section 6	Forest Service	No	0.35 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
A	Exploration	T1S, R13E, SE ¼ NW ¼ SE ¼ Section 32	Forest Service	Yes	0.25 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling1 co-located hydrology well	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
B	Exploration	T1S, R13E, SE ¼ SW ¼ SE ¼ Section 32	Forest Service	Yes	0.07 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
C	Exploration	T2S, R13E, NE ¼ NW ¼ NW ¼ Section 6	Forest Service	Yes	0.27 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
D	Exploration	T2S, R13E, NE ¼ SW ¼ NW ¼ Section 6	Forest Service	Yes	0.21 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
F	Exploration	T2S, R13E, NW ¼ SE ¼ NW ¼ Section 6	Forest Service	Yes	0.27	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling1 co-located hydrology well	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
M	Exploration	T1S, R13E, SE ¼ SW ¼ SW ¼ Section 33	Forest Service	Yes	0.55 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling2 co-located hydrology wells	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
#1	Exploration	T1S, R13E, SE ¼ SE ¼ NW ¼ Section 32	Forest Service	Yes	0.94 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
#2	Exploration	T1S, R13E, NE ¼ SW ¼ SE ¼ Section 32	Forest Service	Yes	0.28 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling1 co-located hydrology well	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
#3	Exploration	T2S, R13E, SW ¼ NE ¼ SE ¼ Section 6	Forest Service	Yes	0.30 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size3,000ft drill trunk hole using open hole techniqueUp to 4 trunk holesTrunk hole deepened to 7,000ft by diamond drillingMultiple deflections by motor/diamond drilling	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe	Length of Occupancy – December 31, 2014 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
Deep Hydrogeologic Testing and Monitoring Wells								
H-L	Deep hydrologic monitoring for depth to groundwater, lithology of drill cuttings, aquifer hydraulic parameters, and chemical quality data	T1S, R13E, NE ¼ NE ¼ SE ¼ Section 28	Forest Service	Yes	0.15 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size2,000m core drill hole completed with 4” steel casing1m × 1m concrete pad to be installed at wellhead	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 Lang LM-200 series tophead rotary drill rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – After completion of drill and testing activities, the drill pad will be graded and reclaimed according to operating procedures. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
H-K	Deep hydrologic monitoring for depth to groundwater, lithology of drill cuttings, aquifer hydraulic parameters, and chemical quality data	T1S, R13E, SW ¼ NW ¼ SW ¼ Section 21	Forest Service	No	0.30 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size2,000m core drill hole completed with 4” steel casing1m × 1m concrete pad to be installed at wellhead	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 Lang LM-200 series tophead rotary drill rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – After completion of drill and testing activities, the drill pad will be graded and reclaimed according to operating procedures. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
H-N	Deep hydrologic monitoring for depth to groundwater, lithology of drill cuttings, aquifer hydraulic parameters, and chemical quality data	T1S, R13E, SW ¼ SW ¼ SW ¼ Section 26	Forest Service	Yes	0.35 ac	<ul style="list-style-type: none">80ft × 100ft drill pad size2,000m core drill hole completed with 4” steel casing1m × 1m concrete pad to be installed at wellhead	1 UDR-5000 Core Drill Rig 1 CP-50 Core Drill Rig 1 Lang LM-200 series tophead rotary drill rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – After completion of drilling and testing activities, the drill pad will be graded and reclaimed according to operating procedures. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
Shallow Hydrologic Monitoring Wells								
H-B	Explore groundwater in Whitetail Conglomerate of underlying units where Apache Leap Tuff is absent; provide additional control for direction and magnitude of water level gradients south of the Resolution Parcel; provide aquifer parameters for Whitetail of underlying units	T2S, R13E, SW ¼ NW ¼ NE ¼ Section 17	State Land Dept	Yes	0.18 ac	<ul style="list-style-type: none">80ft × 100ft maximum drill pad sizeApproximately 1,500ft hole (12” diameter to start reduced to 9” then 6” depending on depth)Well completion with steel casing, pump and/or transducers, gravel pack, sounder access and inflatable packers designed for continual monitoring	1 Lang LM-140 series tophead rotary drill rig or equivalent 1 mud tank 1 heavy-duty air compressor 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 front end loader 1 backhoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – Sites will be reclaimed but left accessible for long-term monitoring of the Apache Leap Aquifer. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
H-C	Explore groundwater in Whitetail Conglomerate of underlying units where Apache Leap Tuff is absent; provide additional control for direction and magnitude of water level gradients south of the Resolution Parcel; provide aquifer parameters for Whitetail of underlying units	T2S, R13E, SE ¼ NE ¼ NE ¼ Section 20	Forest Service	No	0.27 ac	<ul style="list-style-type: none">80ft × 100ft drill pad sizeApproximately 1,500ft hole (12” diameter to start reduced to 9” then 6” depending on depth)Well completion with steel casing, pump and/or transducers, gravel pack, sounder access and inflatable packers designed for continual monitoring	1 Lang LM-140 series tophead rotary drill rig or equivalent 1 mud tank 1 heavy-duty air compressor 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 front end loader 1 backhoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – Sites will be reclaimed but left accessible for monitoring of the Apache Leap Aquifer. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
H-E	Evaluate present water levels/aquifer conditions in Apace Leap Tuff/Whitetail Conglomerate/Older units near edge of Apace Leap	T2S, R13E, SW ¼ NE ¼ NW ¼ Section 7	Forest Service	No	0.16 ac	<ul style="list-style-type: none">80ft × 100ft drill pad sizeApproximately 1,500ft hole (12” diameter to start reduced to 9” then 6” depending on depth)Well completion with steel casing, pump and/or transducers, gravel pack, sounder access and inflatable packers designed for continual monitoring	1 Lang LM-140 series tophead rotary drill rig or equivalent 1 mud tank 1 heavy-duty air compressor 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 front end loader 1 backhoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – Sites will be reclaimed but left accessible for monitoring of the Apache Leap Aquifer. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
H-F	Evaluate potential enhanced fracturing on downthrown side of main NS fault east of Devils Canyon, east from the Resolution Parcel; provide additional control in Apache Leap Tuff aquifer for direction and magnitude of water level gradients northeast of the Resolution Parcel; provide additional aquifer parameters	T1S, R13E, SW ¼ NW ¼ SE ¼ Section 27	Forest Service	No	0.25 ac	<ul style="list-style-type: none">80ft × 100ft drill pad sizeApproximately 1,500ft hole (12” diameter to start reduced to 9” then 6” depending on depth)Well completion with steel casing, pump and/or transducers, gravel pack, sounder access and inflatable packers designed for continual monitoring	1 Lang LM-140 series tophead rotary drill rig or equivalent 1 mud tank 1 heavy-duty air compressor 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 front end loader 1 backhoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – Sites will be reclaimed but left accessible for monitoring of the Apache Leap Aquifer. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
H-G	Evaluate potential enhanced fracturing on downthrown side of main NS fault east of Devils Canyon; provide additional control in Apache Leap Tuff aquifer for direction and magnitude of water level gradients northeast of the Resolution Parcel; provide additional aquifer parameters for tuff; provide baseline and long-term monitoring data for potential impacts to Top-of-the-World area wells	T1S, R13E, NE ¼ NW ¼ SE ¼ Section 22	Forest Service	Yes	0.20 ac	<ul style="list-style-type: none">80ft × 100ft drill pad sizeApproximately 1,500ft hole (12” diameter to start reduced to 9” then 6” depending on depth)Well completion with steel casing, pump and/or transducers, gravel pack, sounder access and inflatable packers designed for continual monitoring	1 Lang LM-140 series tophead rotary drill rig or equivalent 1 mud tank 1 heavy-duty air compressor 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 front end loader 1 backhoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – Sites will be reclaimed but left accessible for monitoring of the Apache Leap Aquifer. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
H-H	Provide additional control in Apache Leap Tuff aquifer for direction and magnitude of water level gradients in east part of Devils Canyon drainage basin; provide additional aquifer parameters for tuff	T2S, R13E, NE ¼ NW ¼ SE ¼ Section 4	State Land Dept	No	0.18 ac	<ul style="list-style-type: none">80ft × 100ft maximum drill pad sizeApproximately 1,500ft hole (12” diameter to start reduced to 9” then 6” depending on depth)Well completion with steel casing, pump and/or transducers, gravel pack, sounder access and inflatable packers designed for continual monitoring	1 Lang LM-140 series tophead rotary drill rig or equivalent 1 mud tank 1 heavy-duty air compressor 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 front end loader 1 backhoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – Sites will be reclaimed but left accessible for monitoring of the Apache Leap Aquifer. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
H-I	Provide additional control in Apache Leap Tuff aquifer for direction and magnitude of water level gradients in east part of Devils Canyon drainage basin; provide additional aquifer parameters for tuff	T1S, R13E, SW ¼ NW ¼ SE ¼ Section 26	Forest Service	No	0.18 ac	<ul style="list-style-type: none">80ft × 100ft drill pad sizeApproximately 1,500ft hole (12” diameter to start reduced to 9” then 6” depending on depth)Well completion with steel casing, pump and/or transducers, gravel pack, sounder access and inflatable packers designed for continual monitoring	1 Lang LM-140 series tophead rotary drill rig or equivalent 1 mud tank 1 heavy-duty air compressor 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 front end loader 1 backhoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – Sites will be reclaimed but left accessible for monitoring of the Apache Leap Aquifer. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
H-K	Provide additional control in Apache Leap Tuff aquifer on water level gradient direction and magnitude north of Resolution Parcel; provide additional aquifer parameters for tuff	T1S, R13E, SW ¼ NW ¼ SW ¼ Section 21	Forest Service	No	0.3 ac	<ul style="list-style-type: none">80ft × 100ft drill pad sizeApproximately 1,500ft hole (12” diameter to start reduced to 9” then 6” depending on depth)Well completion with steel casing, pump and/or transducers, gravel pack, sounder access and inflatable packers designed for continual monitoring	1 Lang LM-140 series tophead rotary drill rig or equivalent 1 mud tank 1 heavy-duty air compressor 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 front end loader 1 backhoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – Sites will be reclaimed but left accessible for monitoring of the Apache Leap Aquifer. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
Cross Canyon Well	Hydrologic monitoring	T2S, R12E, NE ¼ NE ¼ SW ¼ Section 2	Private	Yes	0.18 ac	<ul style="list-style-type: none">80ft × 100ft maximum drill pad size2,000m core drill hole completed with 4” steel casing1m × 1m concrete pad to be installed at wellhead	1 Lang LM-200 series tophead rotary drill rig 1 pipe truck 1 UDR-5000 Core Drill Rig 1 UDR-1500 Core Drill Rig 1 hoe ram 1 water truck rollers 1 track-mounted back hoe	Length of Occupancy – December 31, 2014 (construction) December 31, 2025 (monitoring and testing) Concurrent Reclamation – Sites will be reclaimed but left accessible for monitoring. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
DOE	Hydrologic monitoring	T1S, R13E, NW ¼, SE ¼, SE ¼ Section 28	Forest Service	Yes	0	<ul style="list-style-type: none">Two monitor wells: HRES-13 and old DOE well	No plans for additional drilling	Length of Occupancy – December 31, 2025 Concurrent Reclamation – After completion of drilling and testing activities, the pad will be graded and reclaimed. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Cleared areas will be ripped and seeded with Forest Service-approved mix.
Tunnel Characterization Boreholes								
PVT-3	Geotechnical drilling for tunnel characterization	T1S, R13E, SE ¼ NE ¼ SE ¼ Section 29	Forest Service	No	0.14 ac	<ul style="list-style-type: none">60ft × 100ft drill pad sizeApproximately 1,200ft hole 12” surface casing then core drilled to TD with HQ (2.5”)Hydrological tests will be conducted in open hole	1 Lang LM-140 series tophead rotary drill rig 1 UDR-1500 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2016 Concurrent Reclamation – Sites will be reclaimed. Decision on designating individual wells as monitoring locations will be made after testing has been conducted. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
PVT-4	Geotechnical drilling for tunnel characterization	T1S, R13E, SW ¼ SW ¼ NW ¼ Section 27	Forest Service	No	0.15 ac	<ul style="list-style-type: none">60ft × 100ft maximum drill pad sizeApproximately 1,200ft hole 12” surface casing then core drilled to TD with HQ (2.5”)Hydrological tests will be conducted in open hole	1 Lang LM-140 series tophead rotary drill rig 1 UDR-1500 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2016 Concurrent Reclamation – Sites will be reclaimed. Decision on designating individual wells as monitoring locations will be made after testing has been conducted. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
PVT-5	Geotechnical drilling for tunnel characterization	T1S, R13E, NW ¼ NW ¼ NE ¼ Section 27	Forest Service	No	0.20 ac	<ul style="list-style-type: none">60ft × 100ft drill pad sizeApproximately 1,200ft hole 12” surface casing then core drilled to TD with HQ (2.5”)Hydrological tests will be conducted in open hole	1 Lang LM-140 series tophead rotary drill rig 1 UDR-1500 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2016 Concurrent Reclamation – Sites will be reclaimed. Decision on designating individual wells as monitoring locations will be made after testing has been conducted. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
PVT-6	Geotechnical drilling for tunnel characterization	T1S, R13E, SE ¼ SW ¼ NE ¼ Section 23	Forest Service	No	0.18 ac	<ul style="list-style-type: none">60ft × 100ft drill pad sizeApproximately 1,200ft hole 12” surface casing then core drilled to TD with HQ (2.5”)Hydrological tests will be conducted in open hole	1 Lang LM-140 series tophead rotary drill rig 1 UDR-1500 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2016 Concurrent Reclamation – Sites will be reclaimed. Decision on designating individual wells as monitoring locations will be made after testing has been conducted. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
PVT-7	Geotechnical drilling for tunnel characterization	T1S, R13E, NW ¼ NE ¼ NW ¼ Section 24	Forest Service	Yes	0.30 ac	<ul style="list-style-type: none">60ft × 100ft maximum drill pad sizeApproximately 1,200ft hole 12” surface casing then core drilled to TD with HQ (2.5”)Hydrological tests will be conducted in open hole	1 Lang LM-140 series tophead rotary drill rig 1 UDR-1500 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2016 Concurrent Reclamation – Sites will be reclaimed. Decision on designating individual wells as monitoring locations will be made after testing has been conducted. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
PVT-8	Geotechnical drilling for tunnel characterization	T1S, R14E, NW ¼ NE ¼ SE ¼ Section 7	Forest Service	No	0.24 ac	<ul style="list-style-type: none">60ft × 100ft drill pad sizeApproximately 1,200ft hole 12” surface casing then core drilled to TD with HQ (2.5”)Hydrological tests will be conducted in open hole	1 Lang LM-140 series tophead rotary drill rig 1 UDR-1500 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer	Length of Occupancy – December 31, 2016 Concurrent Reclamation – Sites will be reclaimed. Decision on designating individual wells as monitoring locations will be made after testing has been conducted. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
PVT-9	Geotechnical drilling for tunnel characterization	T1S, R14E, NE ¼ NW ¼ NW ¼ Section 8	Forest Service	Yes	0.16 ac	<ul style="list-style-type: none">60ft × 100ft drill pad sizeApproximately 1,200ft hole 12” surface casing then core drilled to TD with HQ (2.5”)Hydrological tests will be conducted in open hole	1 Lang LM-140 series tophead rotary drill rig 1 UDR-1500 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2016 Concurrent Reclamation – Sites will be reclaimed. Decision on designating individual wells as monitoring locations will be made after testing has been conducted. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
APV-6	Geotechnical drilling for tunnel characterization	T1S, R13E, NE ¼ SW ¼ SE ¼ Section 23	Forest Service	Yes	0.14 ac	<ul style="list-style-type: none">60ft × 100ft drill pad sizeApproximately 1,200ft hole 12” surface casing then core drilled to TD with HQ (2.5”)Hydrological tests will be conducted in open hole	1 Lang LM-140 series tophead rotary drill rig 1 UDR-1500 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2016 Concurrent Reclamation – Sites will be reclaimed. Decision on designating individual wells as monitoring locations will be made after testing has been conducted. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
APV-8	Geotechnical drilling for tunnel characterization	T1S, R13E, SE ¼ NW ¼ SE ¼ Section 11	Forest Service	Yes	0.29 ac	<ul style="list-style-type: none">60ft × 100ft drill pad sizeApproximately 1,200ft hole 12” surface casing then core drilled to TD with HQ (2.5”)Hydrological tests will be conducted in open hole	1 Lang LM-140 series tophead rotary drill rig 1 UDR-1500 Core Drill Rig 1 mud tank 1 Schram 685 Rotary Drill Rig 2 pipe trucks 1 water storage tank 2 generators for drill rigs 1 Cat bulldozer 1 track hoe 1 tracked jaw crusher	Length of Occupancy – December 31, 2016 Concurrent Reclamation – Sites will be reclaimed. Decision on designating individual wells as monitoring locations will be made after testing has been conducted. Closure – Drill hole abandonment will be conducted in accordance with AAC R12-15, ARS Title 45, Chapter 2, Article 10, as administered by the ADWR. Reclamation will be conducted in accordance with approved Plan of Operations.
Existing Access Road Improvements								
FR 315	Roadway improvements for access to H-C	T2S, R13E, portions of Sections 19, 20, and 30; T2S, R12E, portions of Section 25	Forest Service	Yes	[Note 1]	Improve approximately 3.6 miles of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. The contractor will provide a detailed traffic management plan and coordinate with the Department of Public Safety for access to Forest Roads from any state or federal highway to ensure public safety. Closure – Repair and maintain.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
FR 320	Roadway improvements for access to PVT-8	T1S, R14E, Section 7 S ½	Forest Service	Yes	[Note 1]	Improve approximately 0.6 mile of existing road FR 320 is located within the 1920s alignment of US 60. No adverse impact would occur to the site due to the implementation of the following procedures: <ul style="list-style-type: none">• Fill potholes will fill dirt• Use only rubber-tire vehicles• Cleanly remove ramps used to access drill pad• Keep vegetation removal to a minimum An archaeologist will monitor site construction.	1 front end loader 1 water truck	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. The contractor will provide a detailed traffic management plan and coordinate with the Department of Public Safety for access to Forest Roads from any state or federal highway to ensure public safety. Closure – Repair and maintain.
FR 898	Roadway improvements for access to APV-8	T1S, R13E, E ½ of Sections 11 and 14	Forest Service (a portion of FR 898 traverses privately owned lands)	Yes	[Note 1]	Improve approximately 0.7 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. The contractor will provide a detailed traffic management plan and coordinate with the Department of Public Safety for access to Forest Roads from any state or federal highway to ensure public safety. Closure – Repair and maintain.
FR 2261	Roadway improvements for access to H-C	T2S, R13E, portion of N ½ Section 20	Forest Service	Yes	[Note 1]	Improve approximately 0.3 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Repair and maintain.
FR 2440	Roadway improvements for access to drill sites QC-04 and MB-03	T2S, R12E, Sections 2 S ½ and 3 SE ¼	Forest Service (FR 2440 traverses privately owned lands located within the TNF)	Yes	[Note 1]	Improve approximately 0.9 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – Road will be maintained for access to monitoring well on Resolution fee land. The contractor will provide a detailed traffic management plan and coordinate with the Department of Public Safety for access to Forest Roads from any state or federal highway to ensure public safety. Closure – Extension: repair and maintain; remainder: close.
FR 2461	Improvements to an existing road and grading and clearing for extension of road to access PVT-5	T1S, R13E, Sections 22 SE ¼, 23 W ½, and 27 N ½	Forest Service	Partially	[Note 1]	Improve approximately 0.9 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Repair and maintain.
FR 2463	Roadway improvements for access to PVT-6	T1S, R13E, Section 23 N ½	Forest Service	Yes	[Note 1]	Improve approximately 0.5 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Close.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
FR 2466 (and small section of FR 2467)	Roadway improvements for access to various well sites and geotechnical borehole sites	T1S, R13E, Sections 22, 23, 26, 27, and 34; T2S, R13E, Section 4	Forest Service (a portion of FR 2466 extends onto adjacent State Lands)	Yes	[Note 1]	Improve approximately 4.2 miles of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. The contractor will provide a detailed traffic management plan and coordinate with the Department of Public Safety for access to Forest Roads from any state or federal highway to ensure public safety. Closure – Repair and maintain 2466; close small section of 2467.
FR 2469	Roadway improvements for access to shallow well site H-I	T1S, R13E, Sections 26 and 35; T2S, R13E, Section 3	Forest Service (a portion of FR 2469 extends onto adjacent State Lands)	Yes	[Note 1]	Improve approximately 1.7 miles of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Close.
FR 2505	Roadway improvements for access to APV-6	T1S, R13E, Section 23 S ½	Forest Service	No	[Note 1]	Improve approximately 0.5 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Close.
FR 2511	Potential roadway improvements for helicopter support and access to PVT-7	T1S, R13E, portions of S ½ Section 13 and N ½ Section 24	Forest Service	Yes	[Note 1]	Improve approximately 0.5 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Close.
FR 3139	Roadway improvements for access to H-C	T2S, R13E, portion of NE ¼ Section 20	Forest Service	Yes	[Note 1]	Improve approximately 0.4 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Close.
FR 3786	Roadway improvements for access to drill site MB-03	T2S, R12E, SW ¼ and SE ¼ Section 2	Forest Service	Yes	[Note 1]	Improve approximately 0.4 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – Road can be reclaimed when drilling is completed at QC-04. Closure – Reclaim.
Existing unidentified road from FR 315 to H-E	Roadway improvements to gain access to H-E	T2S, R13E, portions of N ½ Section 7 and SE ¼ Section 6	Forest Service	Yes	[Note 1]	Improve approximately 0.8 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Reclaim.
Existing unidentified road from FR 2440 to QC-04	Roadway improvements for access to drill site QC-04	T2S, R12E, NE ¼ Section 2	Forest Service	Yes	[Note 1]	Improve approximately 0.1 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – Road can be reclaimed when drilling is completed at QC-04. Closure – Reclaim.
Existing unidentified road from FR 2466 to H-F	Improvements to existing road for access to H-F	T1S, R13E, SE ¼ Section 27	Forest Service	Yes, heavily vegetated trail alignment	[Note 1]	Improve approximately 0.7 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Reclaim.

Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
Existing unidentified road from Highway 60 to PVT-9	Roadway improvements for access to PVT-9	T1S, R14E, Sections 5 SW ¼ and 8 NW ¼	Forest Service	Yes	[Note 1]	Improve approximately 0.1 mile of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. The contractor will provide a detailed traffic management plan and coordinate with the Department of Public Safety for access to Forest Roads from any state or federal highway to ensure public safety. Closure – Reclaim.
FR 315 (State Land)	Roadway improvements for access through State land to shallow hydrologic well site H-B (located on State land)	T2S, R13E, portions of E ½ Sections 8 and 17	State Land Dept	Yes	[Note 1]	Improve approximately 2.13 acres of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Repair and maintain.
Extension of FR 898 (Private)	Roadway improvements for access through privately owned land to tunnel characterization borehole APV-8 (located on Tonto National Forest)	T1S, R13E, portion of E ½ Section 14	Private	Yes	[Note 1]	Improve approximately 1.51 acres of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Repair and maintain.
Extension of FR 2440 (Private)	Roadway improvements for access through privately owned land to exploration sites QC-04 and MB-03 on Forest Lands	T2S, R12E, portion of S ½ Section 2	Private	Yes	[Note 1]	Improve 0.97 acres of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – None Closure – Repair and maintain.
Extension of FR 2466 and FR 2469 (State Land)	Roadway improvements for access through State land to shallow hydrologic well site H-I (located on Tonto National Forest)	T2S, R13E, portions of Sections 3 and 4	State Land Dept	Yes	[Note 1]	Improve 3.62 acres of existing road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – By-passed sections of road at hairpins will be ripped and seeded with a Forest Service-approved mix. Closure – Repair and maintain.
Existing Roads that Do Not Require Improvement but May Require Periodic Maintenance								
Magma Mine Road to PVT In-holding	Roadway maintenance	T1, R13E, W ½ Section 32	Forest Service	Yes	0.11 ac	Maintain roadway with minor grading and dressing	1 grader 1 front end loader 1 track dozer	Length of Occupancy – December 31, 2025 Concurrent Reclamation – None Closure – Repair and maintain.
Magma Mine Road	Main access to East Plant Site and drill site roads from US 60	T1S, R13E SW ¼ Section 28, SE ¼ Section 29, N ¾ Section 32	Forest Service	Yes	2.05 ac	Periodically repair and maintain existing road, including repaving, striping, guardrail repair, brushing, shoulder grading, etc.	1 grader 1 front end loader 1 track dozer	Length of Occupancy – December 31, 2025 Concurrent Reclamation – None Closure – Reclaim.
Magma Mine Road to #1	Provides access to Site #1	T1S, R13E, NW ¼, Section 32	Forest Service	Yes	0.13 ac	Maintain roadway with minor grading and dressing	1 grader 1 front end loader 1 track dozer	Length of Occupancy – December 31, 2025 Concurrent Reclamation – None Closure – Reclaim.
Magma Mine Road to PVT-3	Access to PVT-3	T1S, R13E, SE ¼ Section 29	Forest Service	Yes	0.14 ac	Maintain roadway with minor grading and dressing	1 grader 1 front end loader 1 track dozer	Length of Occupancy – December 31, 2025 Concurrent Reclamation – None Closure – Reclaim.
From (but not on) FR 2438 to FR 3153 (east)	General and emergency access	T1S, R13E, S ½ Section 8	Forest Service	Yes	0.49 ac	Maintain roadway with minor grading and dressing	1 grader 1 front end loader 1 track dozer	Length of Occupancy – December 31, 2025 Concurrent Reclamation – None Closure – Reclaim.

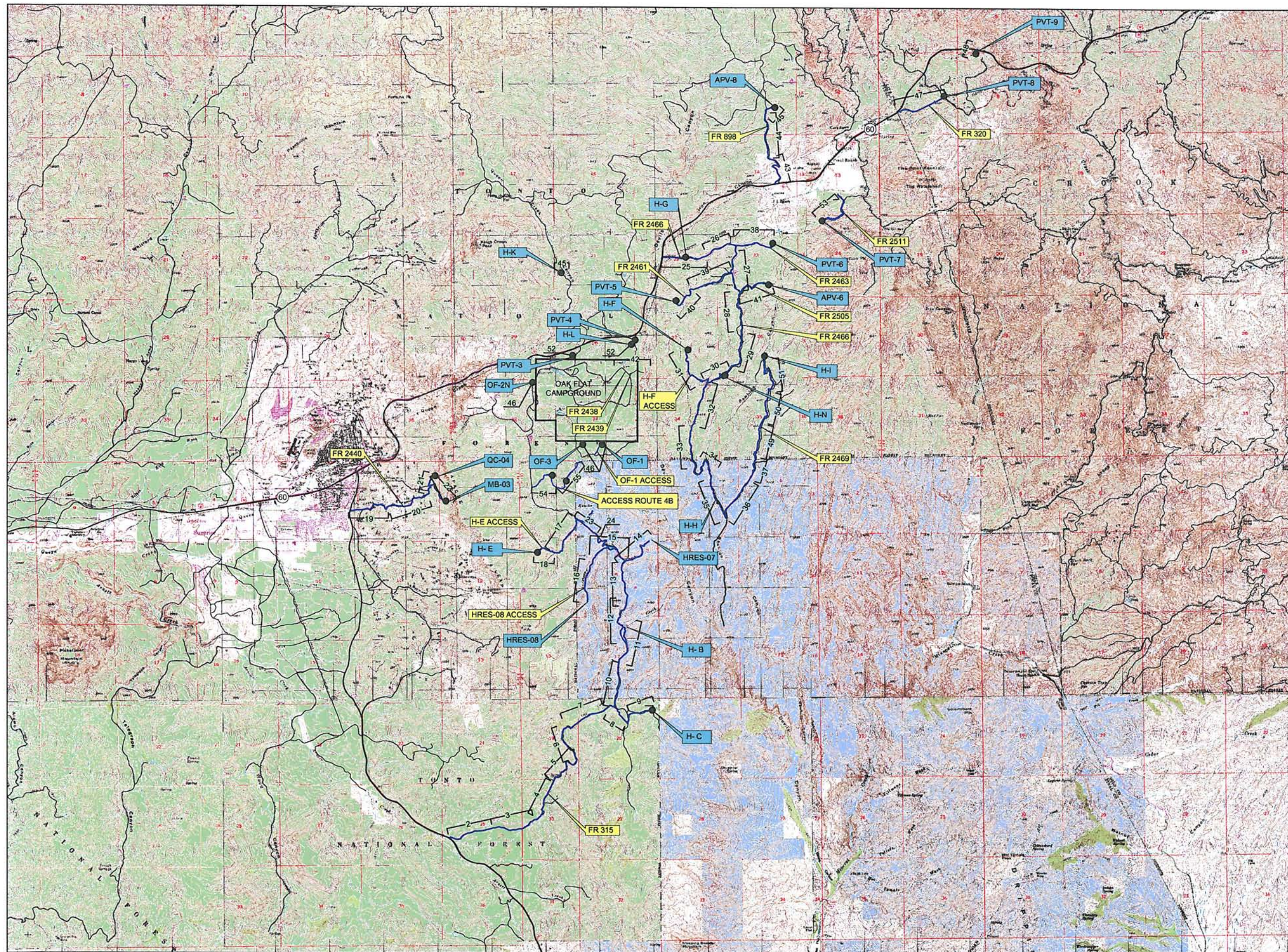
Resolution Copper Mining, LLC – Description of Proposed Activities on Tonto National Forest								
Activity Name	Purpose and Uses	Location	Land Ownership	Disturbance		Facility Description	Equipment Used	Phasing/Abandonment Generalized Schedule
				Within Existing Disturbance?	Estimated (new) Surface Disturbance			
From (but not on) FR 2438 to FR 3153	General and emergency access	T1S, R13E, N ½ Section 33	Forest Service	Yes	0.48 ac	Maintain roadway with minor grading and dressing	1 grader 1 front end loader 1 track dozer	Length of Occupancy – December 31, 2025 Concurrent Reclamation – None Closure – Reclaim.
FR 2438 to H-L and PVT-4	Access to H-L and PVT-4	T1S, R13E, SE ¼ Section 28, W ½ Section 27	Forest Service	Yes	0.78 ac	Maintain roadway with minor grading and dressing	1 grader 1 front end loader 1 track dozer	Length of Occupancy – December 31, 2025 Concurrent Reclamation – None Closure – Reclaim.
FR 3153 South to OF-1	Access to OF-1	T1S, R13E, W ½ Section 33	Forest Service	Yes	0.95 ac	Maintain roadway with minor grading and dressing	1 grader 1 front end loader 1 track dozer	Length of Occupancy – December 31, 2025 Concurrent Reclamation – None Closure – Reclaim.
New Access Roads								
2 new access roads from FR 2458 to H-K	Grading and clearing for new access roads to monitoring well H-K	T1S, R13E, SW ¼ SW ¼ Section 21	Forest Service	No	[Note 2]	Approximately 175 feet and 150 feet of new access road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – This road will be reclaimed when monitoring is no longer required. Closure – Reclaim.
New access road from FR 2461 to PVT-5	Grading and clearing for new access road to tunnel characterization borehole PVT-5	T1S, R13E, portions of N ½ Section 27	Forest Service	No (extension of existing FR 2461)	[Note 2]	Approximately 330 feet of new access road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – This road will be reclaimed when monitoring is no longer required for mine-planning purposes. Closure – Reclaim.
New access road from FR 3153 to OF-1	Grading and clearing for new access road to exploration drill site OF-1	T1S, R13E, SW ¼ SE ¼ Section 33	Forest Service	No	[Note 2]	Approximately 1,070 feet of new access road	1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – This road will be reclaimed when monitoring is no longer required for mine-planning purposes. Closure – Reclaim.
4B	New access road to 4W and 4E		Forest Service and State	No	[Note 2]		1 track hoe 1 hammer hoe 1 front end loader 1 water truck 1 tracked jaw crusher	Length of Occupancy – December 31, 2025 Concurrent Reclamation – This road will be reclaimed when monitoring is no longer required for mine-planning purposes. Closure – Reclaim.

Note 1: The maximum area of disturbance for existing road improvements was estimated using roadway profiles created with 2007 aerial imagery and 10-foot contour intervals. Approximately 29.51 acres of Forest System lands would be disturbed as a result of roadway improvements along portions of approximately 16.67 miles of existing access roads.

Note 2: The maximum area of disturbance for new roads was estimated using roadway profiles created with 2007 aerial imagery and 10-foot contour intervals and a maximum disturbance width of 15 feet. Approximately 2.69 acres of disturbance to Forest System lands would be required for the construction of 1.23 miles of new access roads.

APPENDIX B

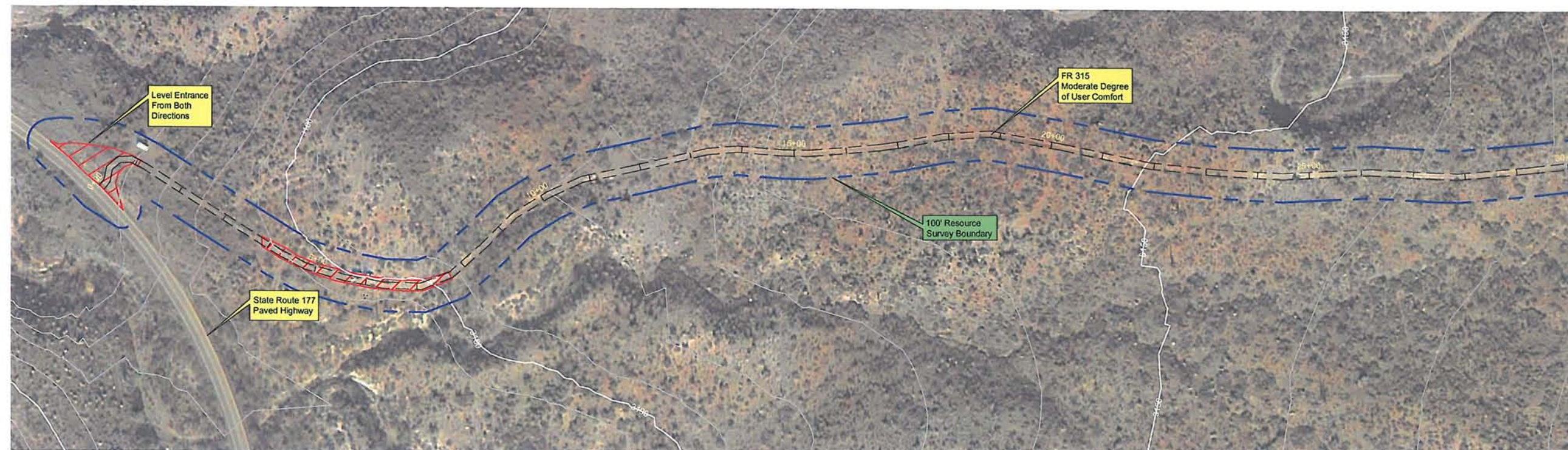
**RESOLUTION
COPPER MINING
PLAN VIEWS OF
PROPOSED ACTIVITIES
AND PROFILES OF
PROPOSED
ACCESS ROAD
IMPROVEMENTS
(SHEETS 1 THROUGH 55)**



- LEGEND**
- New or Improved Road
 - Well or Drill Site
 - Tonto National Forest
 - State Trust Lands
 - Sheet Number



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Equipment List

- Track Hoe
- Hammer Hoe
- Front End Loader
- Tracked Jaw Crusher
- Lang LM-140 Series Tophead
- Rotary Drill Rig Or Equivalent
- Pipe Trucks
- Backhoe
- Water Truck

This Sheet:

- Rework Entrance to Allow Entry From Both Directions (SR 177)
- Minimal New Surface Disturbance on Remaining Portions

T2S - R12E - SECTION 25

FR 315 PROFILE

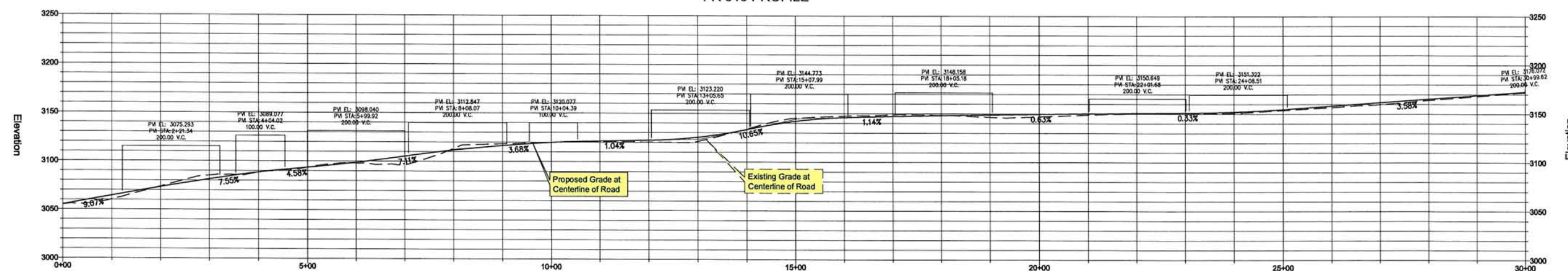


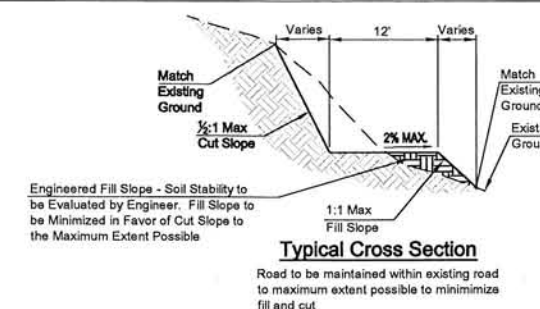
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience

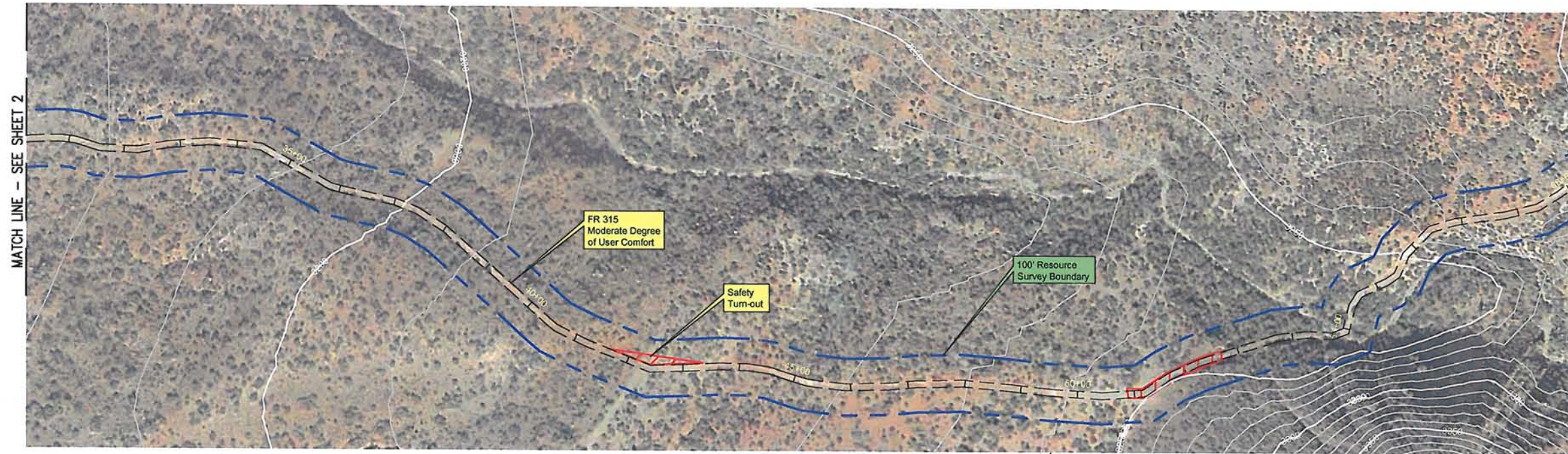


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RESOLUTION COPPER MINING, LLC

Resolution Pre-Feasibility Activities
FR 315 Improvements
Access To Shallow Well Site H-C

Sheet 2 of 55



Equipment List

- Track Hoe
- Hammer Hoe
- Front End Loader
- Tracked Jaw Crusher
- Lang LM-140 Series Tophead
- Rotary Drill Rig Or Equivalent
- Pipe Trucks
- Backhoe
- Water Truck

This Sheet:

- Providing Safety Turn-Out
- Minimal Disturbance on Remaining Portions

FR 315 PROFILE

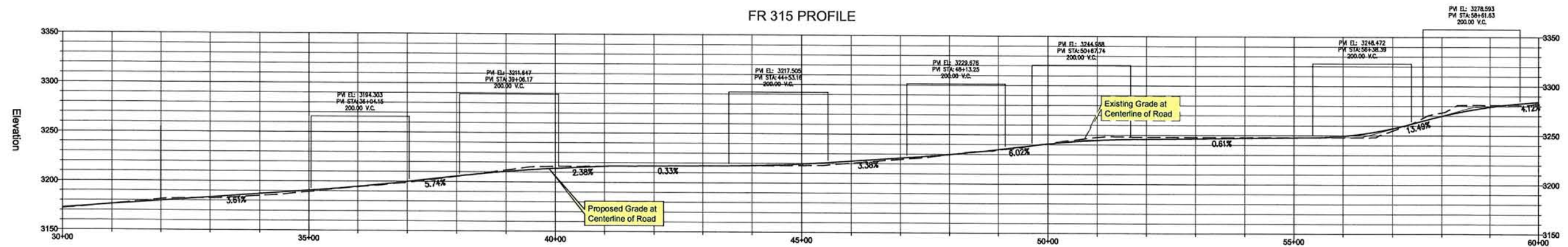


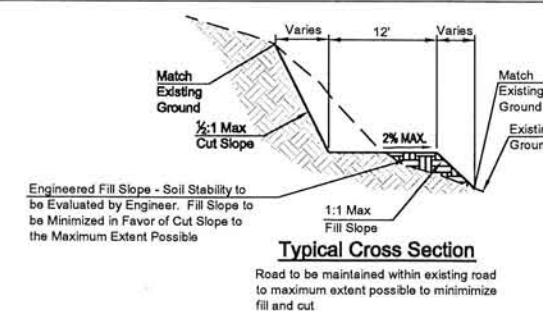
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
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Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

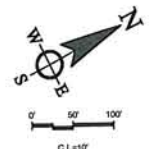
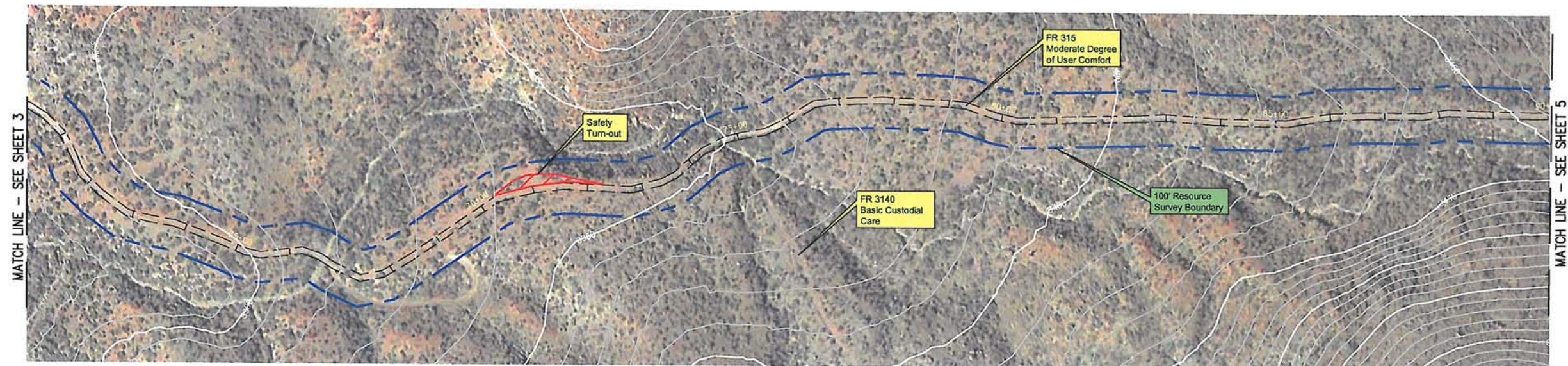
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
FR 315 Improvements
Access To Shallow Well Site H-C



- Equipment List**
- Track Hoe
 - Hammer Hoe
 - Front End Loader
 - Tracked Jaw Crusher
 - Lang LM-140 Series Tophead
 - Rotary Drill Rig Or Equivalent
 - Pipe Trucks
 - Backhoe
 - Water Truck

- This Sheet:**
- Providing Safety Turn-Out
 - Minimal Disturbance on Remaining Portions

T2S - R13E - SECTION 30

FR 315 PROFILE

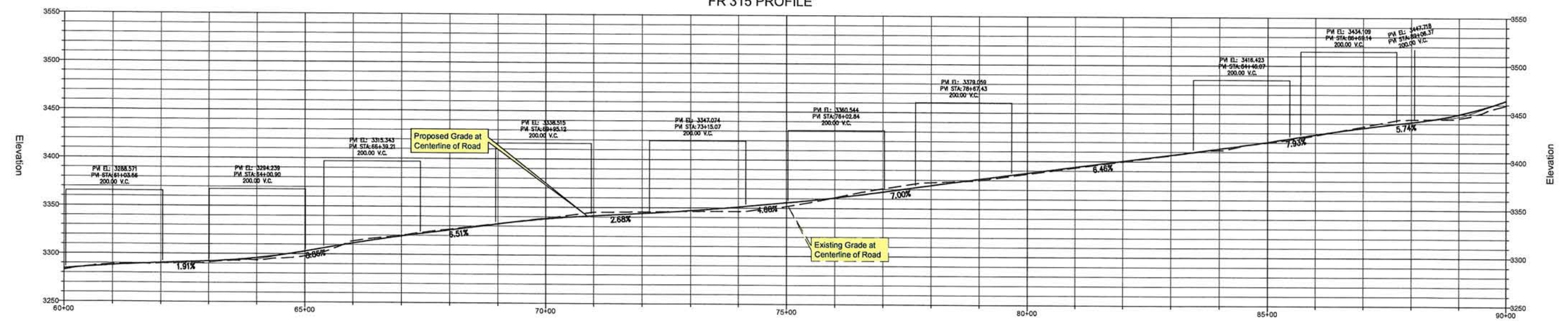
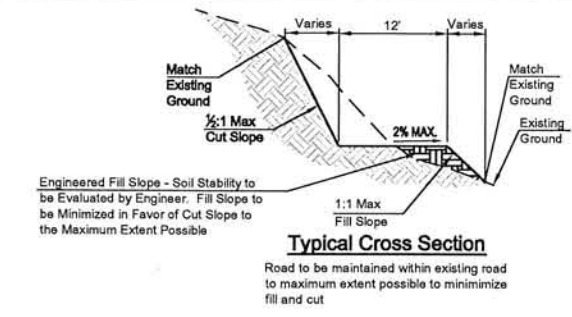


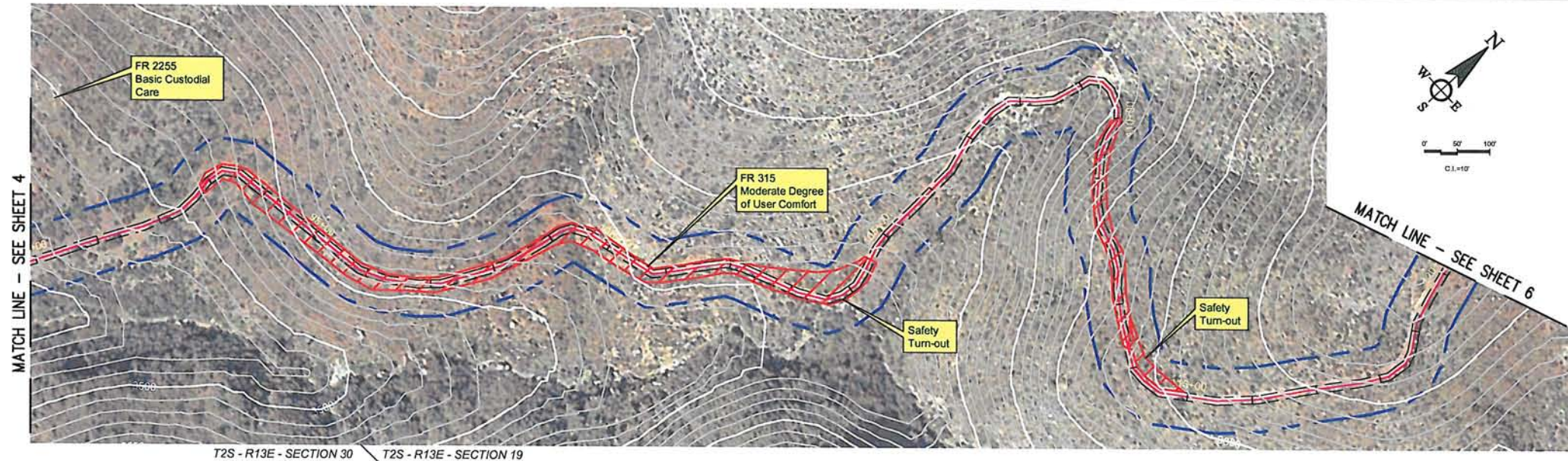
Image Source: Digit. Globe QuickBird Dataset
 Topographical Source: USGS NED Dataset
 Contour Interval= 10'
 PVI= Point of Vertical Intersection of Slopes
 VC = Vertical Curve Between Slopes to Avoid
 Abrupt Transition Between Grades

- Legend**
- Existing Road - To Be Improved
 - Approximate Area of Cut/ Fill
 - T-Post and Wire Clear Limit Fencing
 Note: All Fencing to be placed by Qualified Monitors Prior to Construction
 - National Forest Boundary
 - Resource Survey Area -
 Note: 100' Wide or Greater

- Forest Service Road Designations:**
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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 - 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
 - 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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- Equipment List**
- Track Hoe
 - Hammer Hoe
 - Front End Loader
 - Tracked Jaw Crusher
 - Lang LM-140 Series Tophead
 - Rotary Drill Rig Or Equivalent
 - Pipe Trucks
 - Backhoe
 - Water Truck

- This Sheet:**
- Providing Safety Turn-Outs
 - Grading for Treatment of Existing Topography
 - Minimal Disturbance on Remaining Portions

FR 315 PROFILE

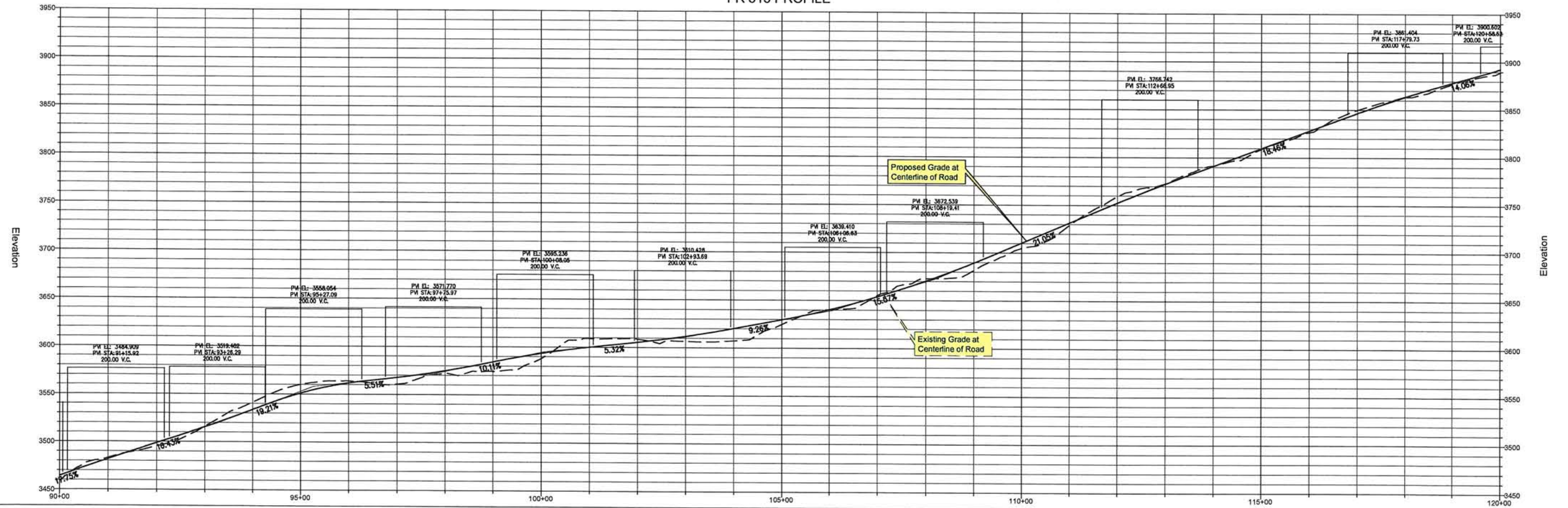


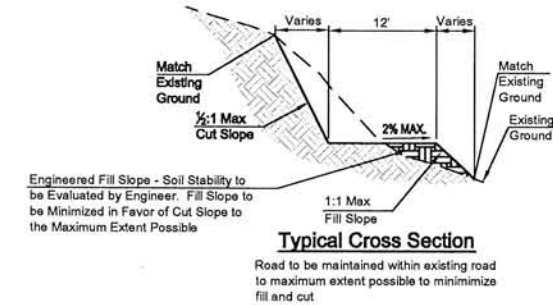
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Topographical Source: USGS NED Dataset
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PVI= Point of Vertical Intersection of Slopes
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

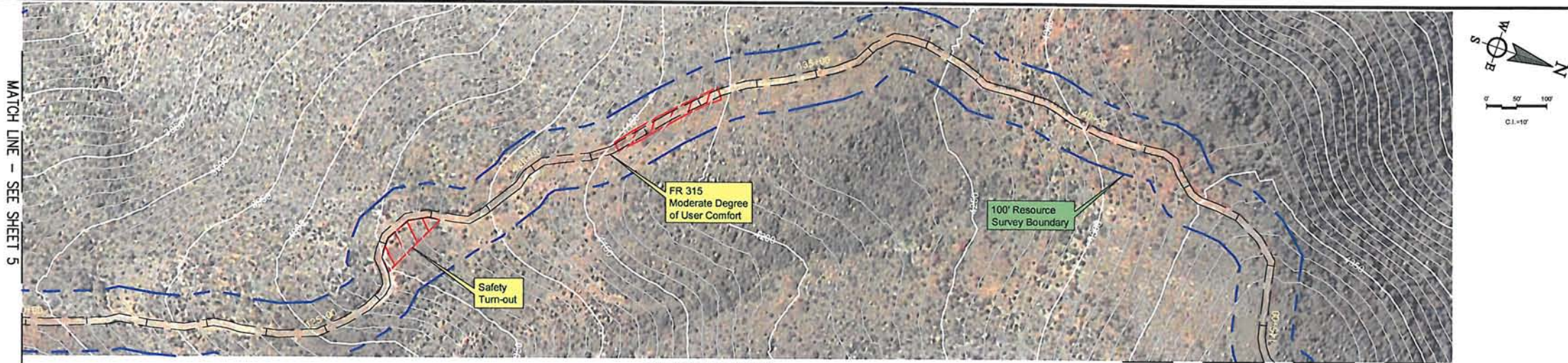
Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



RESOLUTION COPPER MINING, LLC

Resolution Pre-Feasibility Activities
FR 315 Improvements
Access To Shallow Well Site H-C



Equipment List

- Track Hoe
- Hammer Hoe
- Front End Loader
- Tracked Jaw Crusher
- Lang LM-140 Series Tophead
- Rotary Drill Rig Or Equivalent
- Pipe Trucks
- Backhoe
- Water Truck

This Sheet:

- Providing Safety Turn-Out
- Minimal Disturbance on Remaining Portions

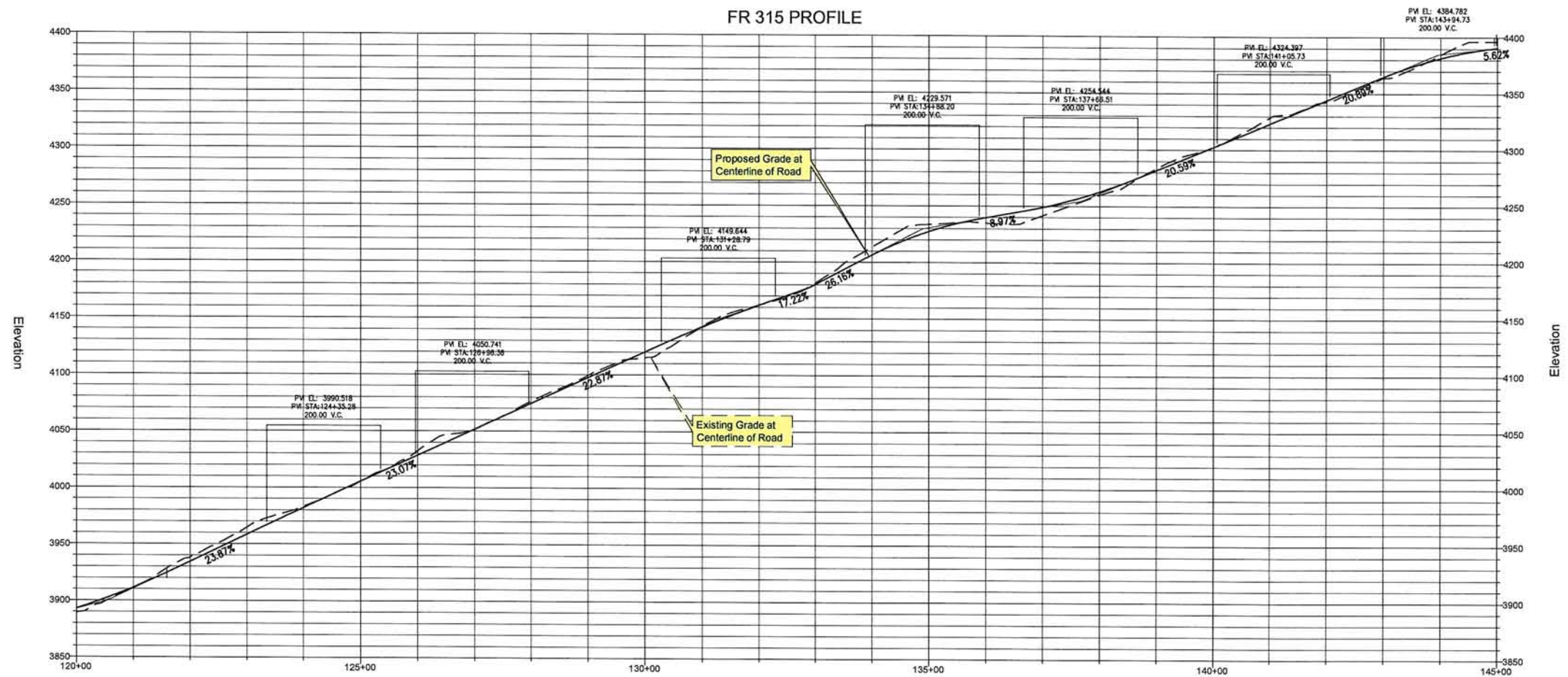


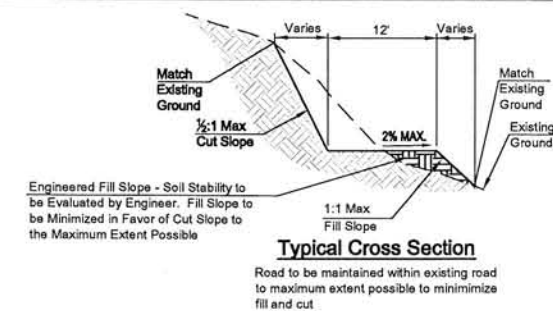
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

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Resolution Pre-Feasibility Activities
FR 315 Improvements
Access To Shallow Well Site H-C

Sheet 6 of 55



- This Sheet:**
- Providing Safety Turn-Out
 - Widening Bend for Safety
 - Minimal Disturbance on Remaining Portions

T2S - R13E - SECTION 19 / T2S - R13E - SECTION 20

FR 315 PROFILE

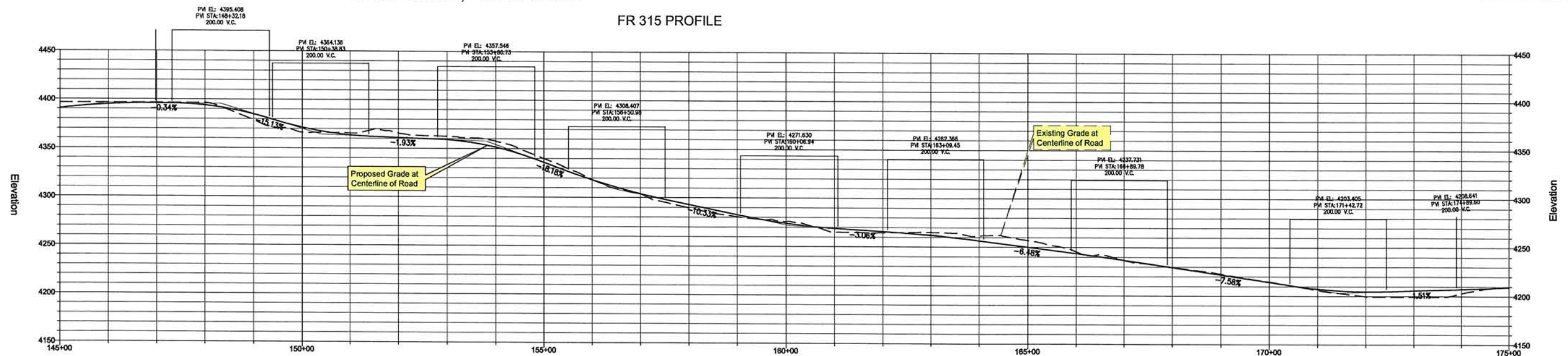


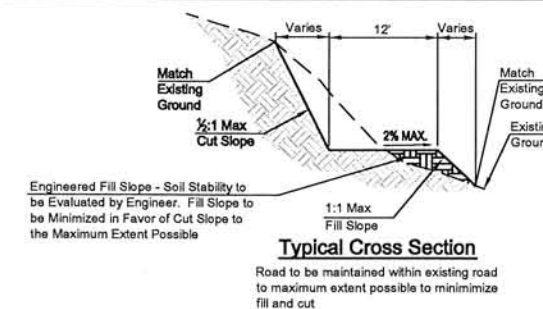
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Topographical Source: USGS NED Dataset
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
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- Resource Survey Area -
Note: 100' Wide or Greater

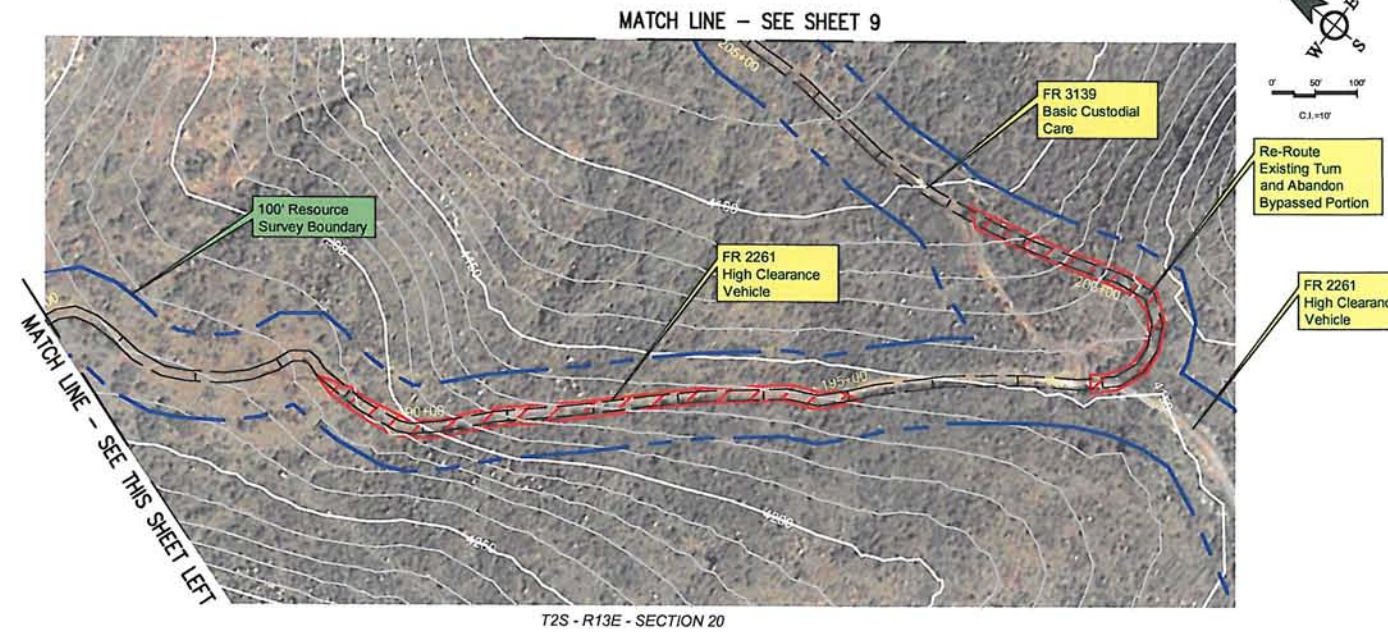
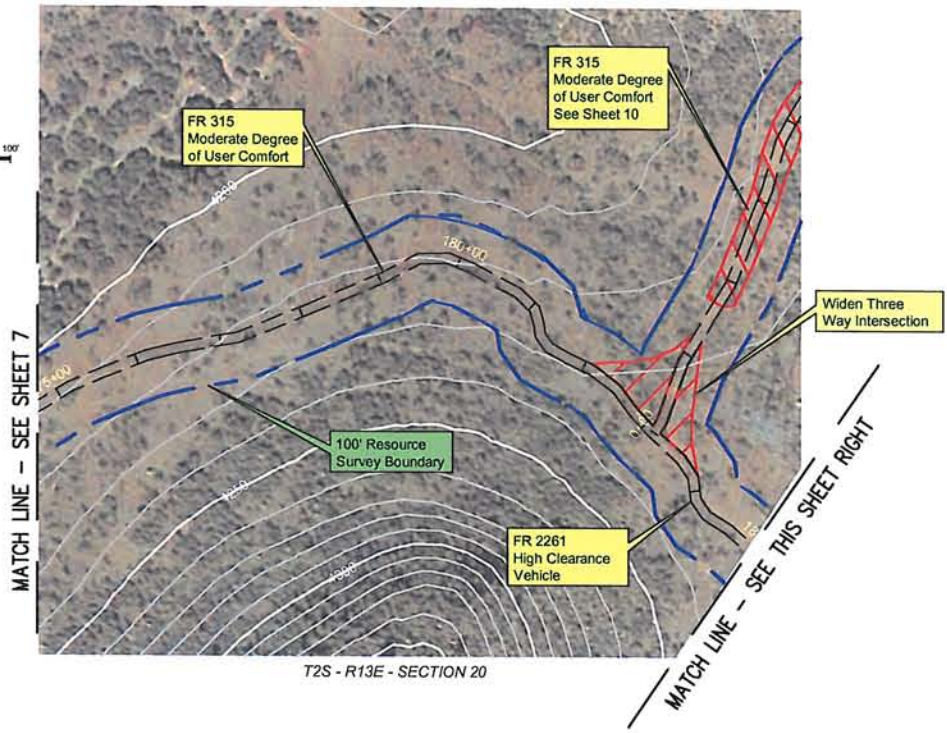
Forest Service Road Designations:

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RESOLUTION COPPER MINING, LLC

Resolution Pre-Feasibility Activities
FR 315 Improvements
Access To Shallow Well Site H-C



- Equipment List**
- Track Hoe
 - Hammer Hoe
 - Front End Loader
 - Tracked Jaw Crusher
 - Lang LM-140 Series Tophead
 - Rotary Drill Rig Or Equivalent
 - Pipe Trucks
 - Backhoe
 - Water Truck

- This Sheet:**
- Widening 3-Way Intersection
 - Re-Routing Existing Turn to Improve Radius
 - Minimal Disturbance on Remaining Portions

FR 315, FR 2261, AND FR 3139 PROFILE

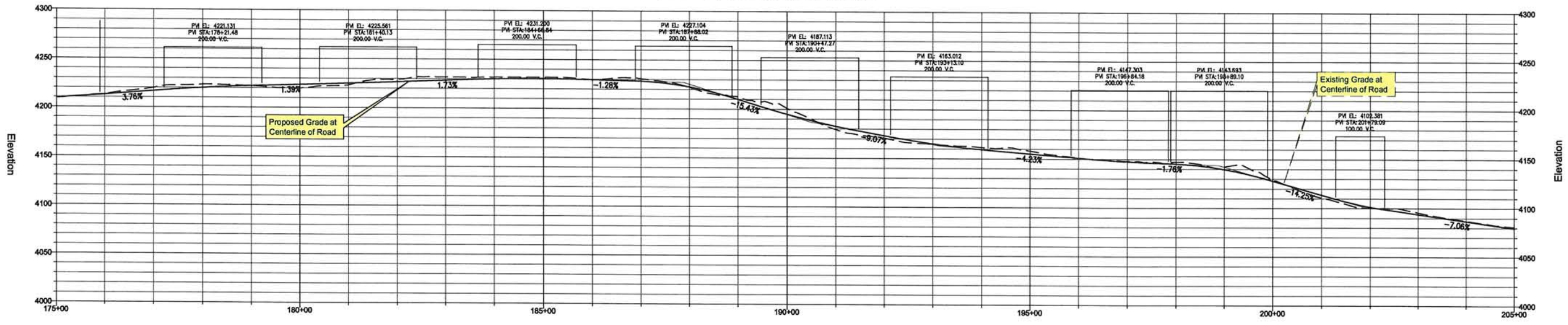
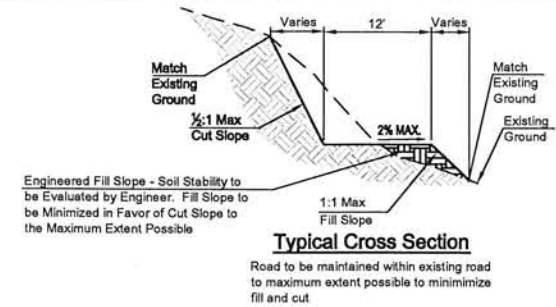


Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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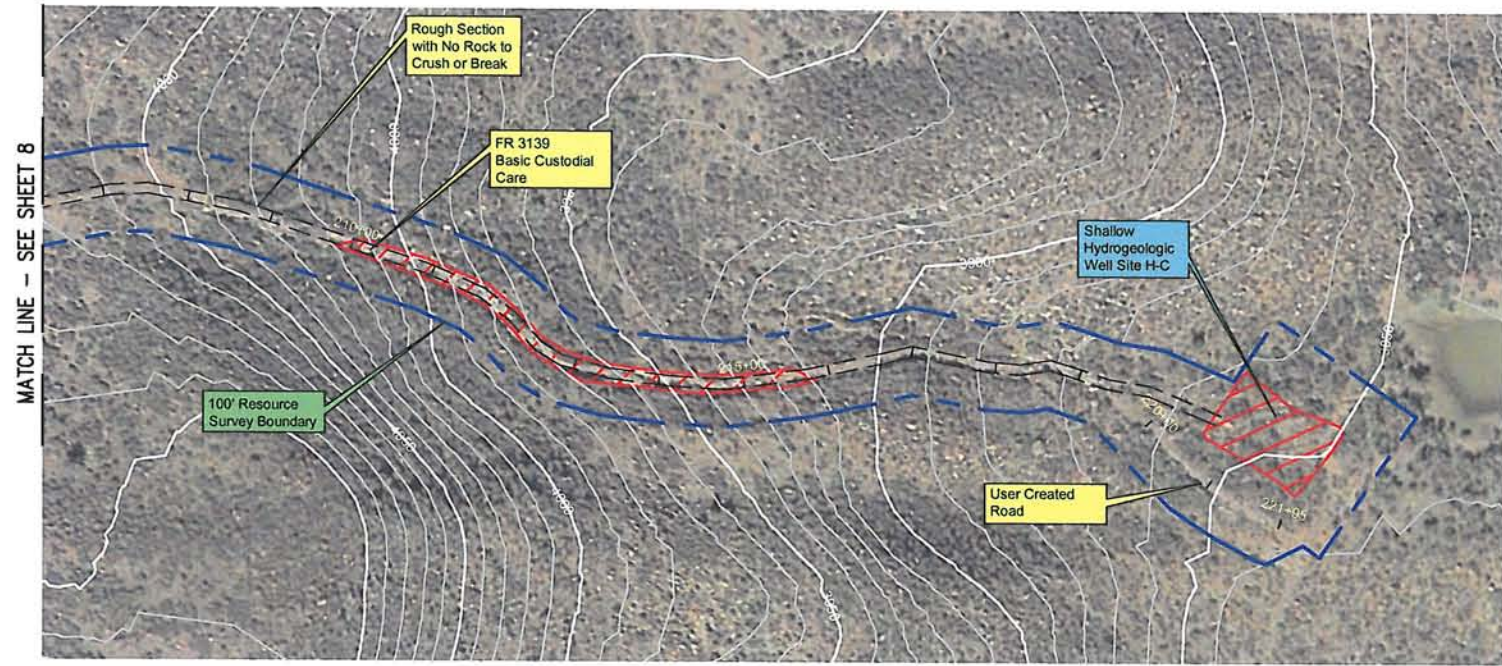
- Legend**
- Existing Road - To Be Improved
 - Approximate Area of Cut/ Fill
 - T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
 - National Forest Boundary
 - Resource Survey Area -
Note: 100' Wide or Greater

- Forest Service Road Designations:**
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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 - 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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RESOLUTION COPPER MINING, LLC
Resolution Pre-Feasibility Activities
FR 315, FR 2261, and FR 3139 Improvements
Access To Shallow Well Site H-C



- Equipment List**
- Track Hoe
 - Hammer Hoe
 - Front End Loader
 - Tracked Jaw Crusher
 - Lang LM-140 Series Tophead
 - Rotary Drill Rig Or Equivalent
 - Mud Tank
 - Heavy Duty Air Compressor
 - Pipe Trucks
 - Water Storage Tank
 - Generators For Drill Rig
 - Backhoe
 - Water Truck

- This Sheet:**
- Portions of Road Are Rough with No Rocks to Break or Crush
 - Reworking of Roadway Material Required - Possibly Bringing Fill from Upper Portions of Road.
 - Clearing and Grading for H-C Pad
 - An Archaeological Monitor Will Be Present for H-C Clearing Activities

T2S - R13E - SECTION 20

FR 3139 PROFILE

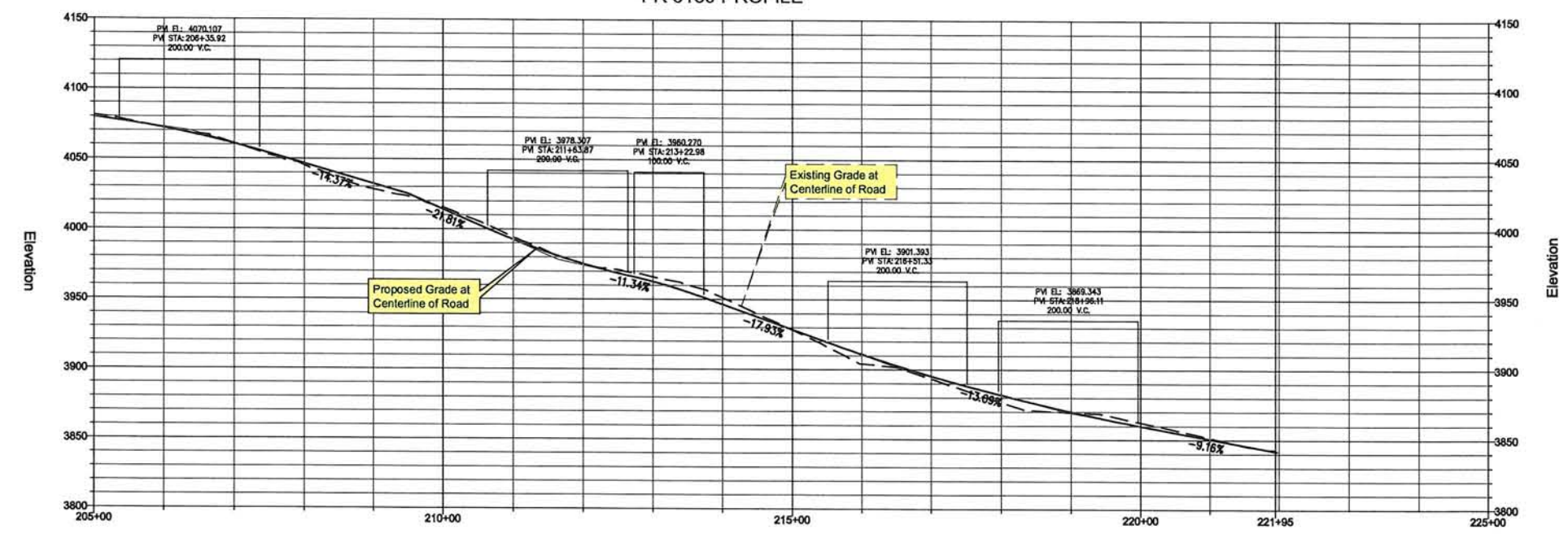
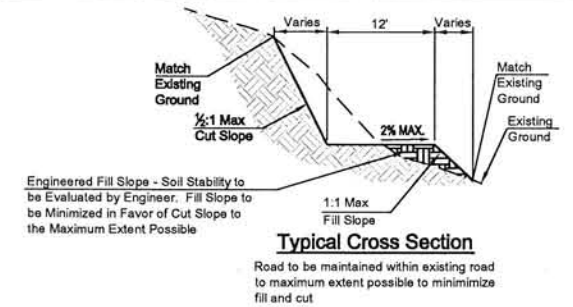


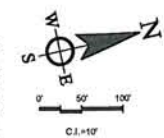
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

- Legend**
- Existing Road - To Be Improved
 - Approximate Area of Cut/Fill
 - T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
 - National Forest Boundary
 - Resource Survey Area -
Note: 100' Wide or Greater

- Forest Service Road Designations:**
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
 - 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
 - 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
 - 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
 - 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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- Equipment List**
- Track Hoe
 - Hammer Hoe
 - Front End Loader
 - Tracked Jaw Crusher
 - Lang LM-140 Series Tophead
 - Rotary Drill Rig Or Equivalent
 - Pipe Trucks
 - Backhoe
 - Water Truck

- This Sheet:**
- Minimal New Surface Disturbance - Grading of Existing Road on Forest Lands
 - Widening Portion of Road for Access

EXTENSION OF FR 315 PROFILE (PARTIALLY ON STATE LAND)

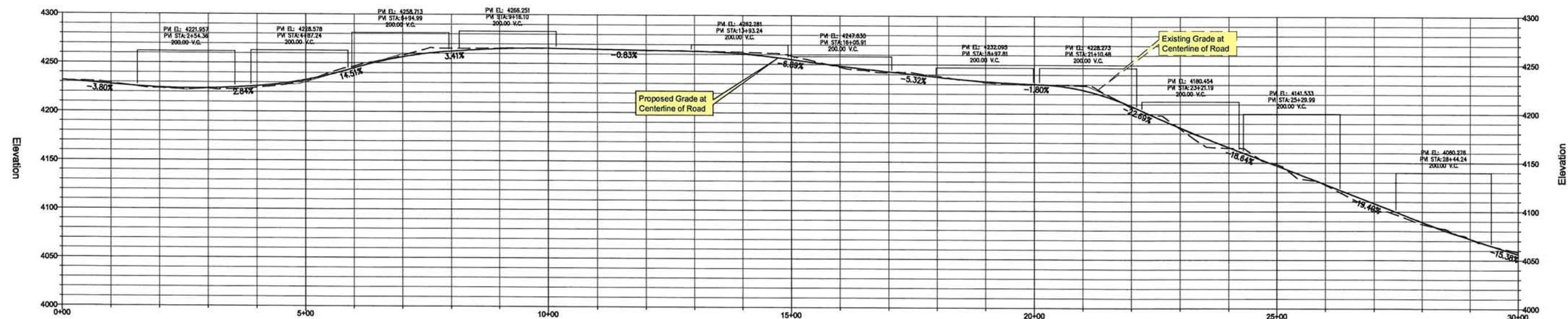


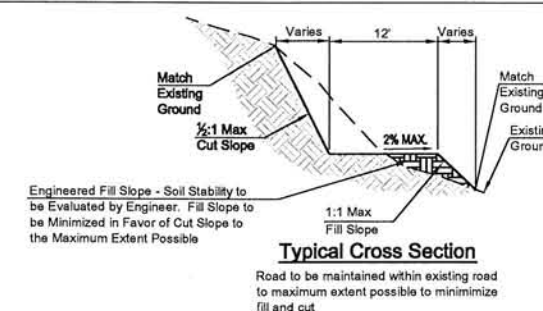
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Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

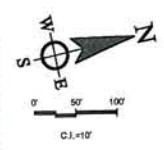
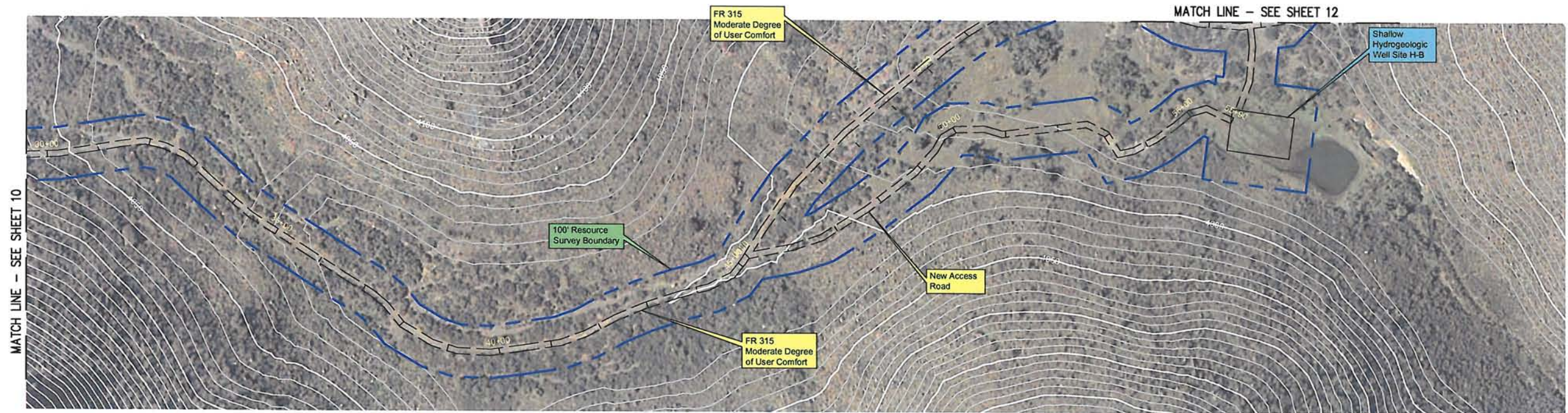
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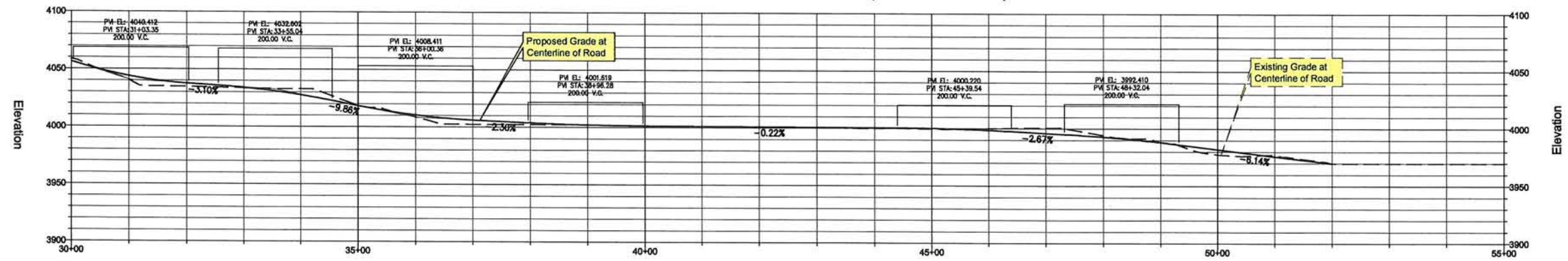
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Resolution Pre-Feasibility Activities
FR 315 Improvements
Partially on State Land



T2S - R13E - SECTION 17

EXTENSION OF FR 315 PROFILE (ON STATE LAND)



Equipment List
Track Hoe
Hammer Hoe
Front End Loader
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig Or Equivalent
Pipe Trucks
Backhoe
Water Truck

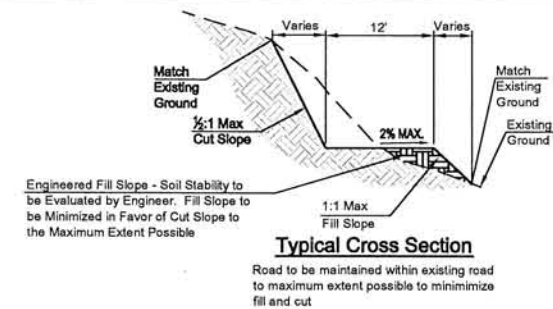
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Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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Abrupt Transition Between Grades

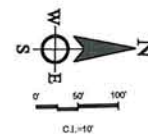
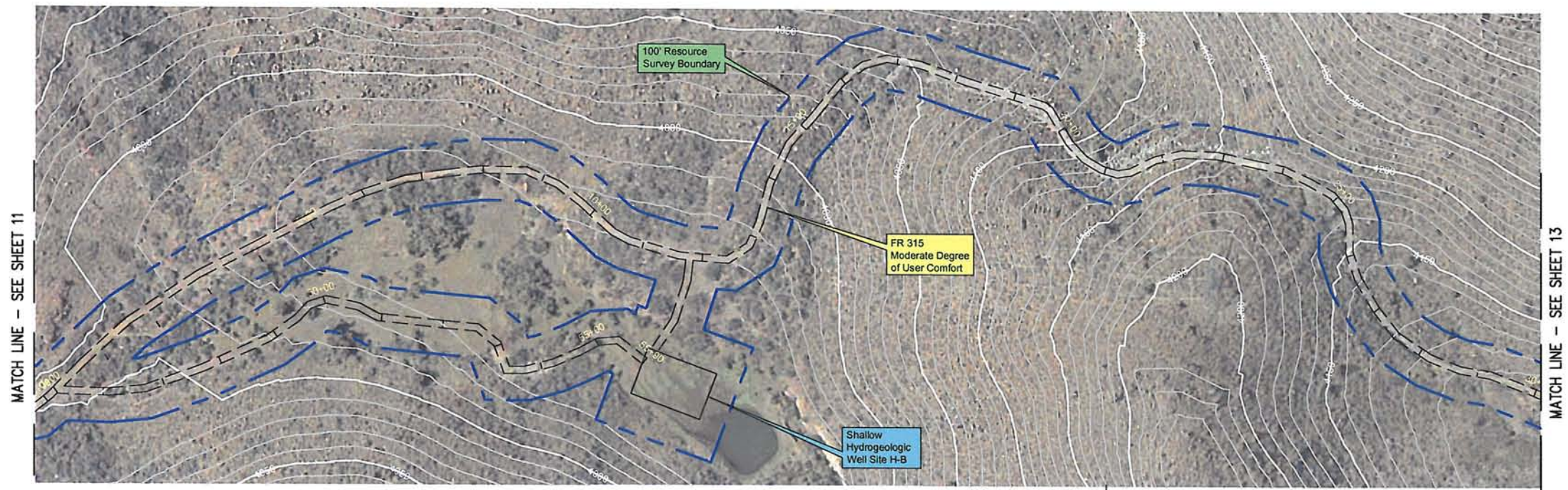
Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
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- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience





Equipment List	
Track Hoe	
Hammer Hoe	
Front End Loader	
Tracked Jaw Crusher	
Lang LM-140 Series Tophead	
Rotary Drill Rig Or Equivalent	
Pipe Trucks	
Backhoe	
Water Truck	

EXTENSION OF FR 315 PROFILE (ON STATE LAND)

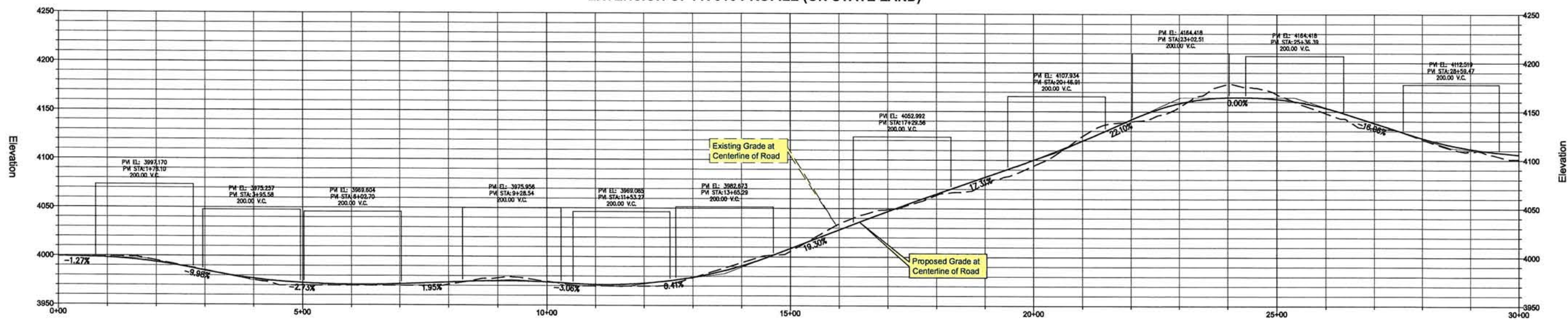


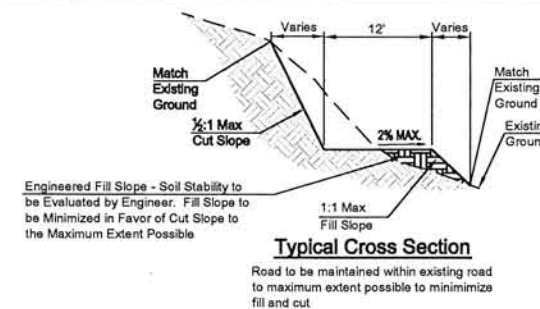
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

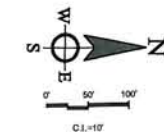
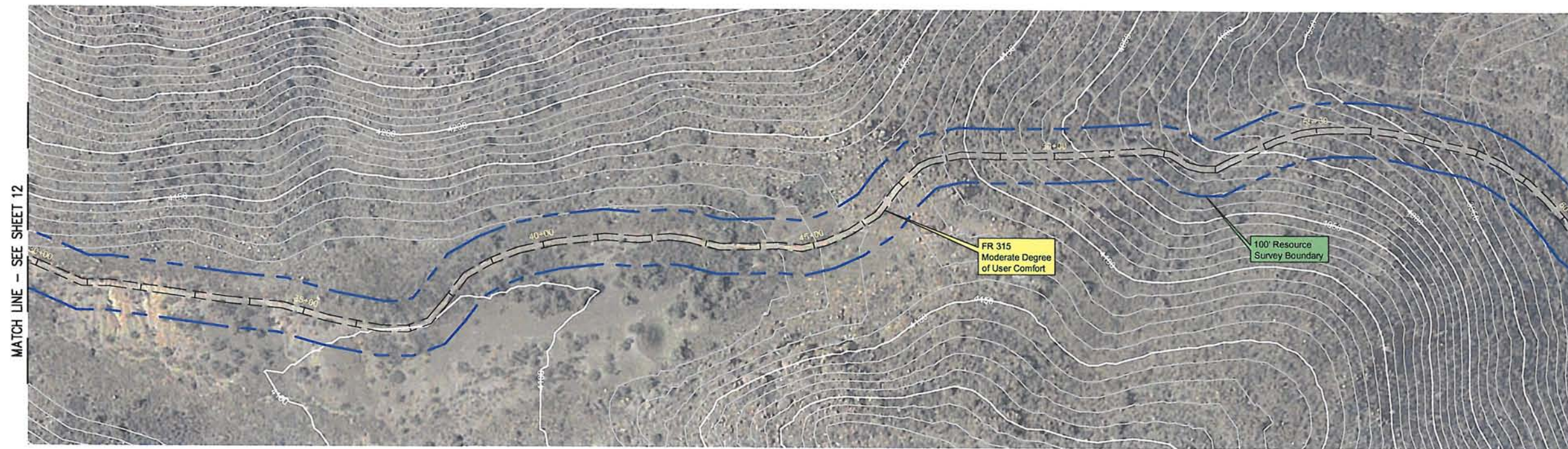
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- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
FR 315 Improvements
Access to Shallow Well Site H-B
on State Land

Sheet 12 of 55



Equipment List	
Track Hoe	
Hammer Hoe	
Front End Loader	
Tracked Jaw Crusher	
Lang LM-140 Series Tophead	
Rotary Drill Rig or Equivalent	
Pipe Trucks	
Backhoe	
Water Truck	

T2S - R13E - SECTION 8

EXTENSION OF FR 315 PROFILE (ON STATE LAND)

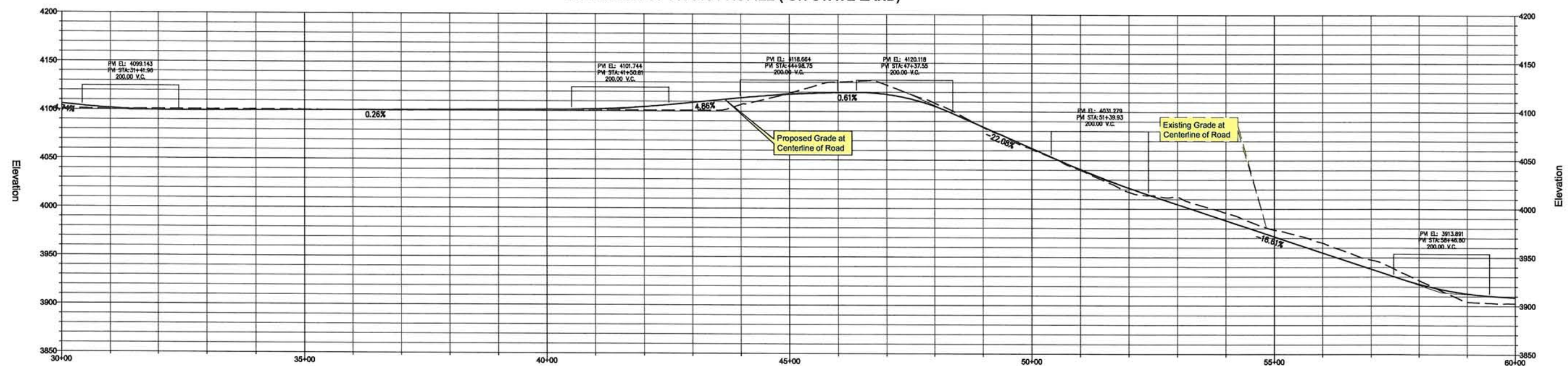


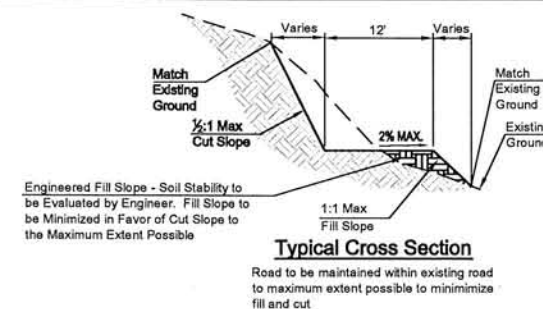
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

Legend

	Existing Road - To Be Improved
	Approximate Area of Cut/ Fill
	T-Post and Wire Clear Limit Fencing Note: All Fencing to be placed by Qualified Monitors Prior to Construction
	National Forest Boundary
	Resource Survey Area - Note: 100' Wide or Greater

Forest Service Road Designations:

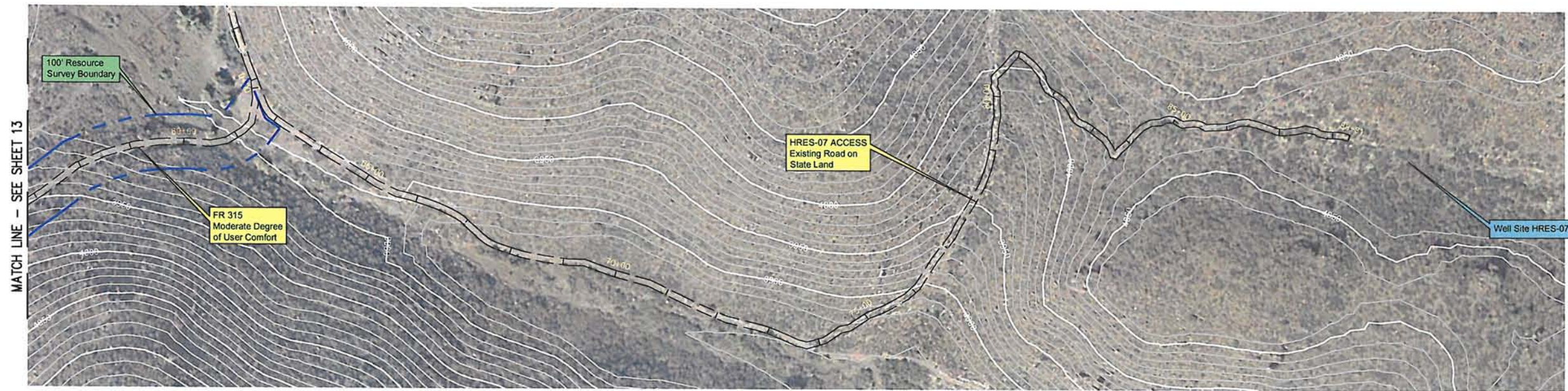
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Resolution Pre-Feasibility Activities
FR 315 Improvements
Access to Shallow Well Site H-B
on State Land
Sheet 13 of 55



T2S - R13E - SECTION 8

HRES-07 ACCESS PROFILE (OCCURS ON STATE LAND, WORK COMPLETED)

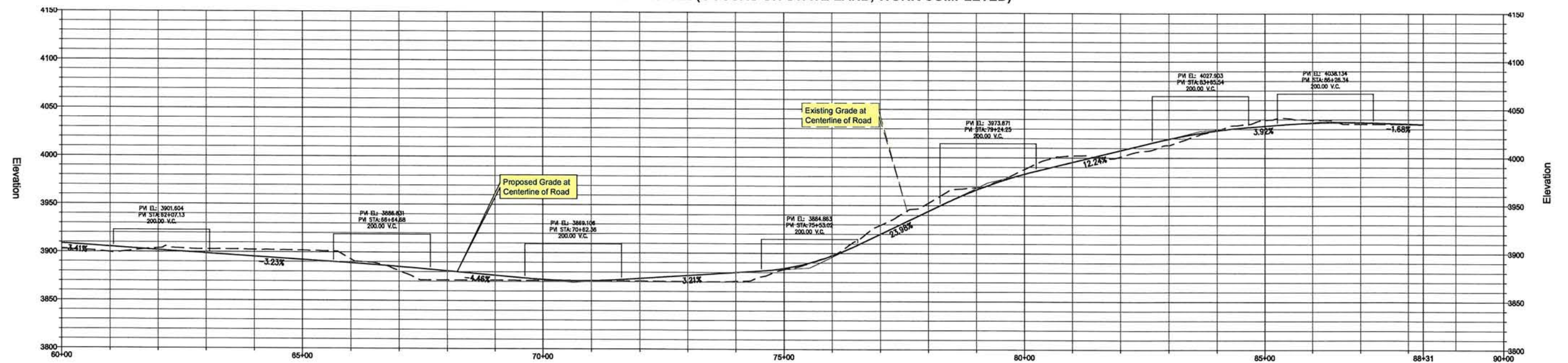


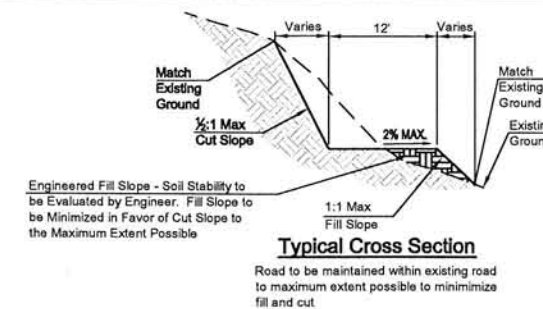
Image Source: Digit. Globe QuickBird Dataset
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Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

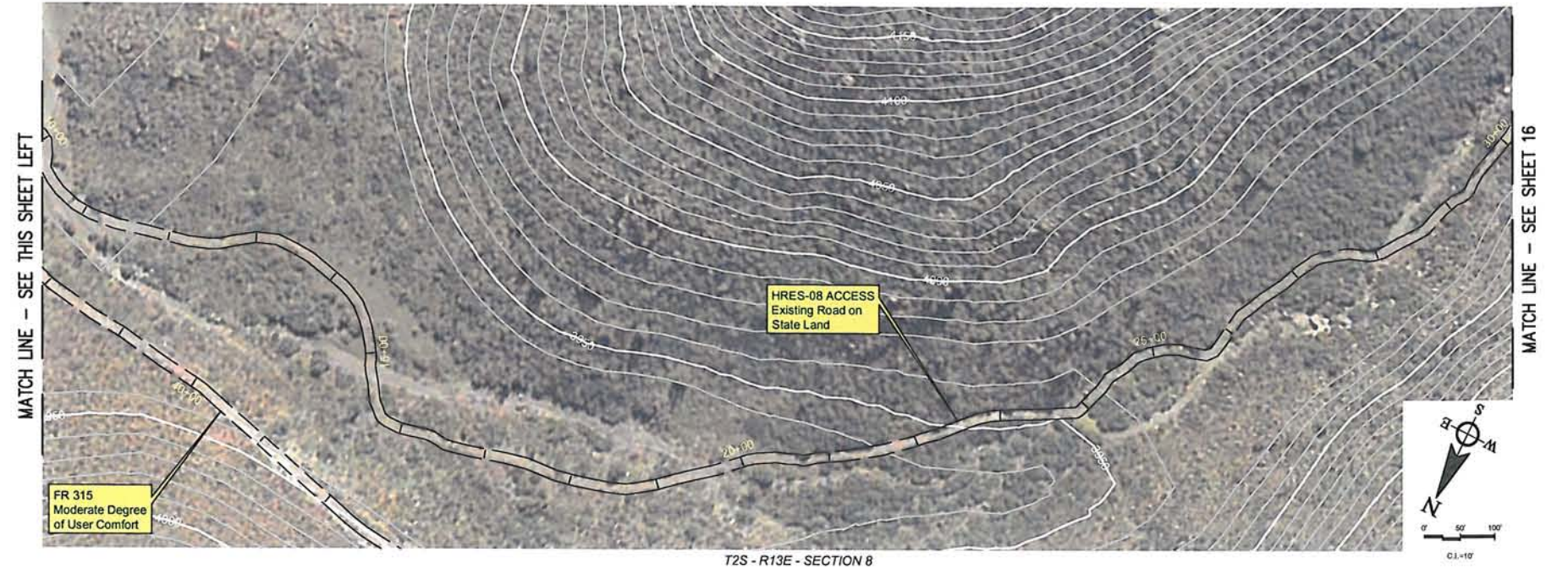
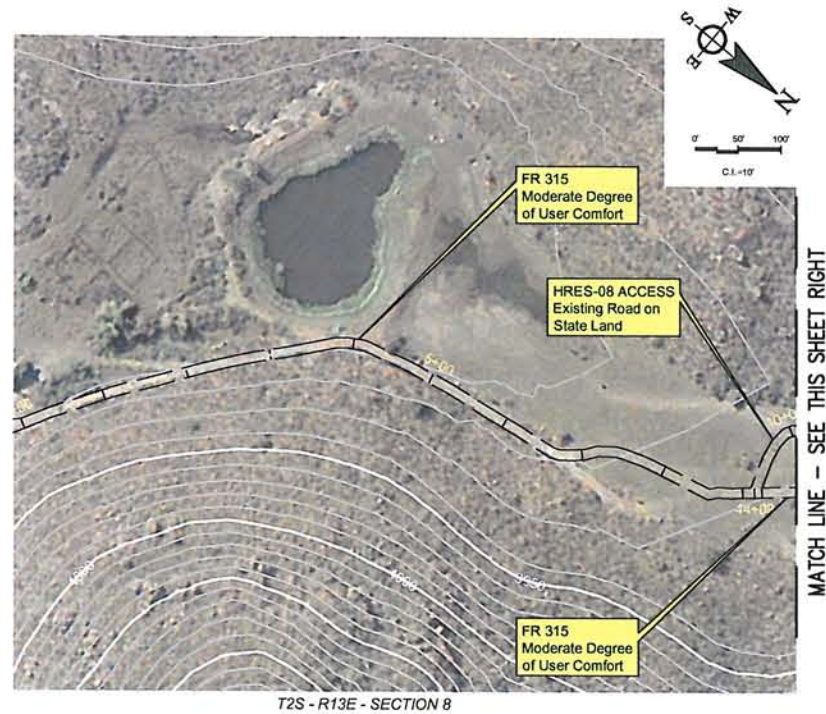
Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
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- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience





EXTENSION OF FR 315 AND HRES-08 ACCESS PROFILE (OCCURS ON STATE LAND, WORK COMPLETED)

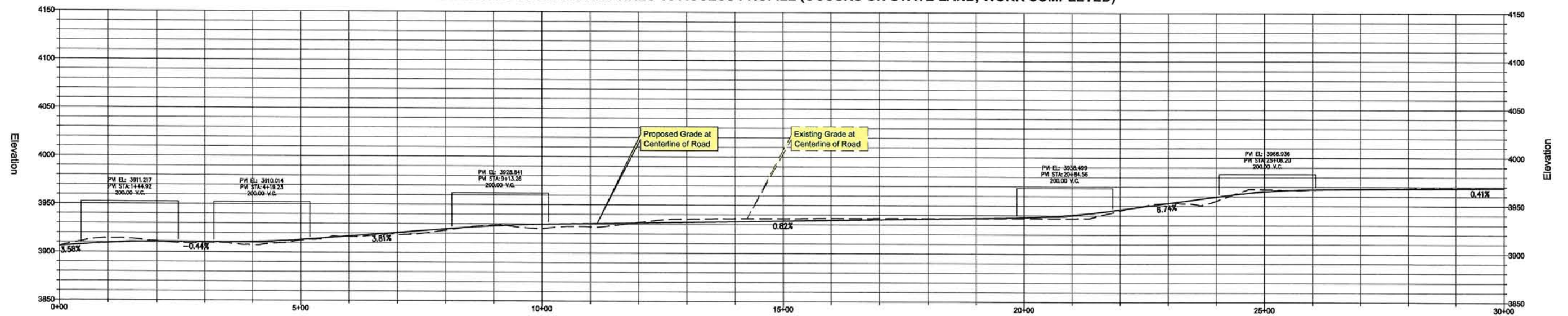
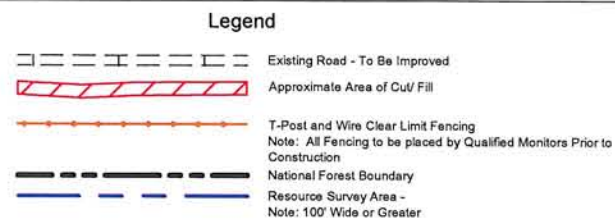
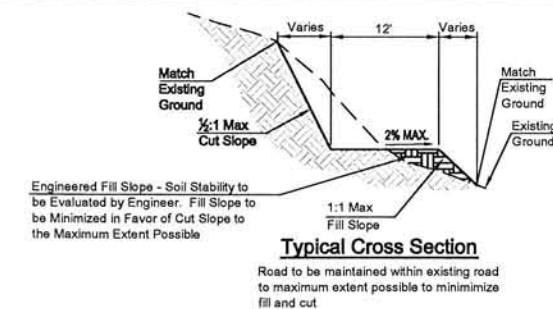


Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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Resolution Pre-Feasibility Activities
Access To Well Site HRES-08
on State Land (Completed)

Sheet 15 of 55

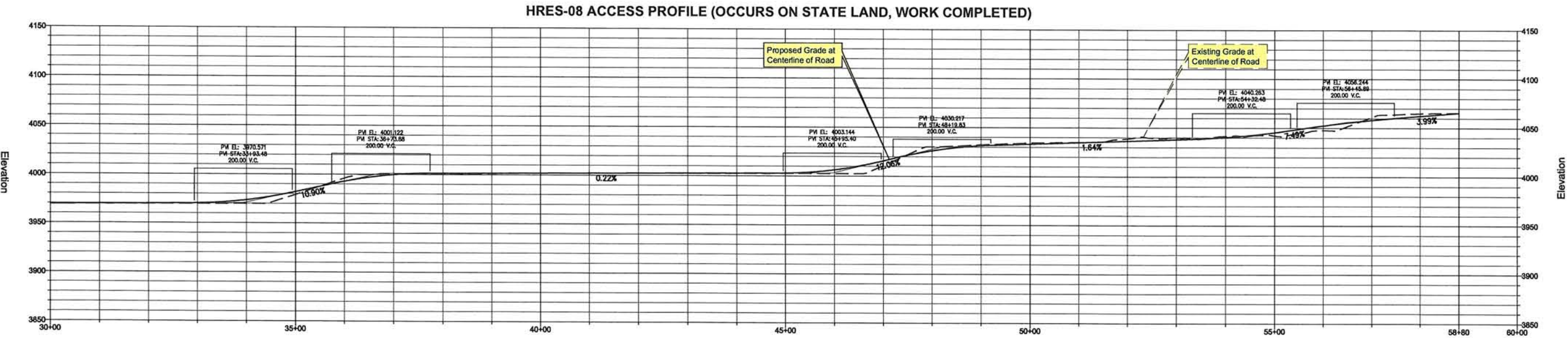
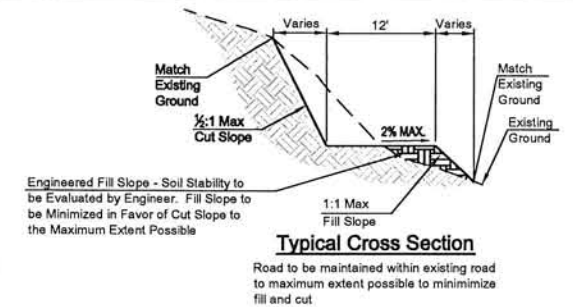


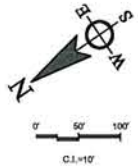
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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Abrupt Transition Between Grades

- Legend**
- Existing Road - To Be Improved
 - Approximate Area of Cut/ Fill
 - T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
 - National Forest Boundary
 - Resource Survey Area -
Note: 100' Wide or Greater

- Forest Service Road Designations:**
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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Equipment List
Track Hoe
Front End Loader
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig Or Equivalent
Pipe Trucks
Backhoe
Water Truck

- This Sheet:**
- Minimal New Surface Disturbance - Grading of Existing Road
 - Widening Turn for Safety
 - Widening 3-way Intersection

USER CREATED ROAD (H-E ACCESS) PROFILE

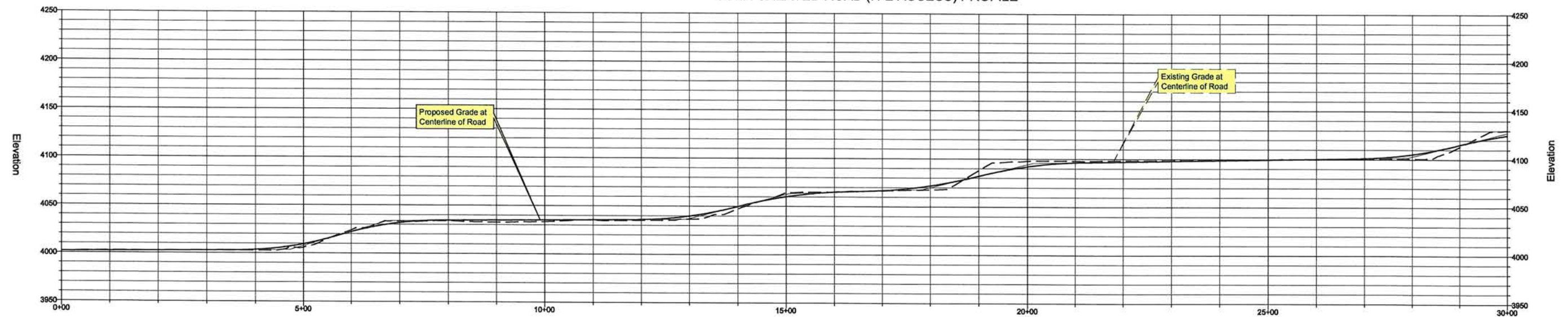
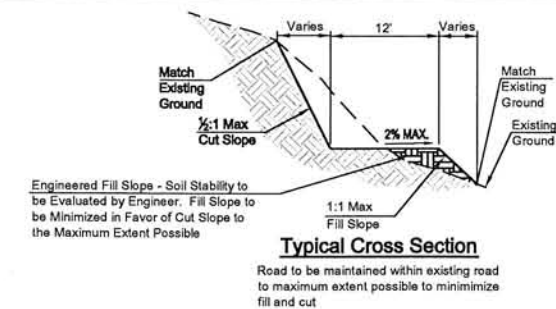


Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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- Legend**
- Existing Road - To Be Improved
 - Approximate Area of Cut/ Fill
 - T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
 - National Forest Boundary
 - Resource Survey Area -
Note: 100' Wide or Greater

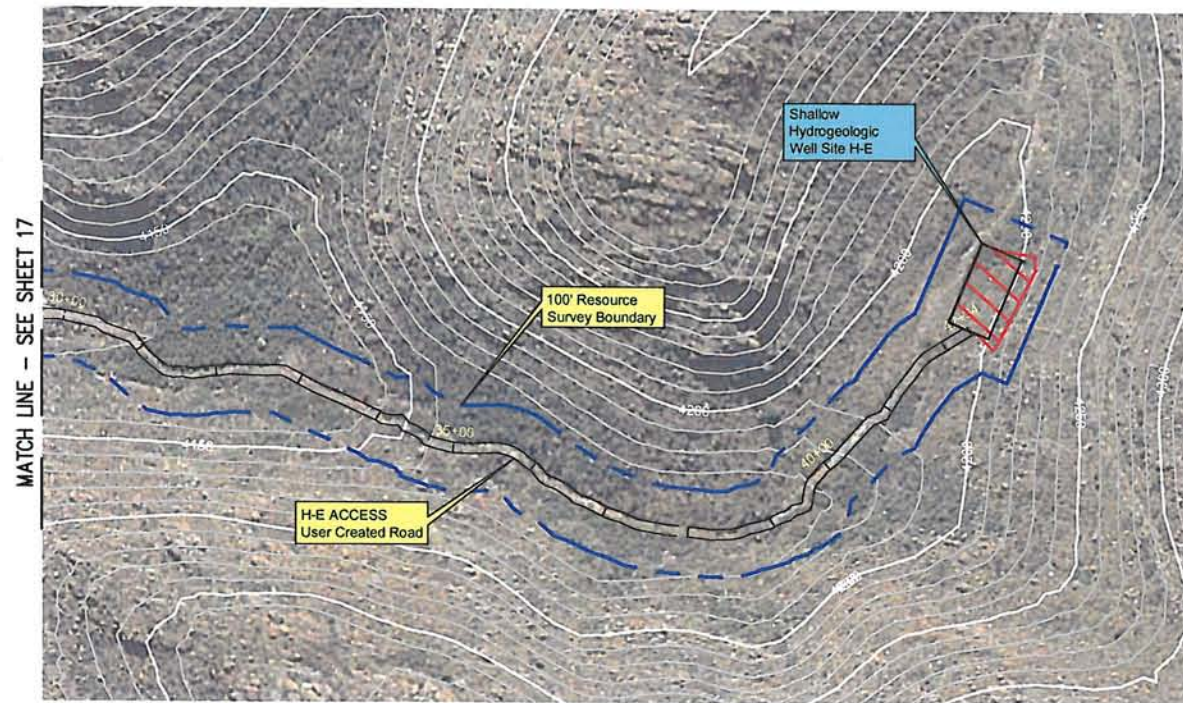
Forest Service Road Designations:

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Resolution Pre-Feasibility Activities
Improvements to User Created Road
Access To Shallow Well Site H-E



Equipment List

- Lang LM-140 Series Tophead
- Rotary Drill Rig Or Equivalent
- Mud Tank
- Heavy Duty Air Compressor
- Pipe Trucks
- Water Storage Tank
- Generators For Drill Rig
- Front End Loader
- Backhoe
- Tracked Jaw Crusher
- Water Truck

This Sheet:

- Minimal New Surface Disturbance - Grading of Existing Road
- Clearing and Grading for H-E Pad
- Rock Removed From Excavation of Drill Site H-E Will Be Crushed and Used to Dress Road Surface

T2S - R13E - SECTION 7

USER CREATED ROAD (H-E ACCESS) PROFILE

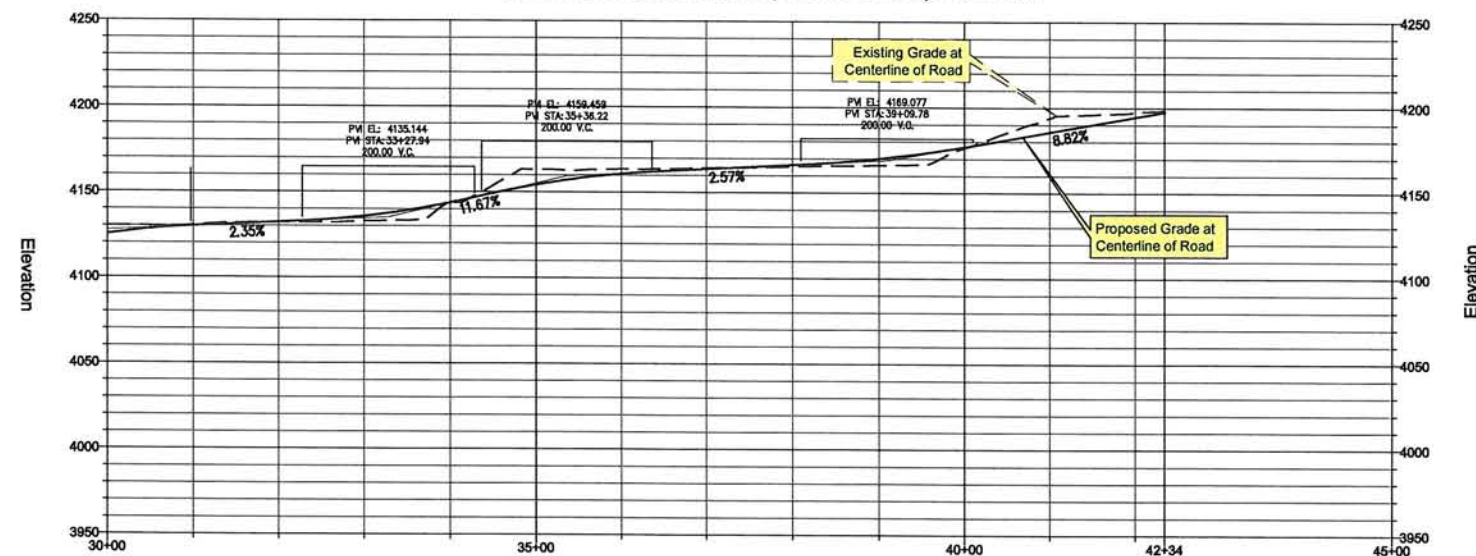


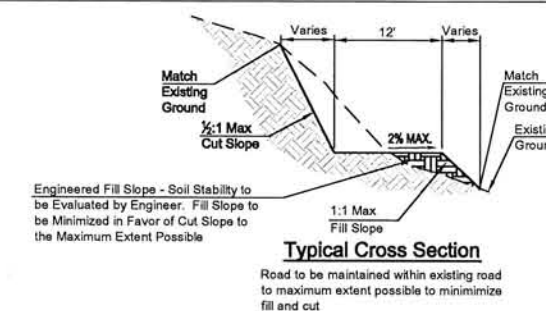
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

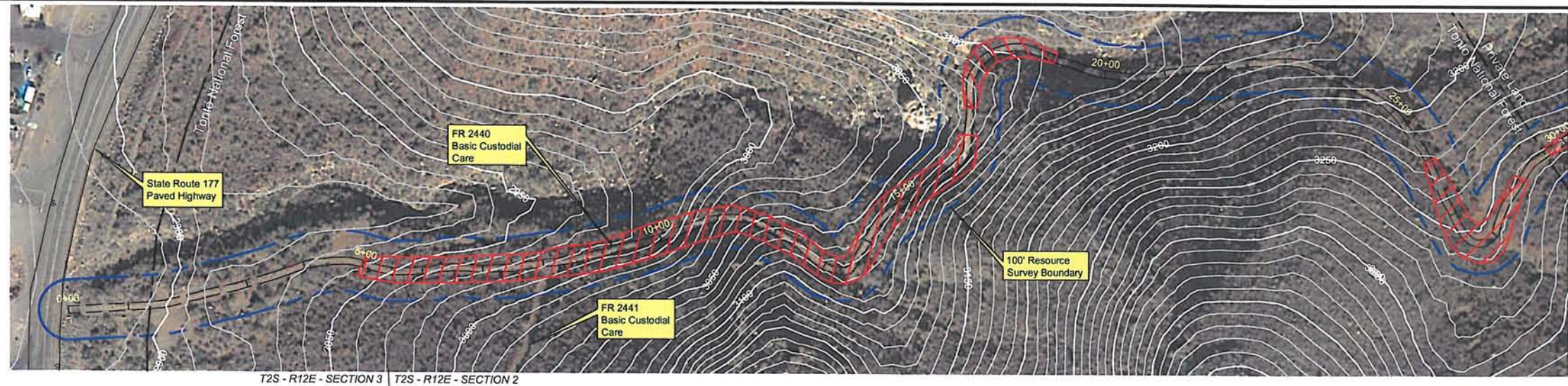
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Resolution Pre-Feasibility Activities
Improvements to User Created Road
Access To Shallow Well Site H-E



Equipment List

- Schram 685 Rotary Drill Rig
- Pipe Trucks
- Cat Bulldozer
- Track Hoe
- Hammer Hoe
- Front End Loader
- Tracked Jaw Crusher
- Water Truck
- LF-90 Rotary Drill Rig

This Sheet:

- Grading of Existing Road
- Widening Turns for Safety

FR 2440 PROFILE

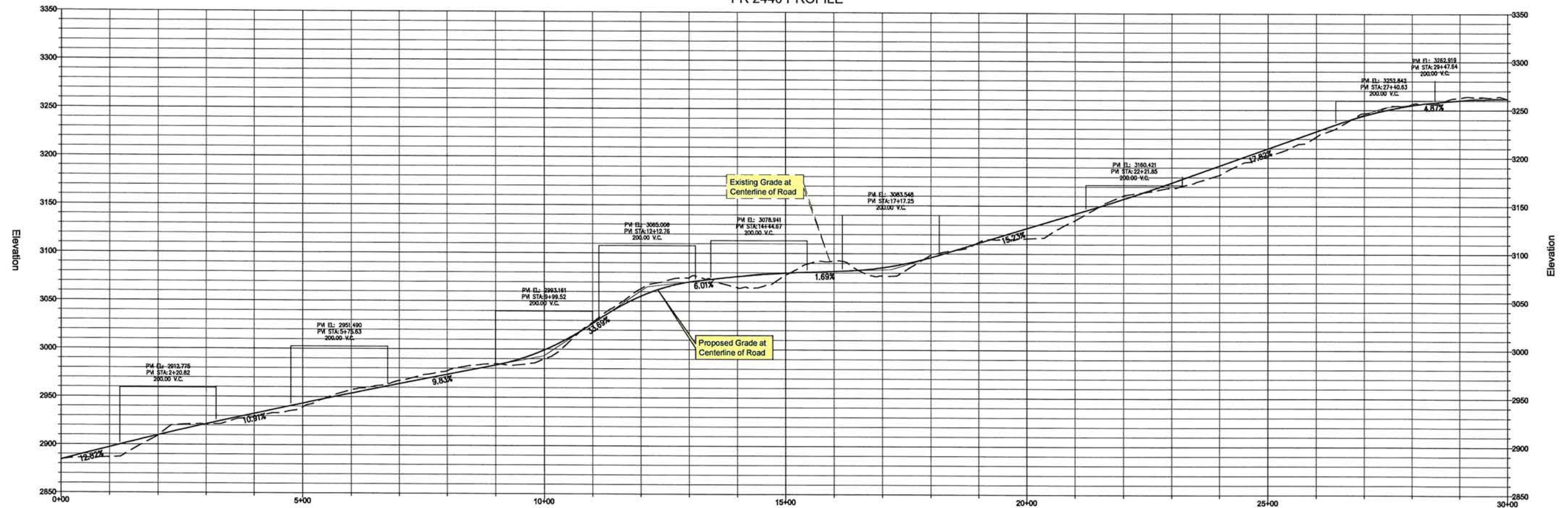


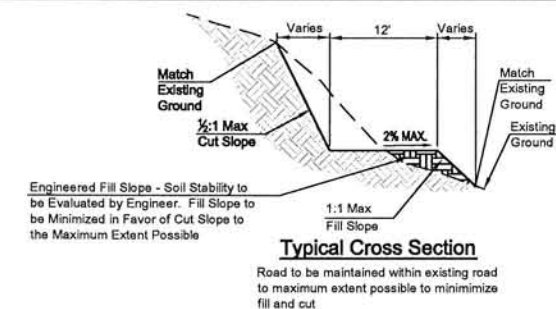
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

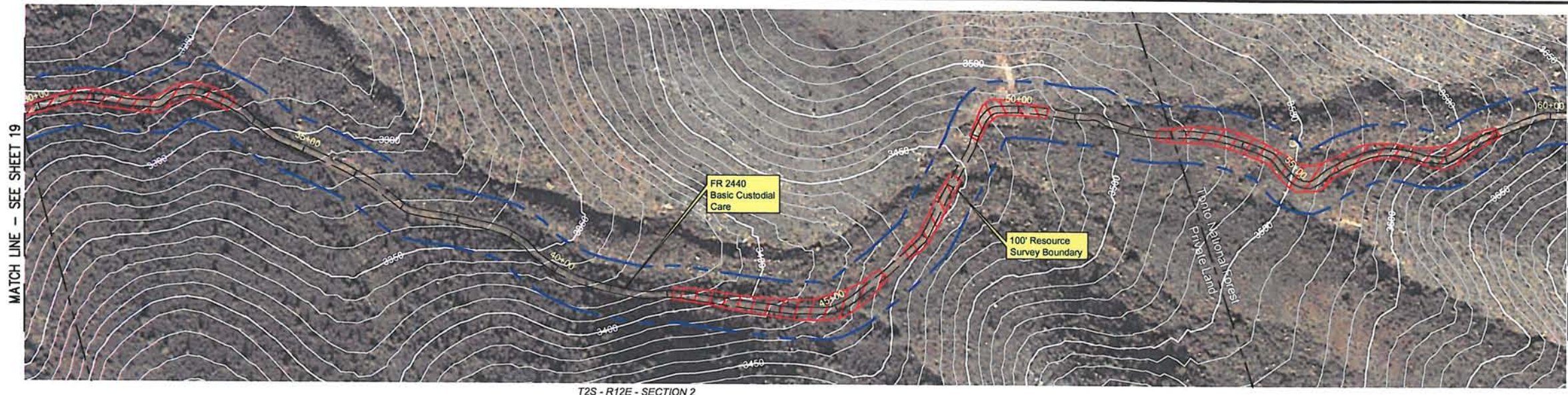
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Resolution Pre-Feasibility Activities
FR 2440 Improvements
Access To Exploration Sites
QC-4 And MB-03
Sheet 19 of 55



- Equipment List**
- Schram 685 Rotary Drill Rig
 - Pipe Trucks
 - Cat Bulldozer
 - Track Hoe
 - Hammer Hoe
 - Front End Loader
 - Tracked Jaw Crusher
 - Water Truck
 - LF-90 Rotary Drill Rig

- This Sheet:**
- Grading of Existing Road
 - Widening Turn for Safety
 - An Archaeological Monitor Will Be Present for Clearing Activities Within AR-03-12-02-1517(TNF)

FR 2440 PROFILE

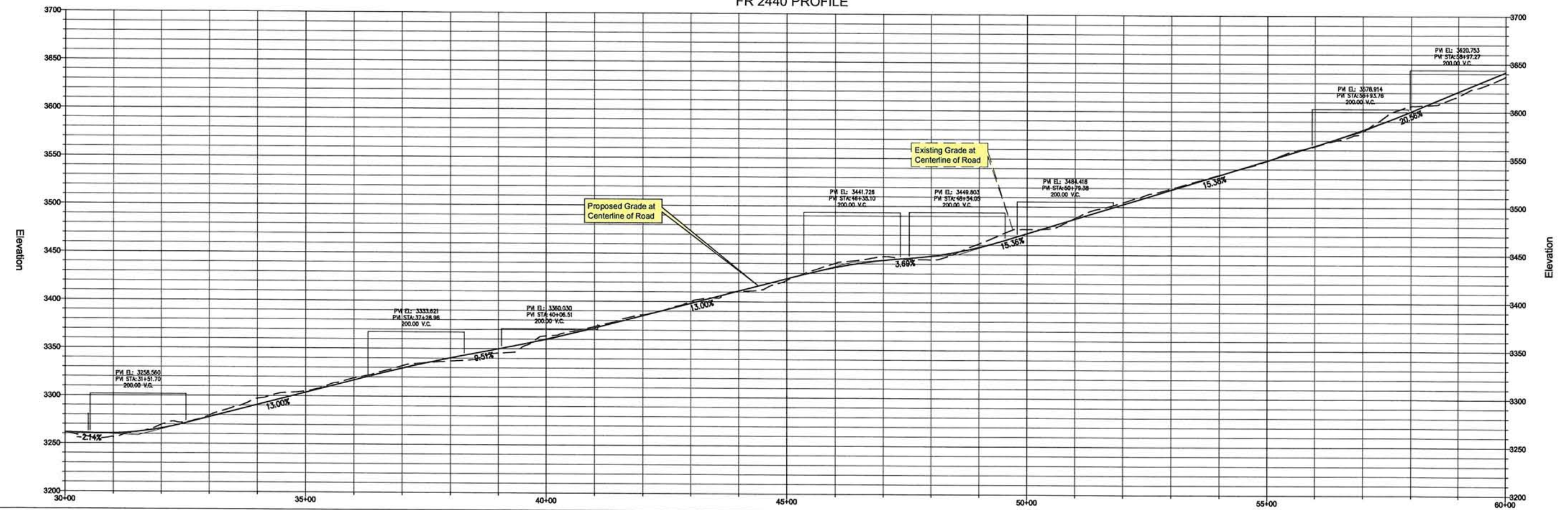
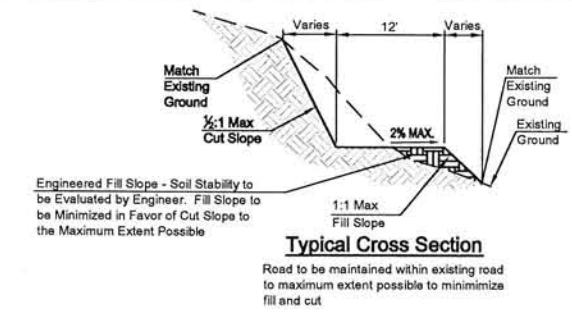


Image Source: Digit. Globe QuickBird Dataset
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 VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

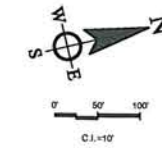
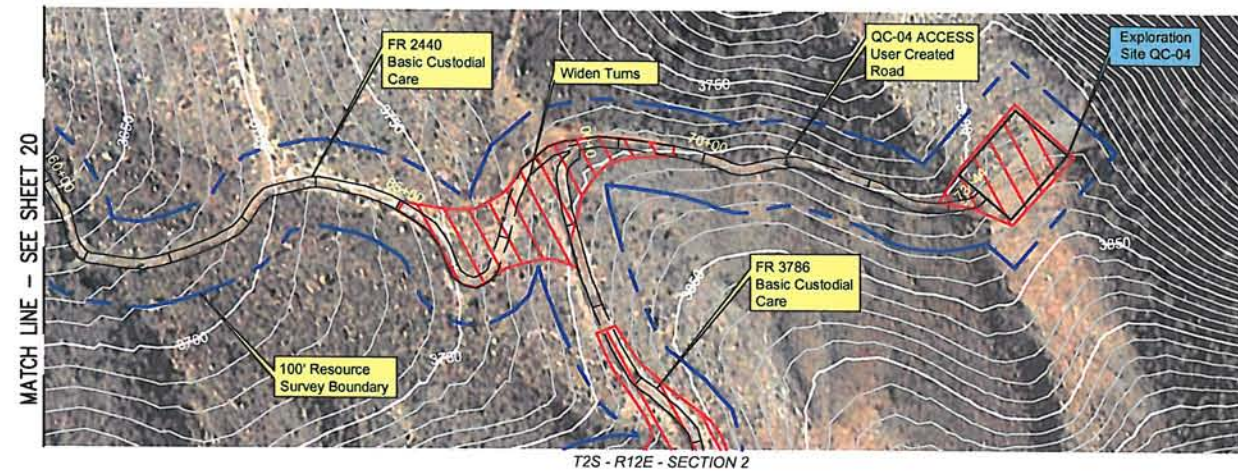
- Legend**
- Existing Road - To Be Improved
 - Approximate Area of Cut/ Fill
 - T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
 - National Forest Boundary
 - Resource Survey Area -
Note: 100' Wide or Greater

- Forest Service Road Designations:**
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
 - 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
 - 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
 - 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
 - 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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RESOLUTION COPPER MINING, LLC
 Resolution Pre-Feasibility Activities
 FR 2440 Improvements
 Access To Exploration Sites
 QC-4 And MB-03
 Sheet 20 of 55



Equipment List

- Schram 685 Rotary Drill Rig
- Pipe Trucks
- Water Storage Tank
- Generators For Drill Rig
- Cat Bulldozer
- Track Hoe
- Hammer Hoe
- Front End Loader
- Tracked Jaw Crusher
- Water Truck
- Mud Tank
- LF-90 Rotary Drill Rig

This Sheet:

- Minimal New Surface Disturbance - Grading of Existing Road
- Widening Bends for Safety
- Clearing and Grading for QC-04 Pad
- Rock Removed From Excavation of Drill Site QC-04 Will Be Crushed and Used to Dress Road Surface
- An Archaeological Monitor Will Be Present for Clearing Activities Within AR-03-12-02-1517(TNF)

FR 2440 PROFILE

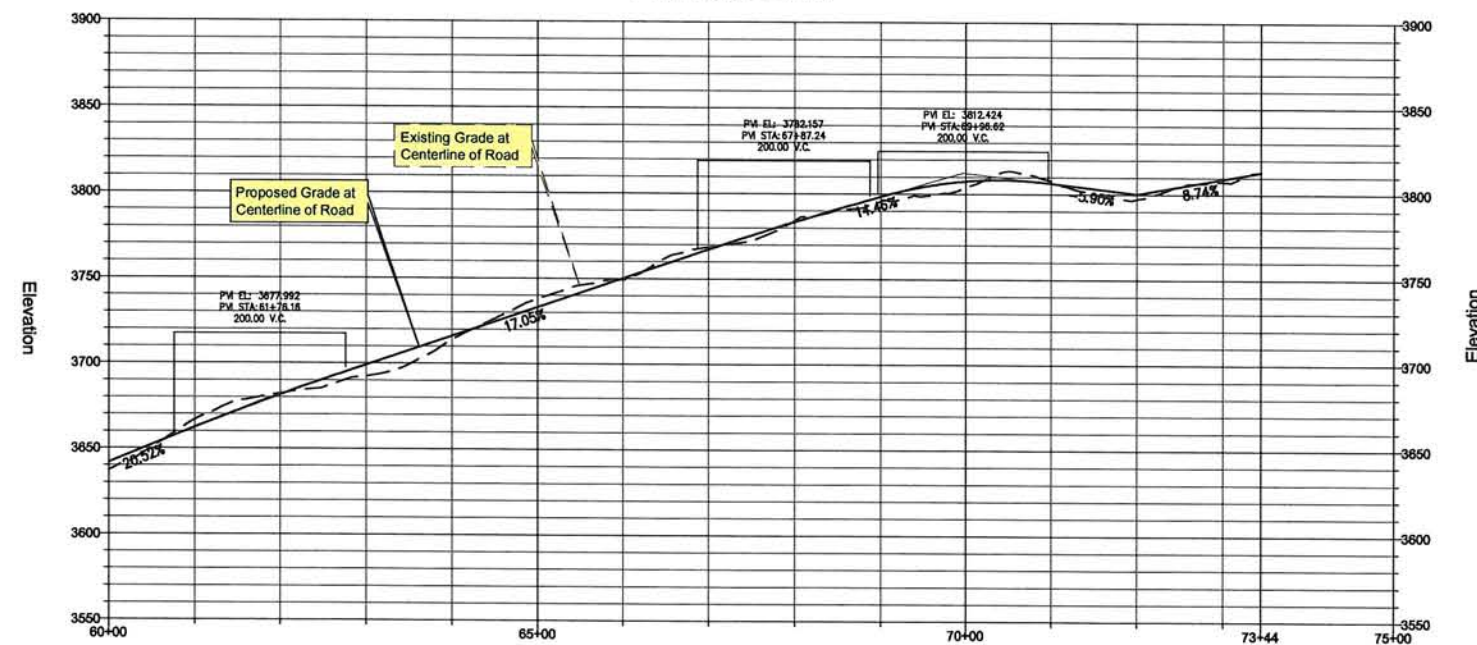


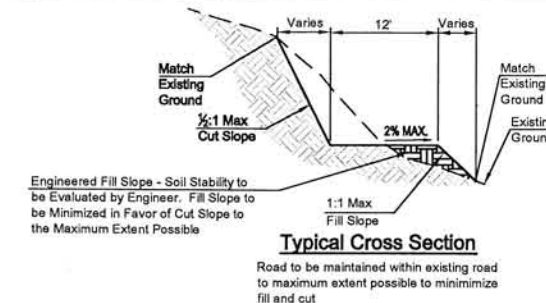
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience

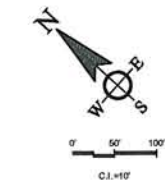
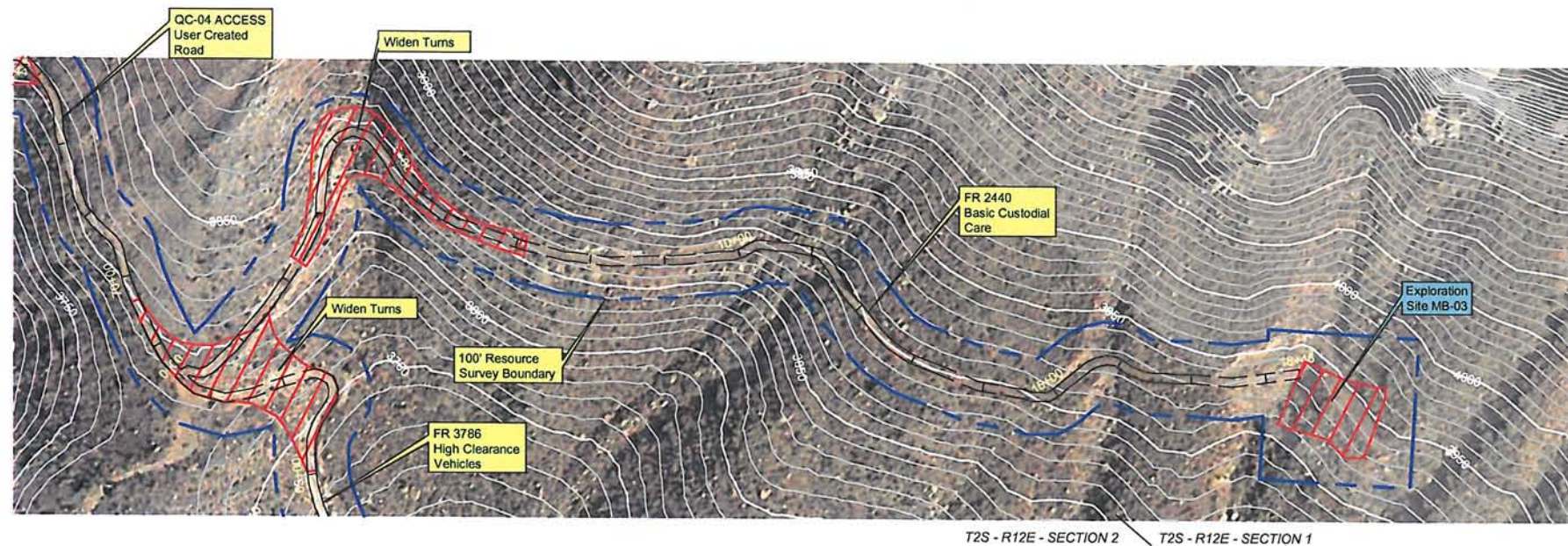


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Resolution Pre-Feasibility Activities
FR 2440 and FR 3786 Improvements
Access to Exploration Sites
QC-04 And MB-03

Sheet 21 of 55



Equipment List
 Mud Tank
 Schram 685 Rotary Drill Rig
 Pipe Trucks
 Water Storage Tank
 Generators For Drill Rig
 Cat Bulldozer
 Track Hoe
 Hammer Hoe
 Front End Loader
 Tracked Jaw Crusher
 Water Truck
 LF-90 Rotary Drill Rig

This Sheet:

- Minimal New Surface Disturbance - Grading of Existing Road
- Widening Hairpin Turn for Safety
- Clearing and Grading for MB-03 Pad
- An Archaeological Monitor Will Be Present for Clearing Activities Within AR-03-12-02-1517(TNF)

FR 2440 PROFILE

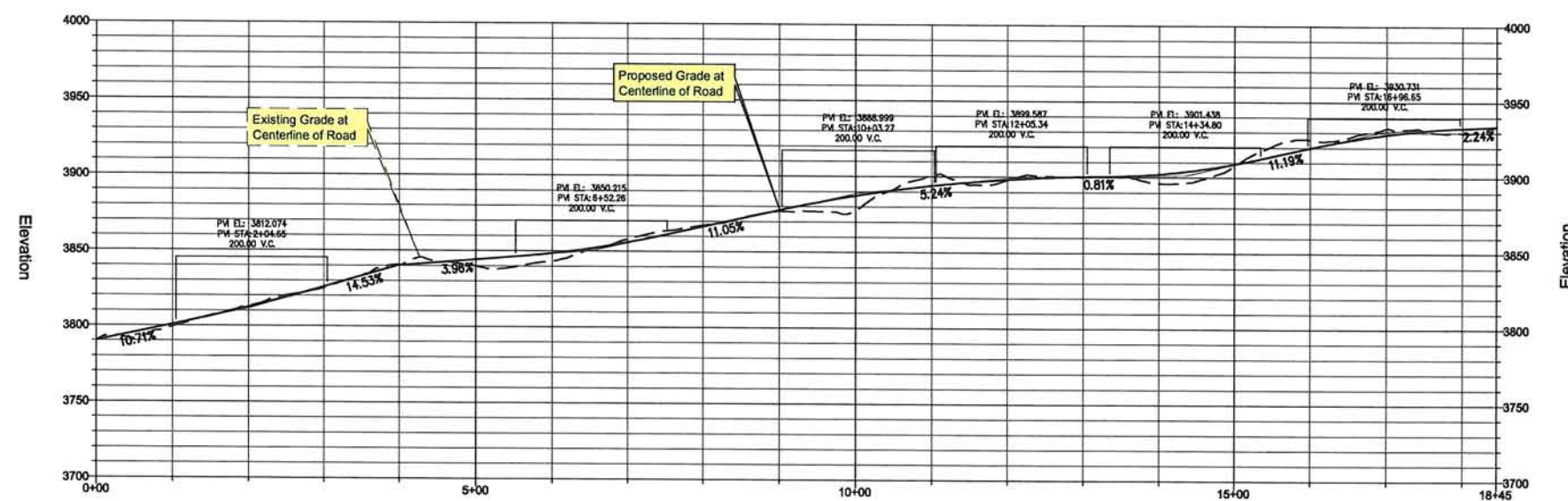


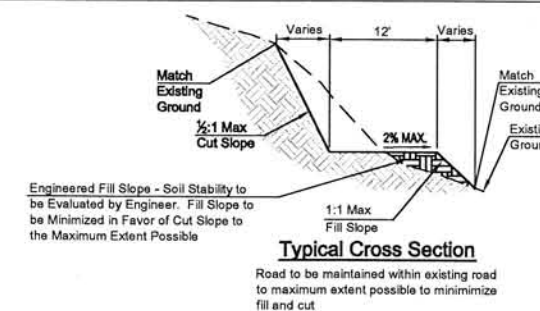
Image Source: Digit. Globe QuickBird Dataset
 Topographical Source: USGS NED Dataset
 Contour Interval= 10'
 PVI= Point of Vertical Intersection of Slopes
 VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
 FR 2440 Access Improvements
 Access To Exploration Site MB-03



EXTENSION OF FR 315 PROFILE (OCCURS ON STATE LAND, WORK COMPLETED)

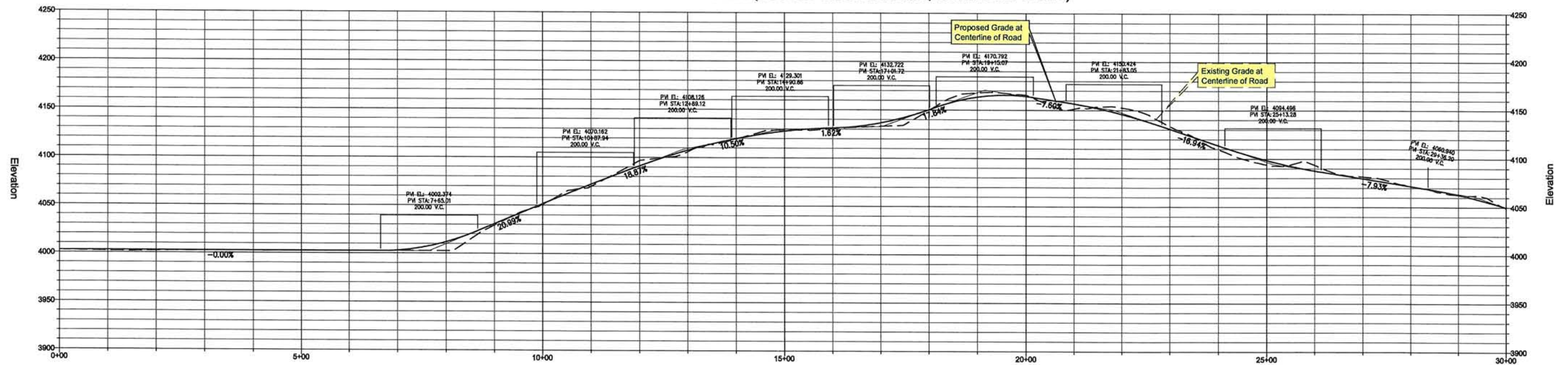


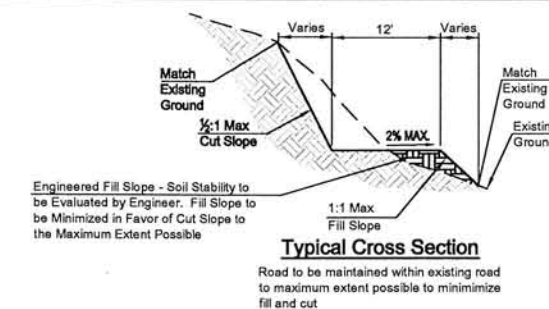
Image Source: Digit, Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
FR 315 on State Land (Completed)



EXTENSION OF FR 315 PROFILE (OCCURS ON STATE LAND, WORK COMPLETED)

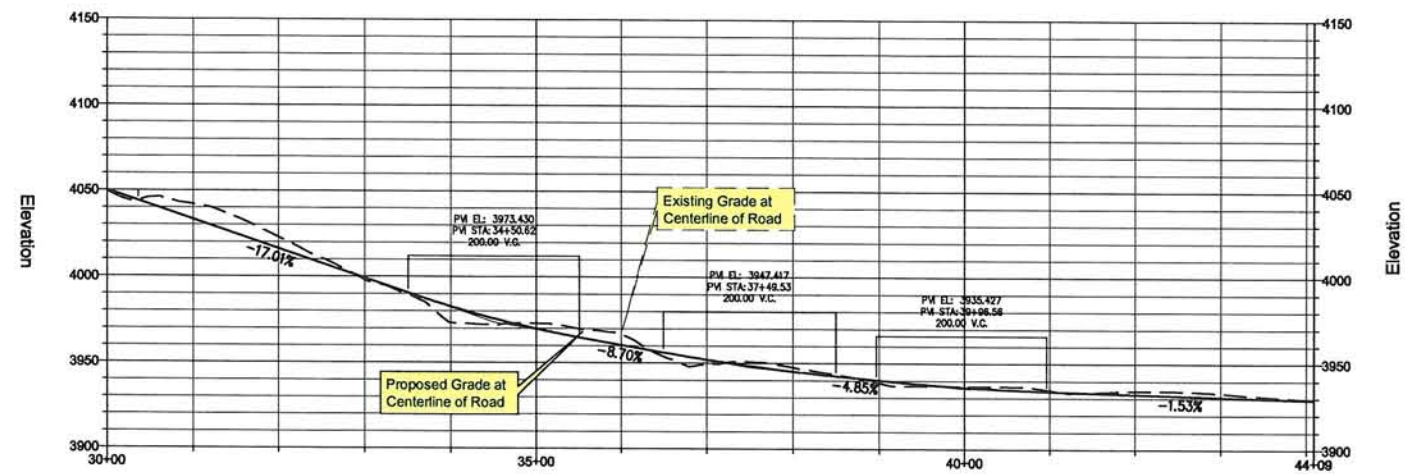


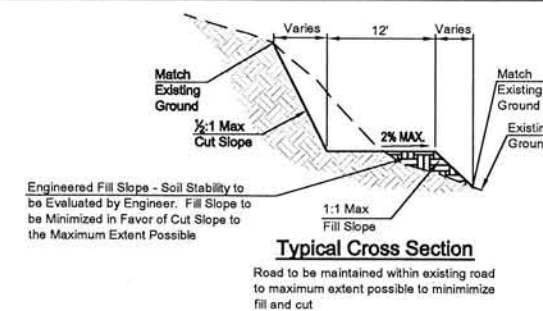
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Abrupt Transition Between Grades

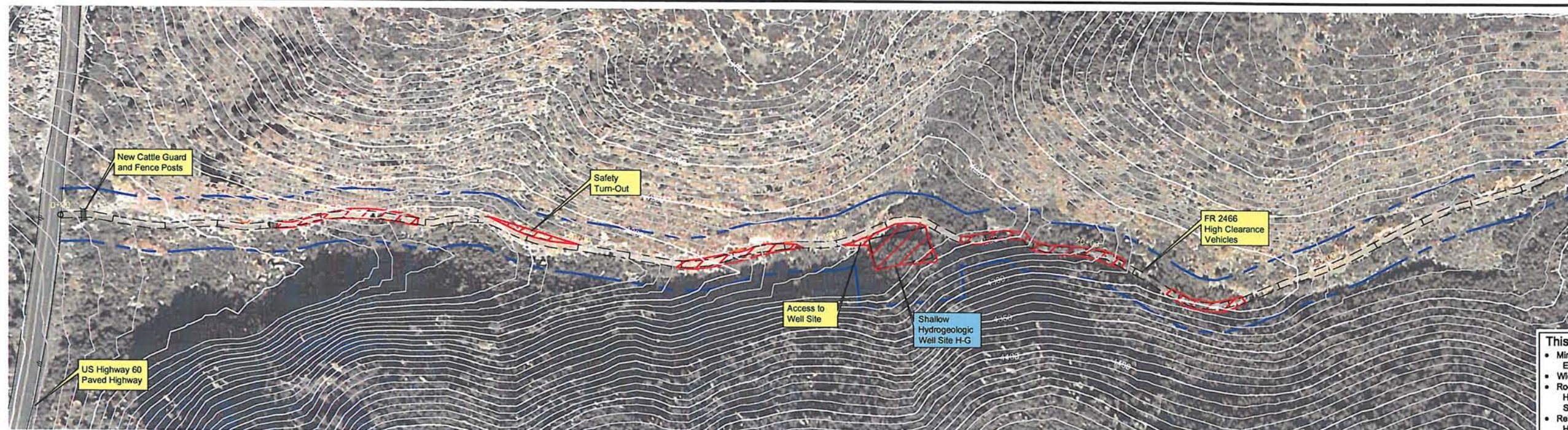
Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience





MATCH LINE - SEE SHEET 25

- Equipment List**
- Track Hoe
 - Hammer Hoe
 - Front End Loader
 - Tracked Jaw Crusher
 - Lang LM-140 Series Tophead
 - Rotary Drill Rig Or Equivalent
 - Schram 685 Rotary Drill Rig
 - UDR-5000 Core Drill Rig
 - CP-50 Core Drill Rig
 - Pipe Trucks
 - Mud Tank
 - Heavy Duty Air Compressor
 - Water Storage Tank
 - Generators For Drill Rig
 - Backhoe
 - Water Truck

- This Sheet:**
- Minimal New Surface Disturbance, Grading of Existing Road
 - Widening of Existing Tight Spots with Track Hoe
 - Rock Removed From Excavation of Drill Site H-G Will Be Crushed and Used to Dress Road Surface
 - Relocating Fence Post at Entrance from US Hwy 60
 - Placing Cattleguard at Entrance
 - Arizona Hedgehog Cacti to be Fenced and Protected with Cactus Guards Where Possible
 - A Biological Monitor will be Present During Clearing and Grading Activities

FR 2466 PROFILE

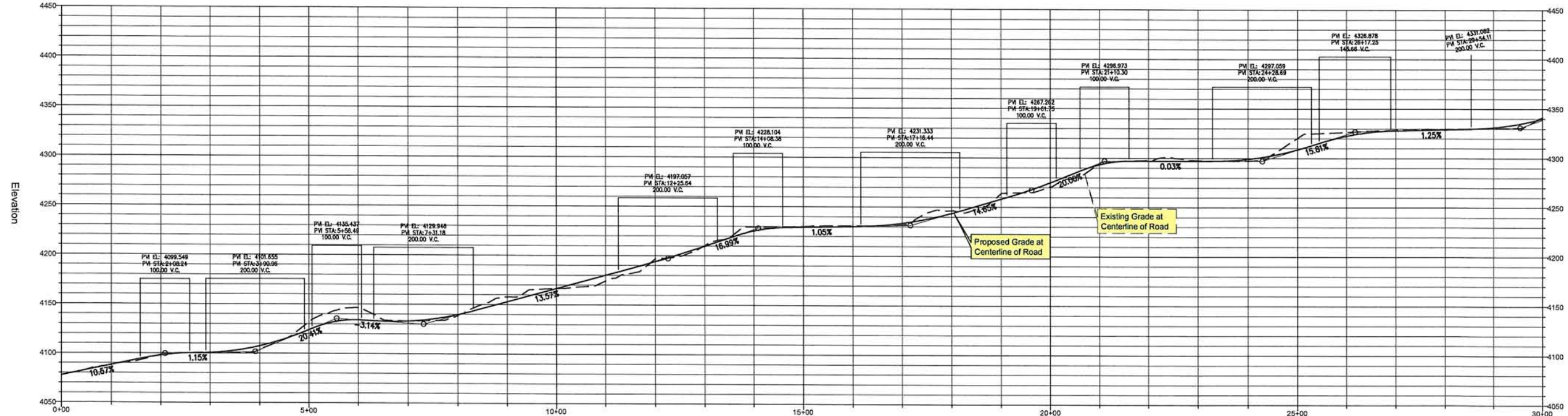
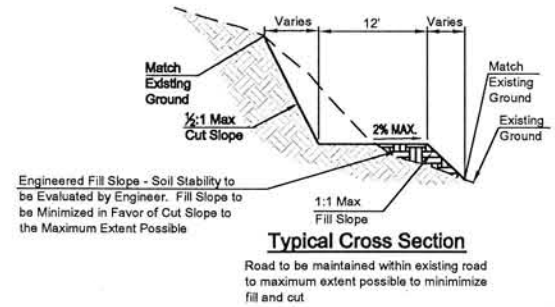


Image Source: Digitl. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval: 10'
PVI= Point of Vertical Intersection of Slopes
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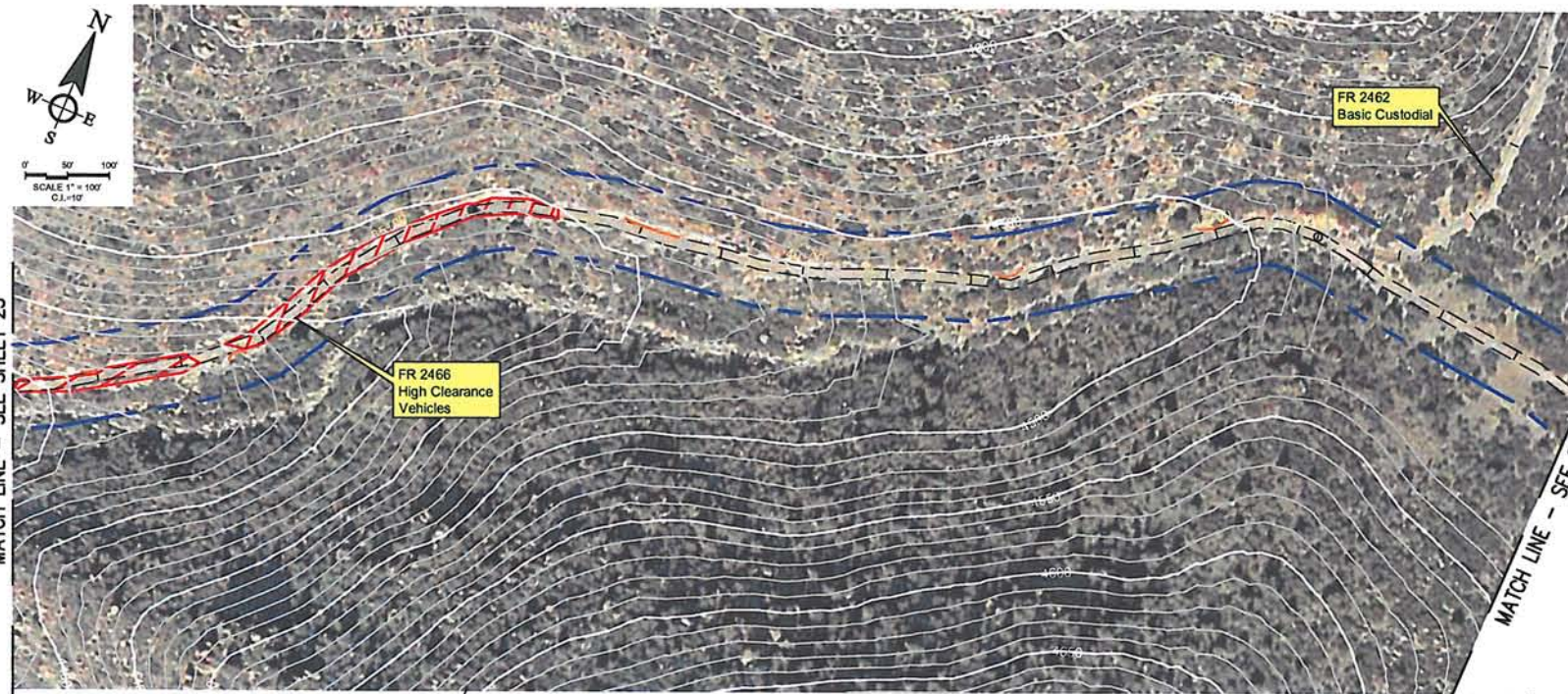
- Legend**
- Existing Road - To Be Improved
 - Approximate Area of Cut/ Fill
 - T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
 - National Forest Boundary
 - Resource Survey Area -
Note: 100' Wide or Greater

- Forest Service Road Designations:**
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
 - 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
 - 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
 - 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
 - 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience

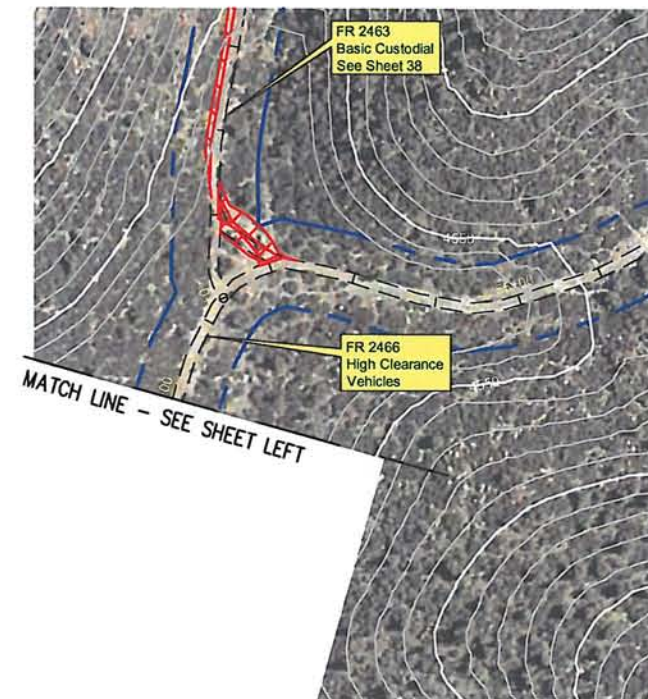


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RESOLUTION COPPER MINING, LLC
Resolution Pre-Feasibility Activities
FR 2466 Improvements
And Shallow Well Site H-G



T1S - R13E - SECTION 22 / T1S - R13E - SECTION 23



T1S - R13E - SECTION 23

Equipment List

Track Hoe
Hammer Hoe
Front End Loader
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig Or Equivalent
Schram 685 Rotary Drill Rig
UDR-5000 Core Drill Rig
CP-50 Core Drill Rig
UDR-1500 Core Drill Rig
Pipe Trucks
Backhoe
Water Truck
Cat Bulldozer

- This Sheet:**
- Minimal New Surface Disturbance - Grading Existing Road and Widening Tight Areas with Track Hoe
 - Providing New Roadway Segment Connecting FR-2466 and FR 2463
 - Rock Removed From Excavation of H-G Will Be Used to Dress Road Surface
 - Arizona Hedgehog Cacti to be Fenced and Protected with Cactus Guards
 - A Biological Monitor will be Present During Clearing and Grading Activities

FR 2466 PROFILE

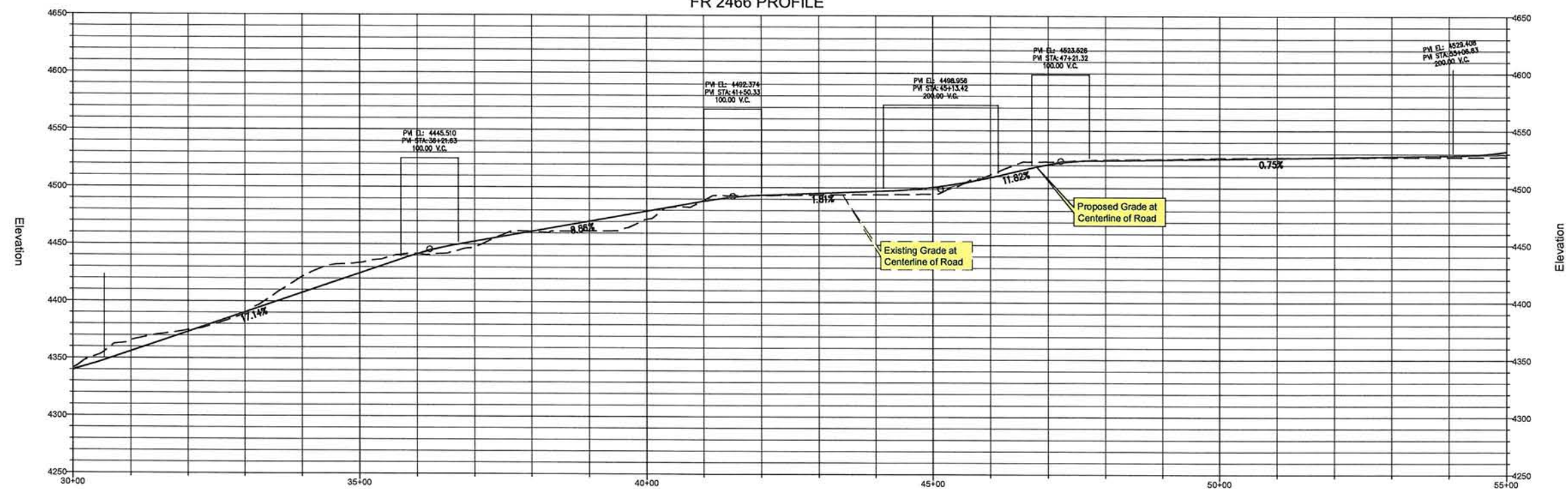


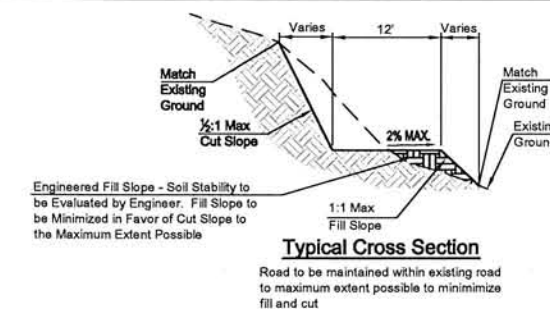
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1-Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2-High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3-Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4-Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5-High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



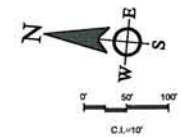
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Resolution Pre-Feasibility Activities
FR 2466 And FR 2463 Improvements
Access to Tunnel Borehole PVT-6 and Areas South
Sheet 26 of 55



T1S - R13E - SECTION 23



Equipment List

Track Hoe
Hammer Hoe
Front End Loader
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig Or Equivalent
Schram 685 Rotary Drill Rig
UDR-5000 Core Drill Rig
CP-50 Core Drill Rig
UDR-1500 Core Drill Rig
Pipe Trucks
Backhoe
Water Truck
Cat Bulldozer

This Sheet:

- Portions of Road Are Rough with No Rocks to Break or Crush
- Reworking of Roadway Material Required - Possibly Bringing Fill from Upper Portions of Road
- Clearing and Grading for H-C Pad
- Arizona Hedgehog Cactus to be Fenced and Protected with Cactus Guards
- A Biological Monitor will be Present During Clearing and Grading Activities

FR 2466 PROFILE

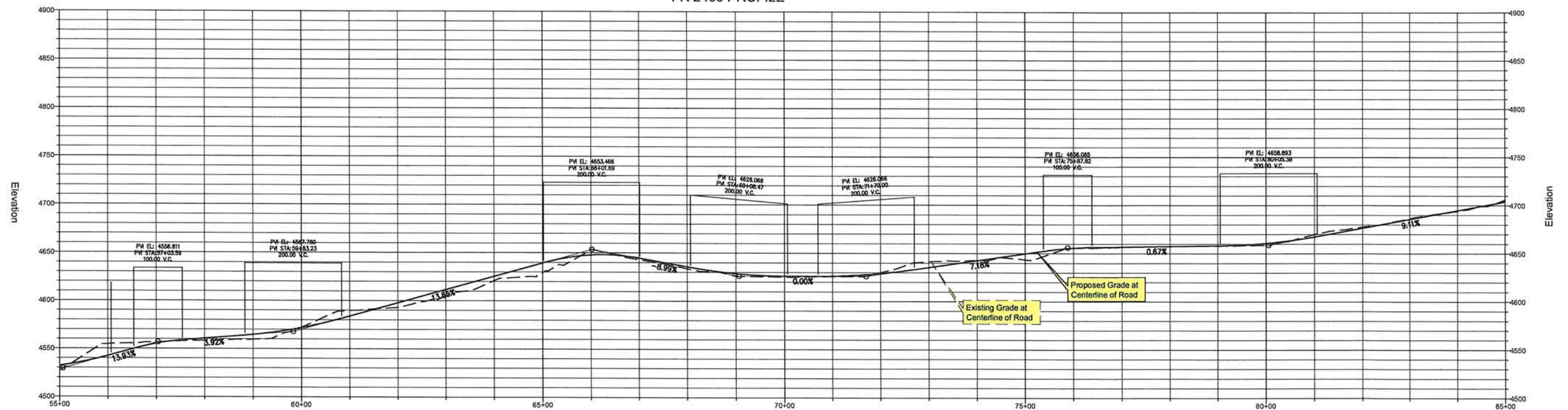


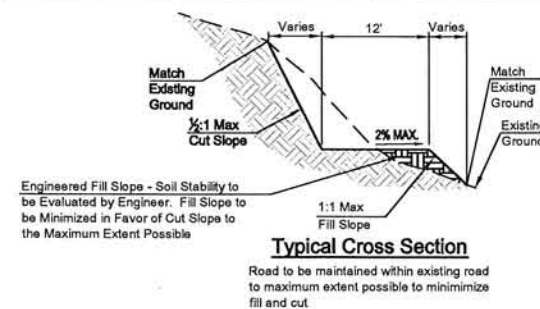
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

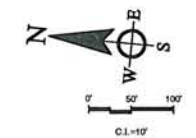
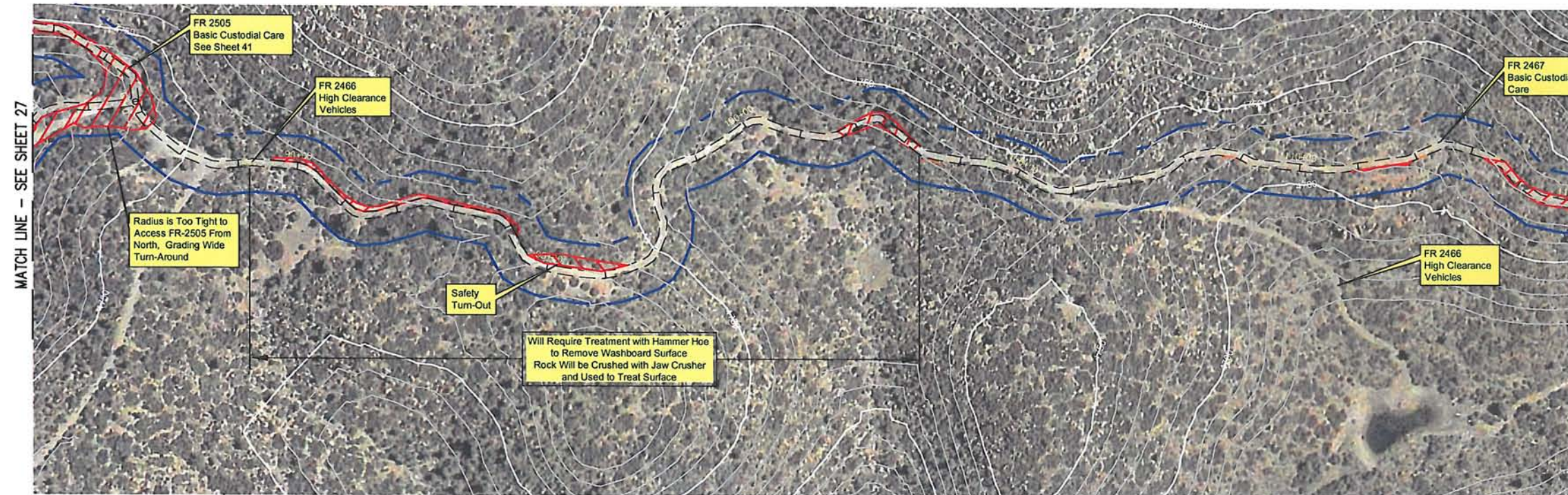
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
FR 2466 And FR 2461 Improvements



- Equipment List**
- Track Hoe
 - Hammer Hoe
 - Front End Loader
 - Tracked Jaw Crusher
 - Lang LM-140 Series Tophead
 - Rotary Drill Rig Or Equivalent
 - Schram 685 Rotary Drill Rig
 - UDR-5000 Core Drill Rig
 - CP-50 Core Drill Rig
 - UDR-1500 Core Drill Rig
 - Pipe Trucks
 - Backhoe
 - Water Truck
 - Cat Bulldozer

- This Sheet:**
- Portions of Road Will Need Significant Treatment with Hammer Hoe to Remove Washboard Surface
 - Rock Will Be Crushed with Jaw Crusher and Used to Treat Surface
 - Three-Way Intersection Will Be Widened to Improve Radius for Access to FR 2505
 - Remaining Areas Will Require Little Disturbance
 - Arizona Hedgehog Cacti to be Fenced and Protected with Cactus Guards
 - A Biological Monitor Will Be Present During Clearing and Grading Activities

T1S - R13E - SECTION 23 | T1S - R13E - SECTION 26

FR 2466 PROFILE

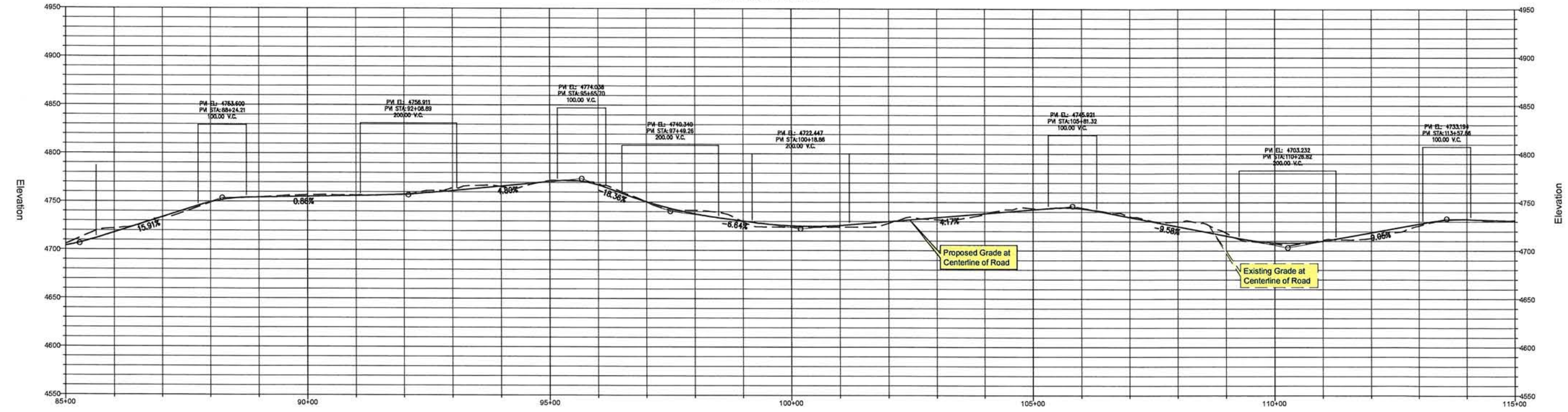
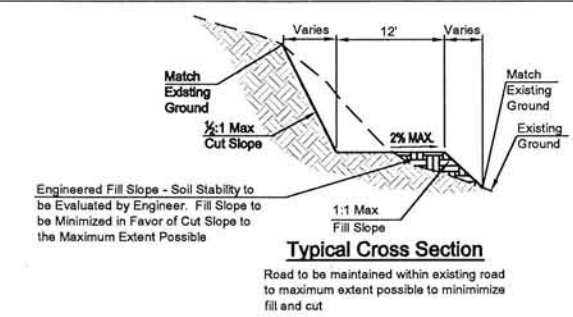


Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

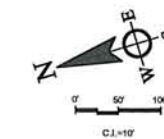
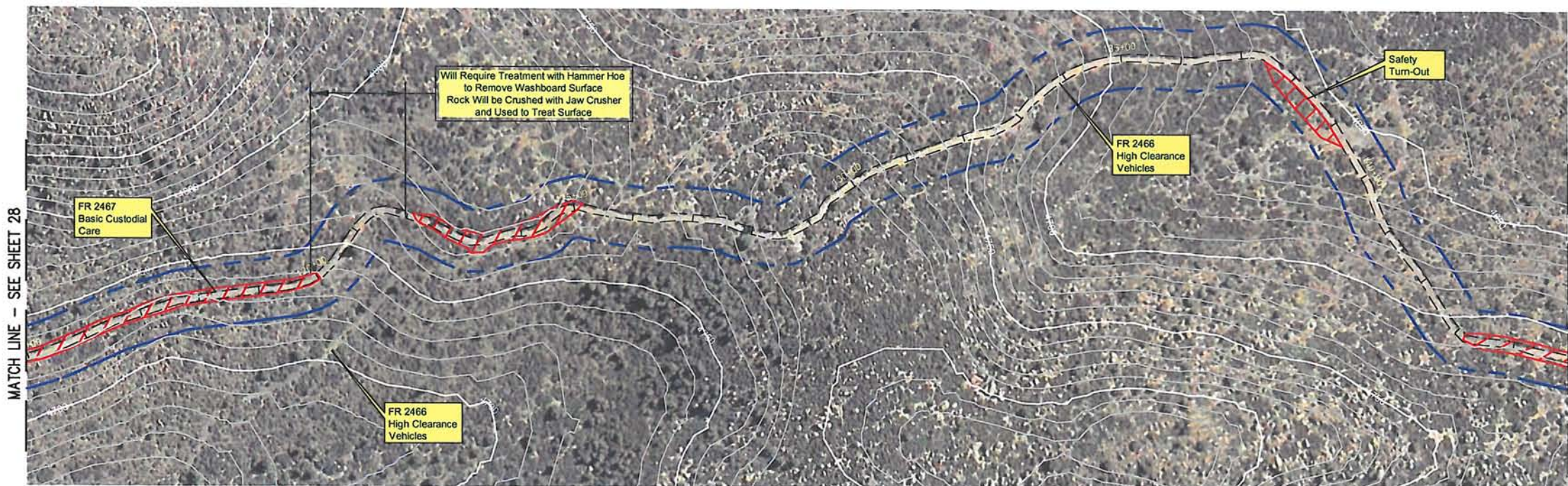
- Legend**
- Existing Road - To Be Improved
 - Approximate Area of Cut/Fill
 - T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
 - National Forest Boundary
 - Resource Survey Area -
Note: 100' Wide or Greater

- Forest Service Road Designations:**
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
 - 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
 - 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
 - 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
 - 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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RESOLUTION COPPER MINING, LLC
Resolution Pre-Feasibility Activities
FR 2466 And FR 2467 Improvements



Equipment List

Track Hoe
Hammer Hoe
Front End Loader
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig Or Equivalent
Schram 685 Rotary Drill Rig
UDR-5000 Core Drill Rig
CP-50 Core Drill Rig
UDR-1500 Core Drill Rig
Pipe Trucks
Backhoe
Water Truck
Cat Bulldozer

This Sheet:

- Area Will Need Significant Treatment with Hammer Hoe Ram to Remove Washboard Surface
- Rock Will Be Crushed With Jaw Crusher and Used to Treat Surface
- Remaining Area Will Require Little Disturbance

FR 2467 and FR 2466 PROFILE

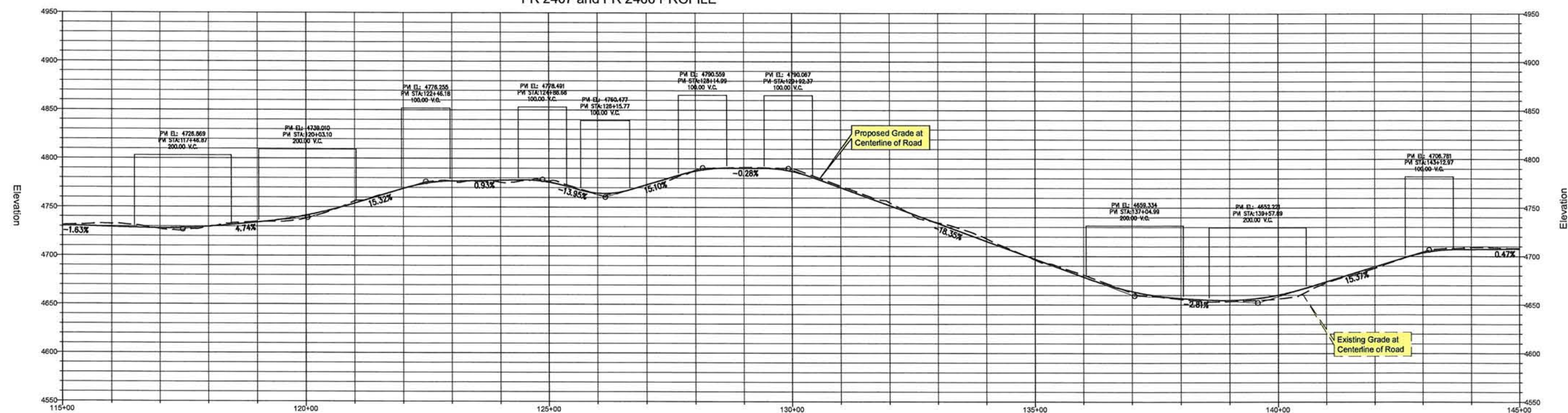


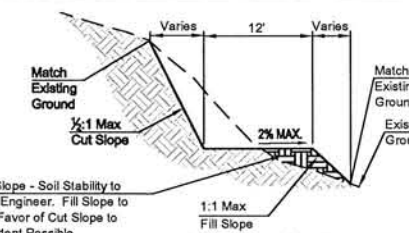
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



Engineered Fill Slope - Soil Stability to be Evaluated by Engineer. Fill Slope to be Minimized in Favor of Cut Slope to the Maximum Extent Possible

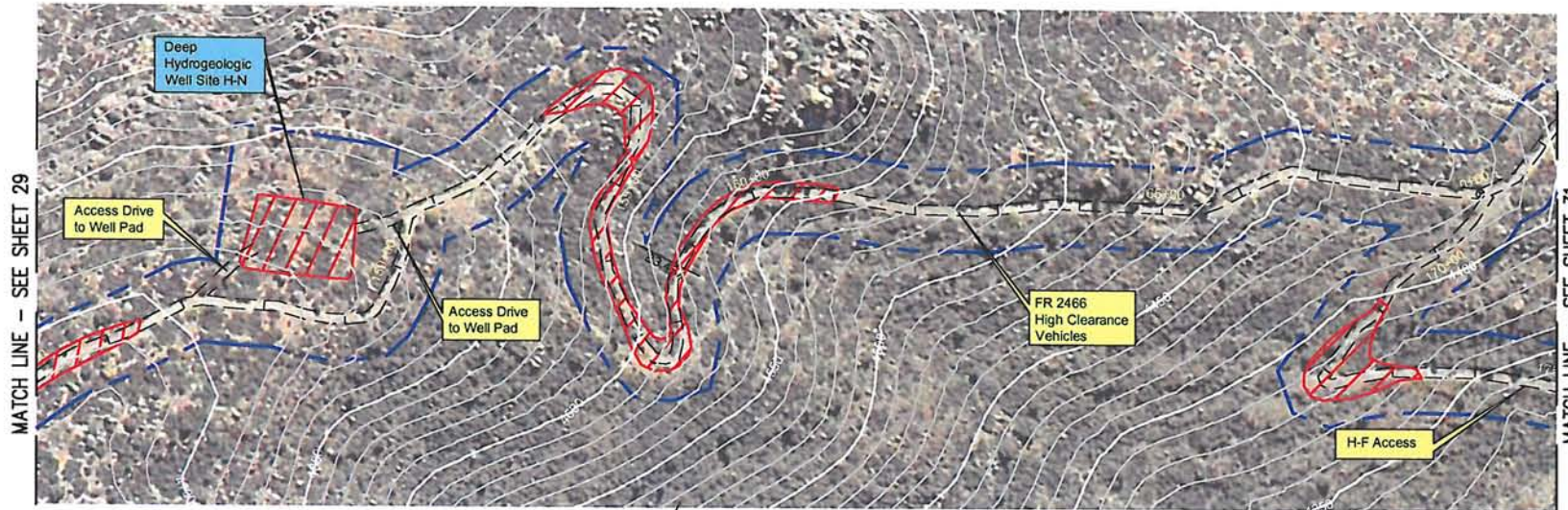
Typical Cross Section

Road to be maintained within existing road to maximum extent possible to minimize fill and cut

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RESOLUTION COPPER MINING, LLC

Resolution Pre-Feasibility Activities
FR 2466 And FR 2467 Improvements



Equipment List

Track Hoe
Hammer Hoe
Front End Loader
Water Truck
Tracked Jaw Crusher
UDR-5000 Core Drill Rig
CP-50 Core Drill Rig
Lang LM-140 Series Tophead
Rotary Drill Rig Or Equivalent
Schram 685 Rotary Drill Rig
Pipe Trucks
Mud Tank
Water Storage Tank
Generators For Drill Rigs
Cat Bulldozer

This Sheet:

- Minimal New Surface Disturbance - Grading of Existing Road
- Widening of Tight Spots with Track Hoe
- Clearing and Grading for H-N Pad
- Boulders Removed for Drill Pad Placement Will Be Replaced Upon Completion of Activities
- Rock Removed From Excavation of Drill Site H-N Will Be Crushed and Used to Dress Road Surface

FR 2466 and H-F ACCESS PROFILE

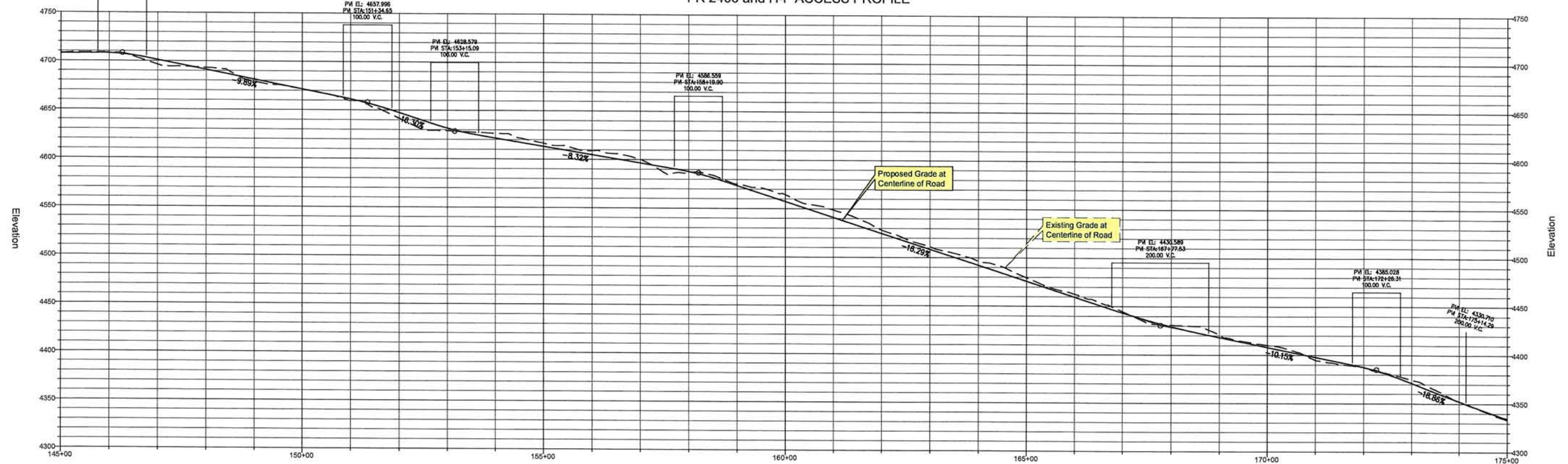


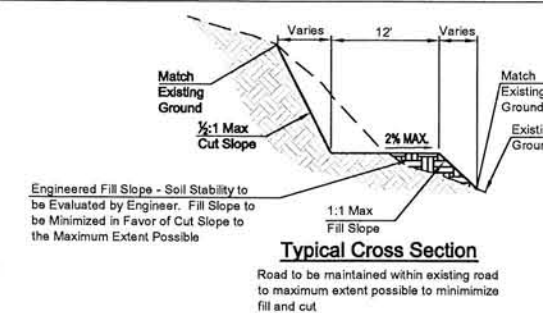
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
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VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

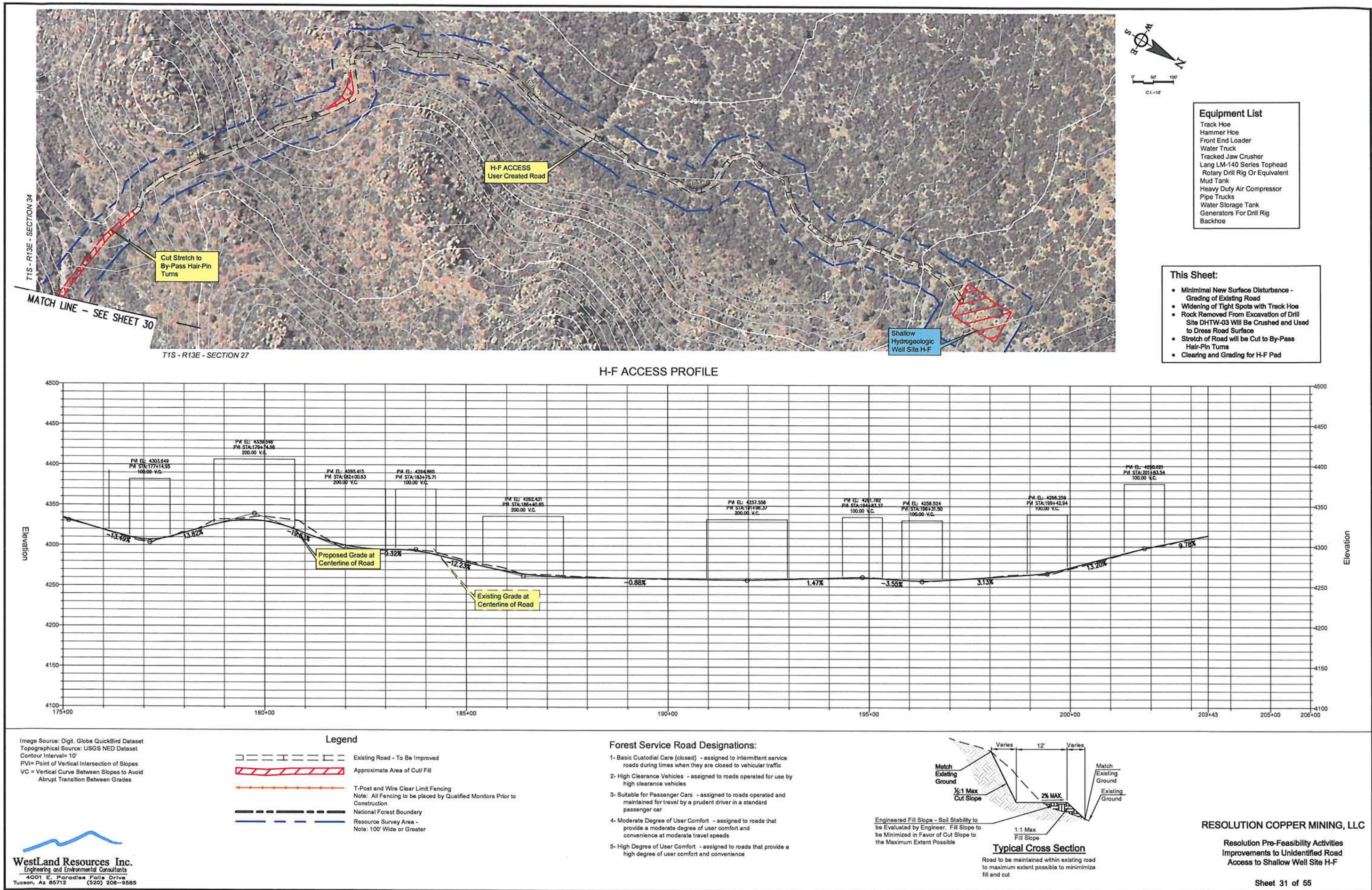
- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience

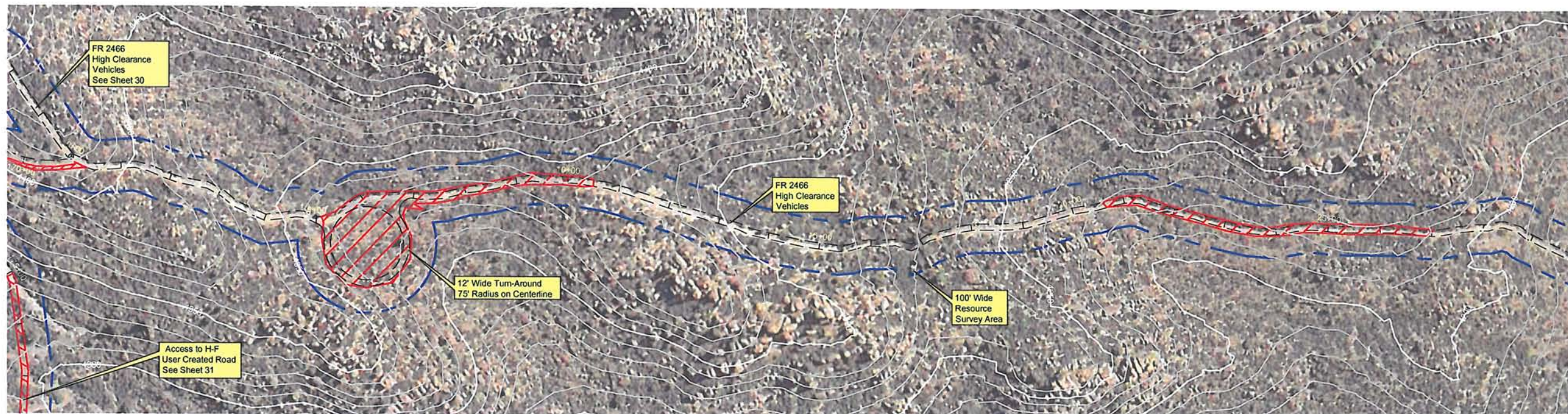


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Resolution Pre-Feasibility Activities
Improvements to FR 2466 and Unidentified Road
Access To Shallow Well Site H-F
and H-N

Sheet 30 of 55





T1S - R13E - SECTION 34

Equipment List
 Lang LM-140 Series Tophead
 Rotary Drill Rig Or Equivalent
 Pipe Trucks
 Front End Loader
 Backhoe
 Tracked Jaw Crusher
 Water Truck
 Track Hoe

This Sheet:
 • Minimal New Surface Disturbance - Grading of Existing Road
 • Widening of Tight Spots with Track Hoe
 • Creating 12' Wide Turnaround

FR 2466 PROFILE

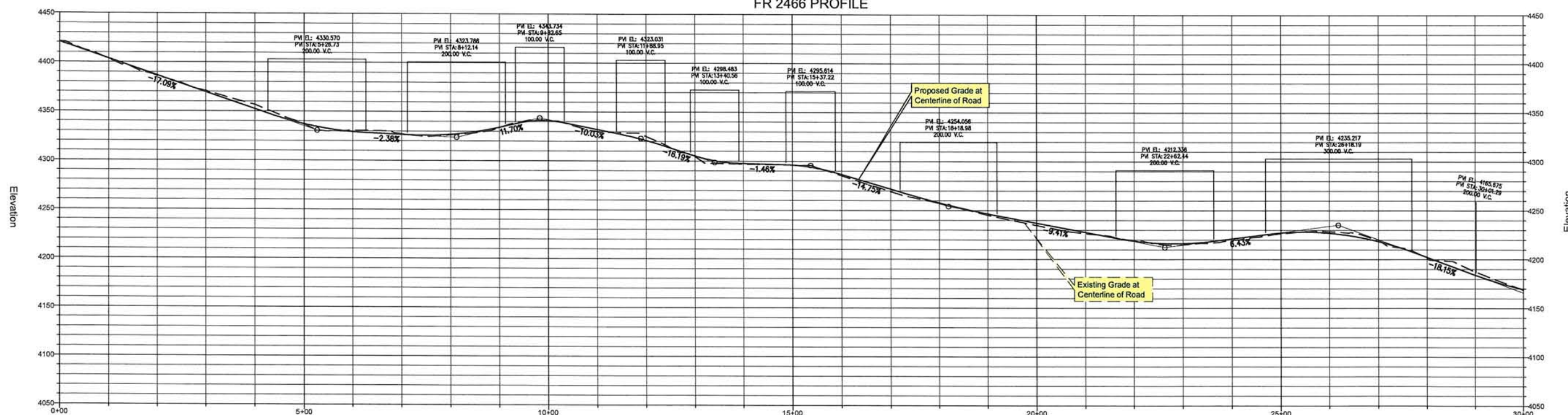


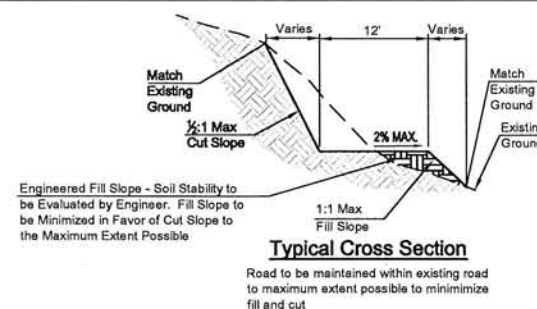
Image Source: Digit. Globe QuickBird Dataset
 Topographical Source: USGS NED Dataset
 Contour Interval= 10'
 PVI= Point of Vertical Intersection of Slopes
 VC = Vertical Curve Between Slopes to Avoid
 Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

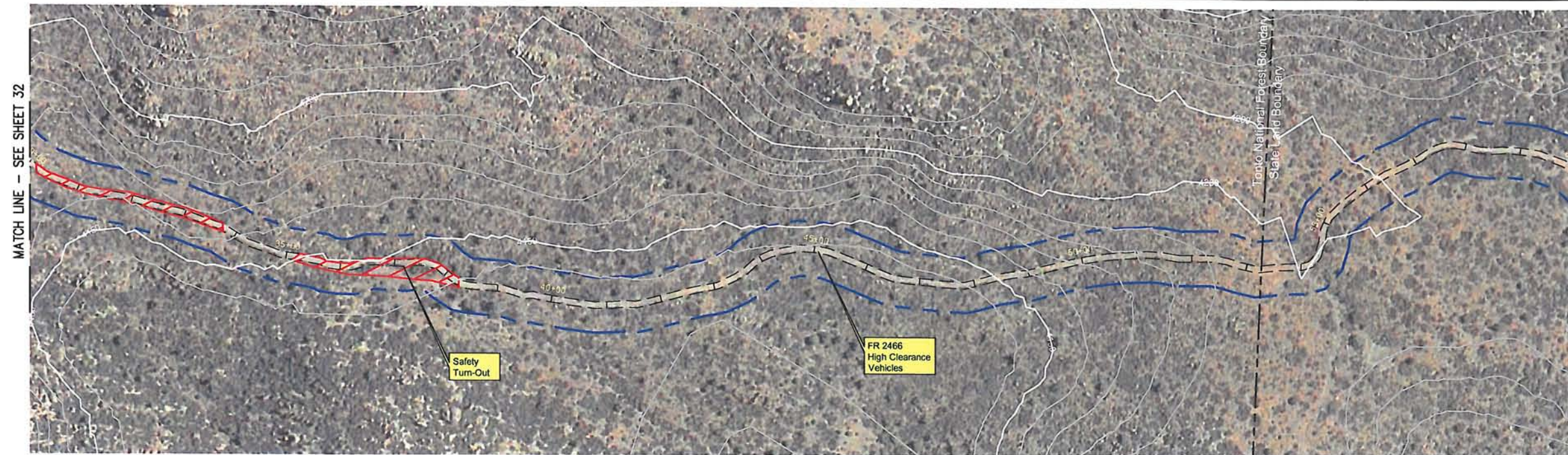
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
 FR 2466 Improvements



Equipment List

- Lang LM-140 Series Tophead
- Rotary Drill Rig or Equivalent
- Pipe Trucks
- Front End Loader
- Backhoe
- Tracked Jaw Crusher
- Water Truck
- Track Hoe

This Sheet:

- Minimal New Surface
- Disturbance - Grading of Existing Road
- Widening of Tight Spots with Track Hoe
- Safety Turnout

T1S - R13E - SECTION 34 T2S - R13E - SECTION 4

FR 2466 PROFILE

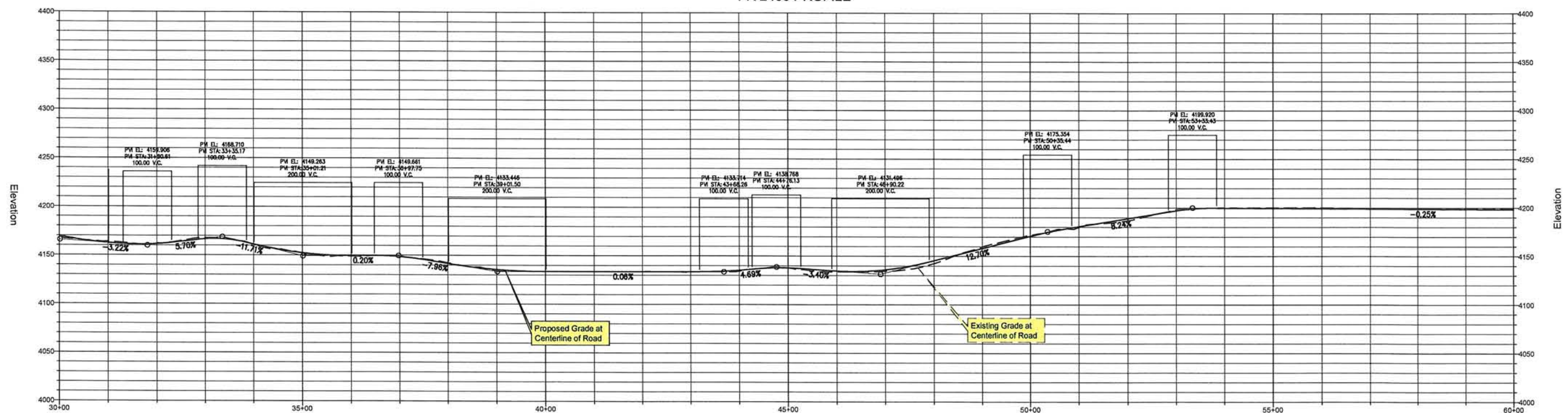


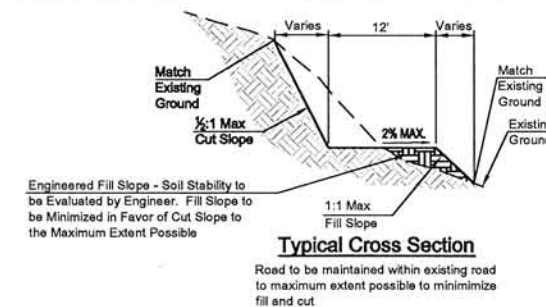
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

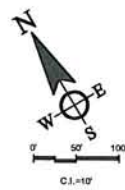
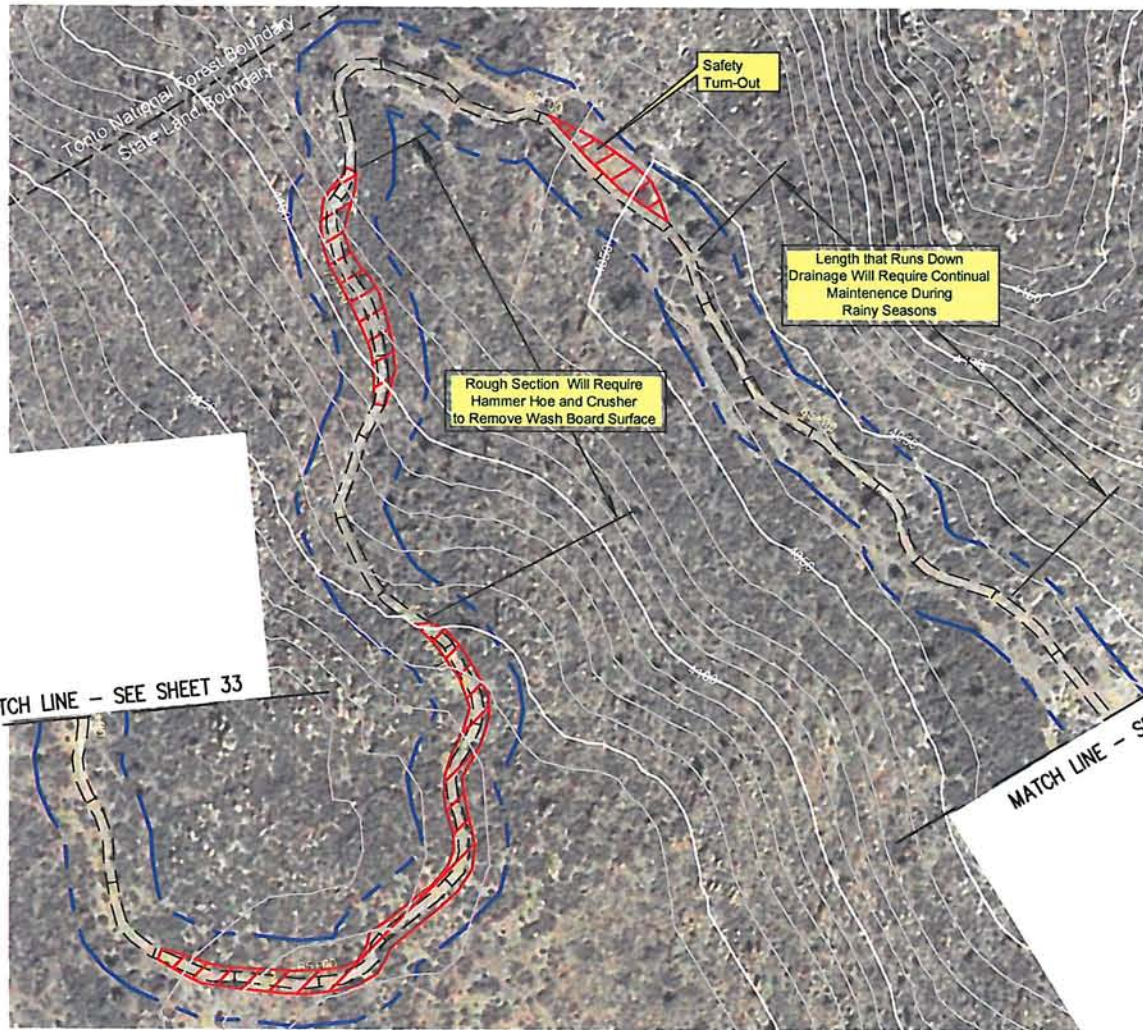
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- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
FR 2466 Improvements

Sheet 33 of 55



Equipment List

Lang LM-140 series Tophead
Rotary Drill Rig or equivalent
Pipe Trucks
Front End Loader
Backhoe
Tracked Jaw Crusher
Water Truck
Hammer Hoe
Track Hoe

This Sheet:

- Rough Section - Will Require Hammer Hoe and Crusher to Remove Wash Board Length that Runs Down Drainage
- Will Require Continual Maintenance During Rainy Seasons
- Providing Safety Turn-out

EXTENSION FR 2466 PROFILE (OCCURS ON STATE LAND)

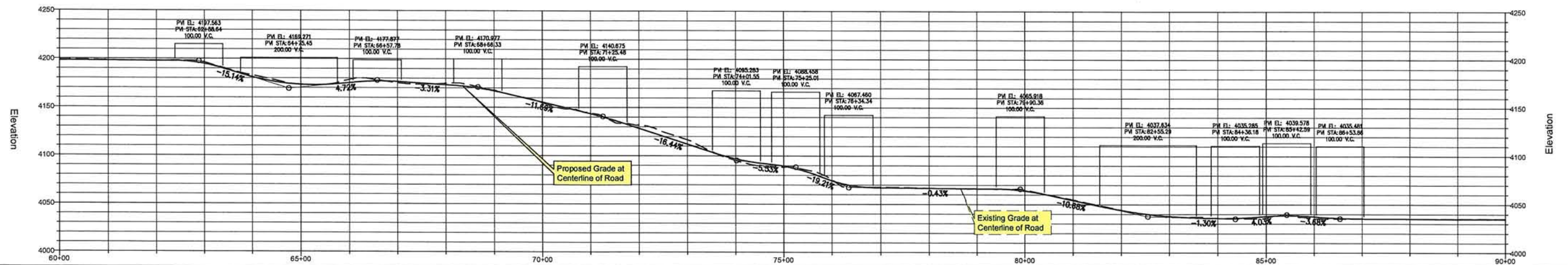


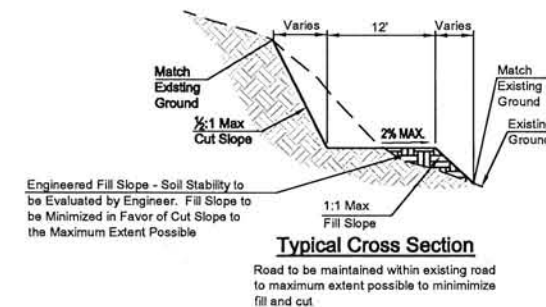
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval: 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

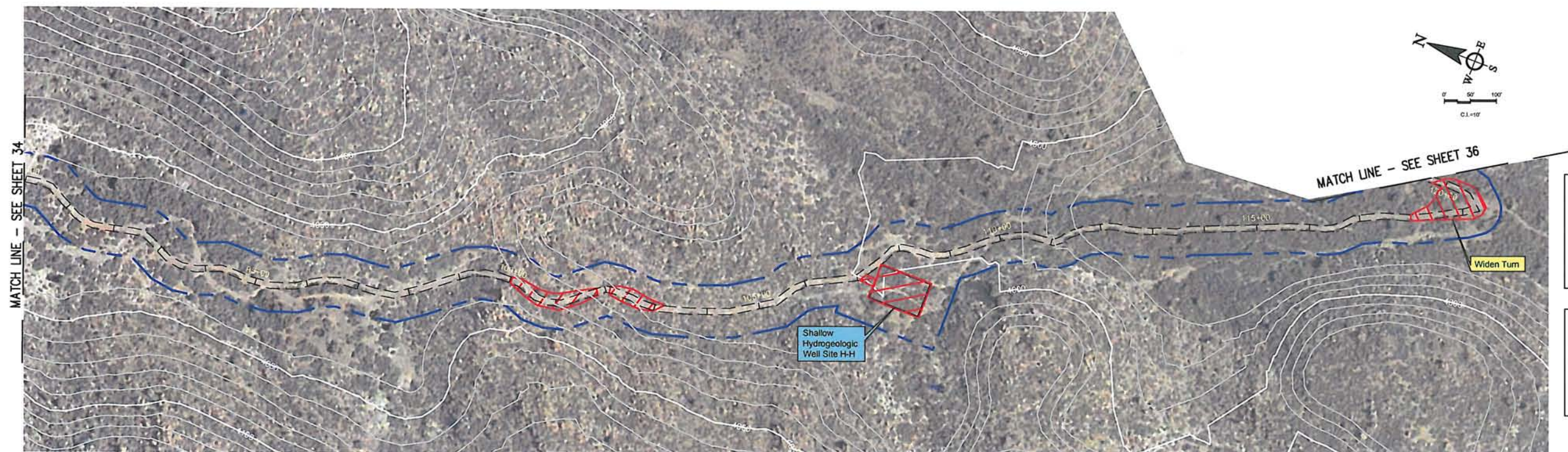
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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Resolution Pre-Feasibility Activities
Extension of FR 2466 on State Land



Equipment List
 Lang LM-140 series Tophead
 Rotary Drill Rig or equivalent
 Pipe Trucks
 Front End Loader
 Backhoe
 Tracked Jaw Crusher
 Water Truck
 Track Hoe

This Sheet:

- Minimal New Surface Disturbance - Grading of Existing Road
- Widening of Tight Spots with Track Hoe
- Clearing and Grading for Placement of H-H on State Land

T2S - R13E - SECTION 4

EXTENSION OF FR 2466 PROFILE (OCCURS ON STATE LAND)

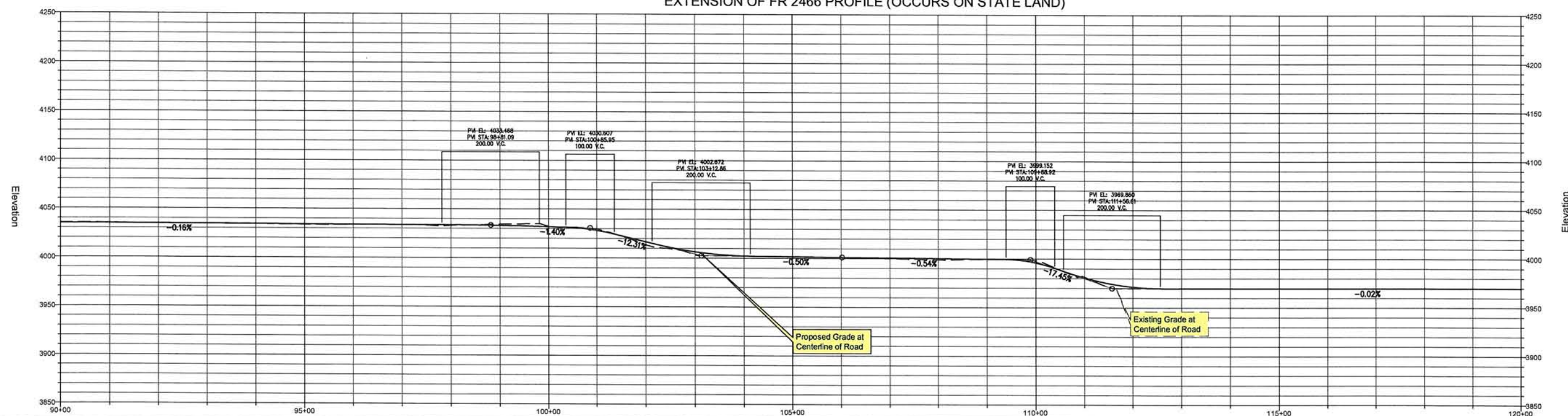


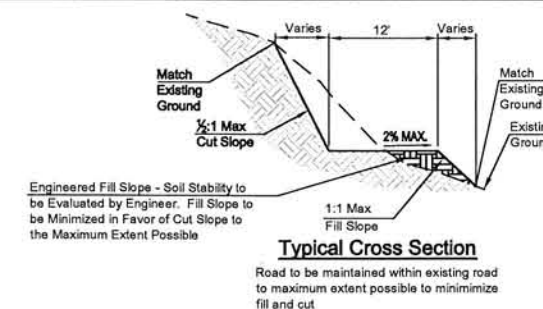
Image Source: Digit. Globe QuickBird Dataset
 Topographical Source: USGS NED Dataset
 Contour Interval= 10'
 PVI= Point of Vertical Intersection of Slopes
 VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area - Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



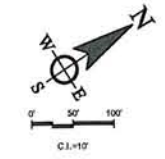
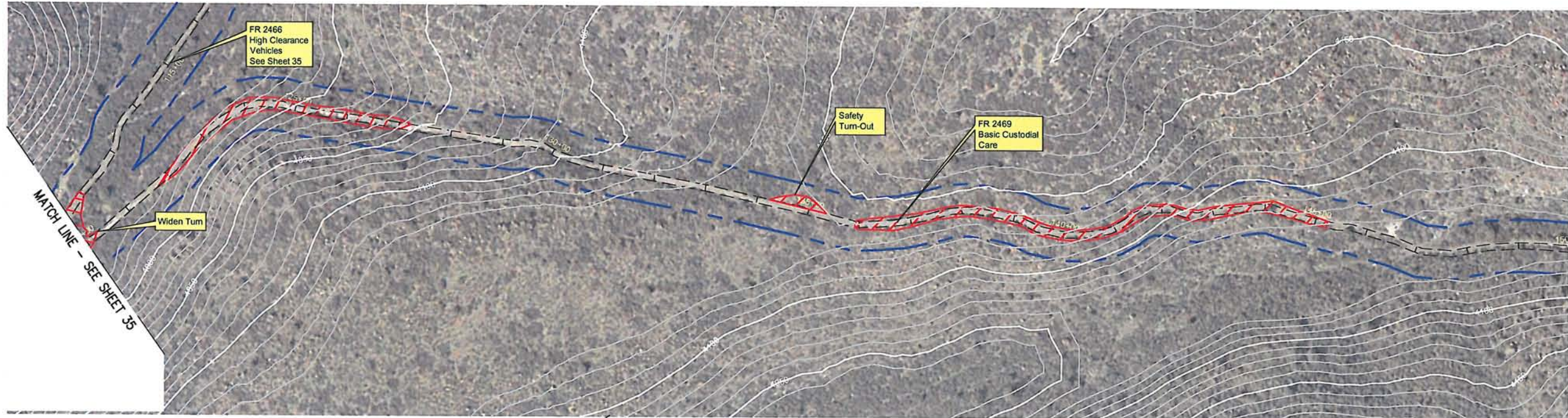
Typical Cross Section

Road to be maintained within existing road to maximum extent possible to minimize fill and cut

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Resolution Pre-Feasibility Activities
 Extension of FR 2466 and Well Site H-H
 on State Land



- Equipment List**
- Lang LM-140 series Tophead Rotary Drill Rig or equivalent
 - Pipe Trucks
 - Front End Loader
 - Backhoe
 - Tracked Jaw Crusher
 - Water Truck
 - Track Hoe

- This Sheet:**
- Minimal New Surface Disturbance - Grading of Existing Road
 - Widening of Tight Spots with Track Hoe
 - Providing Safety Turn-out

EXTENSION OF FR 2469 PROFILE (ON STATE LAND)

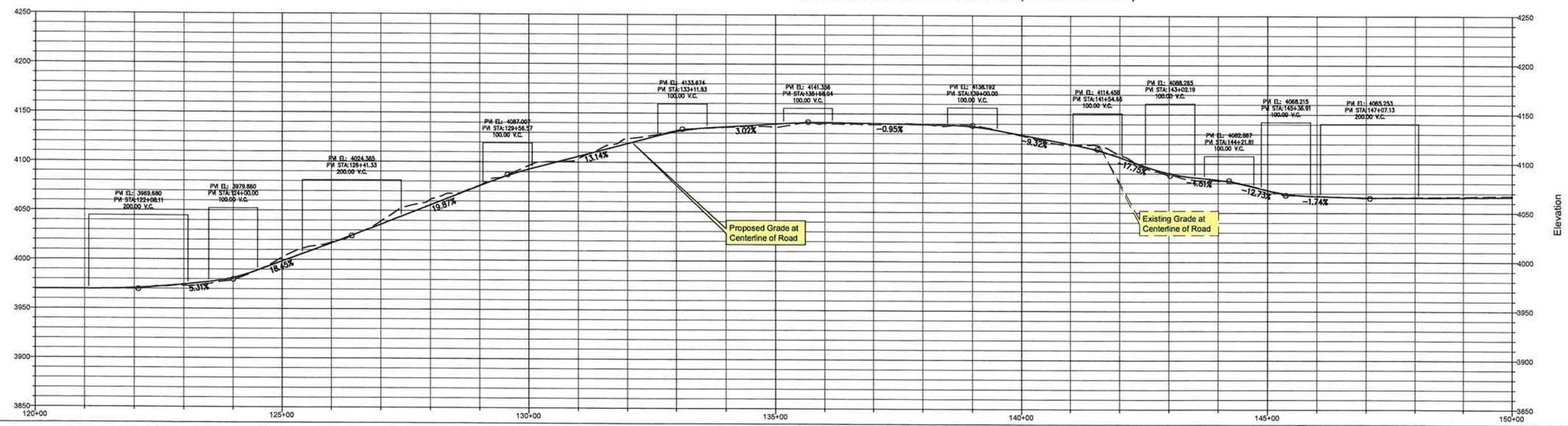
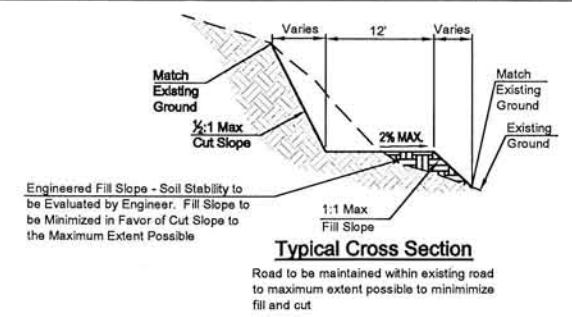


Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

- Legend**
- Existing Road - To Be Improved
 - Approximate Area of Cut/ Fill
 - T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
 - National Forest Boundary
 - Resource Survey Area -
Note: 100' Wide or Greater

- Forest Service Road Designations:**
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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RESOLUTION COPPER MINING, LLC
Resolution Pre-Feasibility Activities
Extension of FR 2466 and FR 2469
on State Land



Equipment List

Lang LM-140 series Tophead
Rotary Drill Rig or equivalent
Mud Tank
Heavy Duty Air Compressor
Pipe Trucks
Water Storage Tank
Generators for Drill Rig
Front End Loader
Backhoe
Tracked Jaw Crusher
Water Truck
Track Hoe

This Sheet:

- Minimal New Surface
Disturbance - Grading of
Existing Road
- Adding Bypass to Hairpin Turn

EXTENSION OF FR 2469 PROFILE (ON STATE LAND)

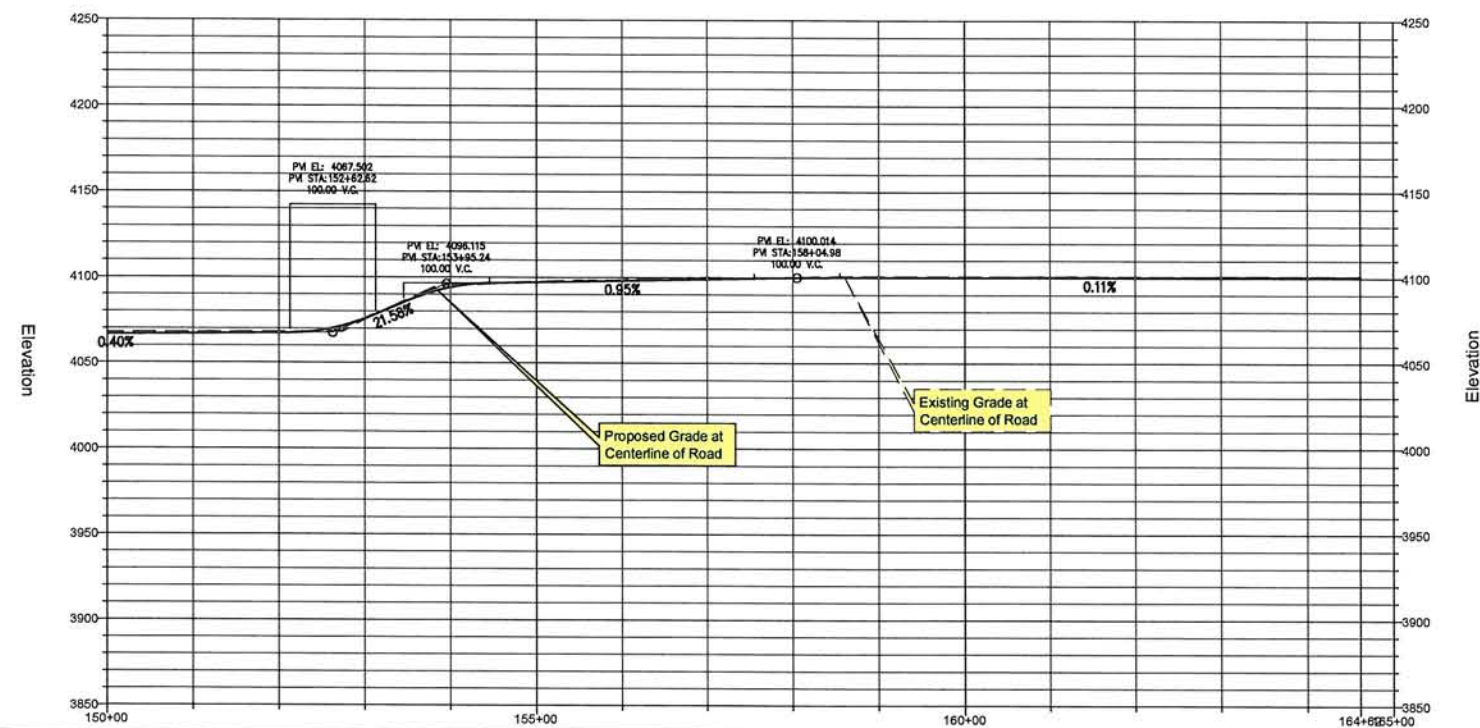


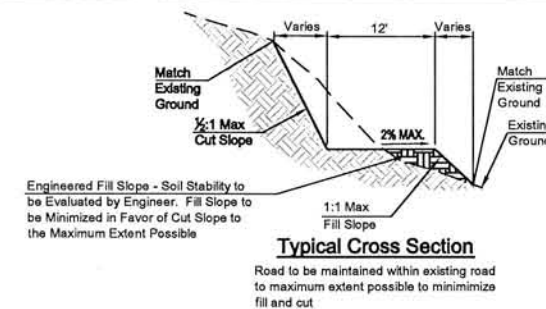
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

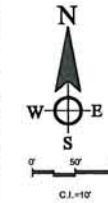
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
Extension of FR 2469
On State Land

Sheet 37 of 55



- Equipment List**
- Track Hoe
 - Hammer Hoe
 - Front end Loader
 - Tracked Jaw Crusher
 - Lang LM-140 Series Tophead
 - Rotary Drill Rig or equivalent
 - Schram 685 Rotary Drill Rig
 - UDR-1500 Core Drill Rig
 - Mud Tank
 - Pipe Trucks
 - Water Storage Tank
 - Generators for Drill Rig
 - Cat Bulldozer

- This Sheet:**
- Minimal New Surface Disturbance - Grading of Existing Road
 - Providing Safety Turn-out
 - Adding Segment to Connect FR 2463 to FR 2466 South
 - Clearing and Grading for PVT-6 Pad
 - Arizona Hedgehog Cacti Will Be Avoided
 - A Biological Monitor Will Be Present During Clearing and Grading Activities

FR 2463 PROFILE

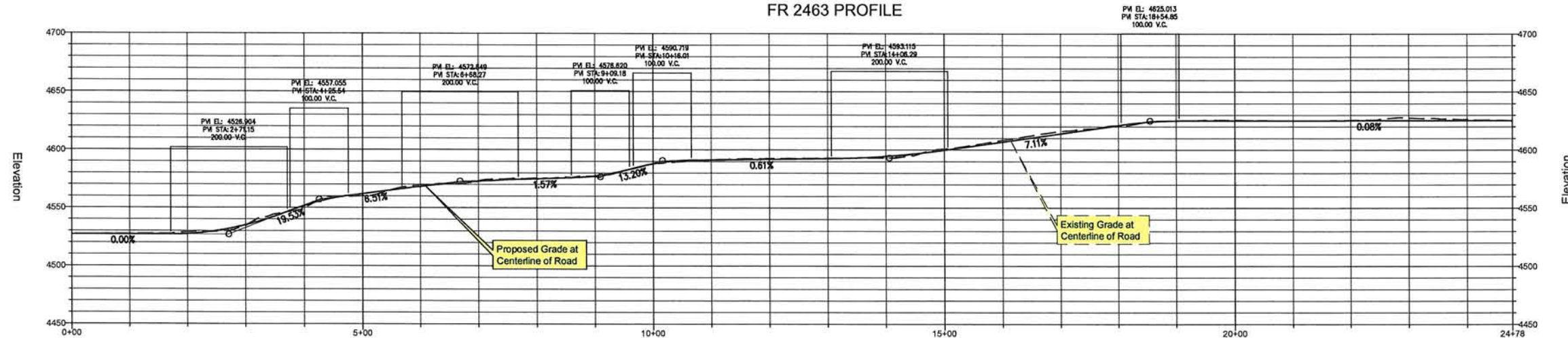


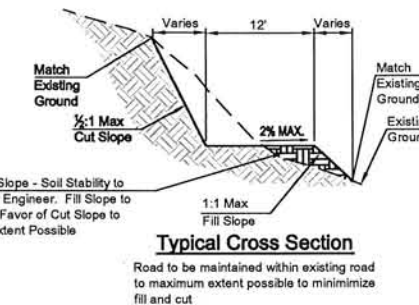
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval: 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
FR 2466 and FR 2463 Improvements
Access To PVT-6

Sheet 38 of 55



T1S - R13E - SECTION 23 / T1S - R13E - SECTION 22

FR 2461 PROFILE

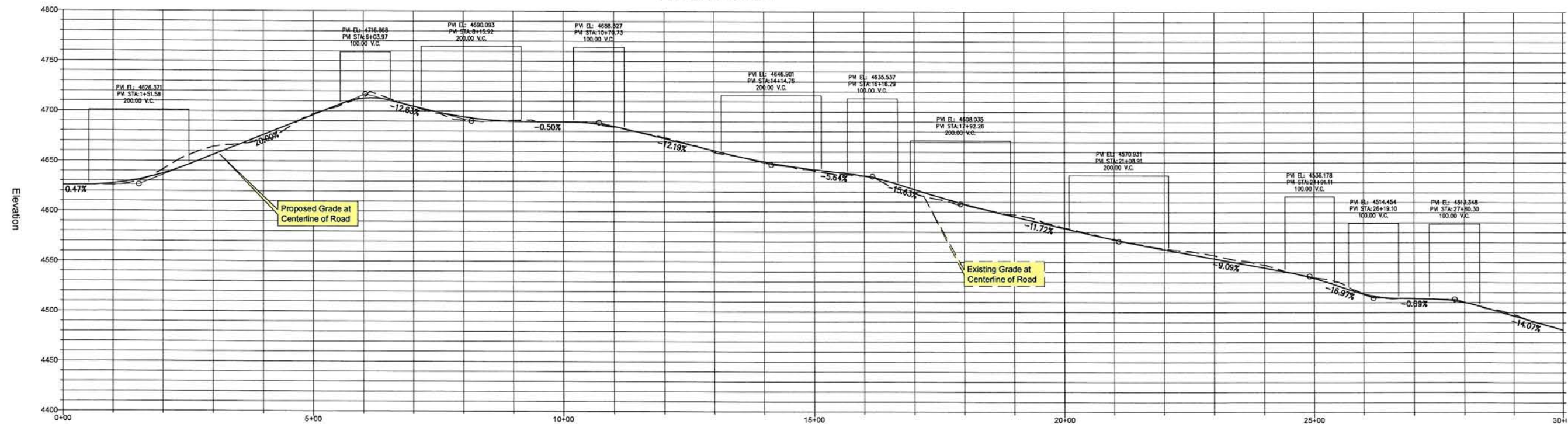


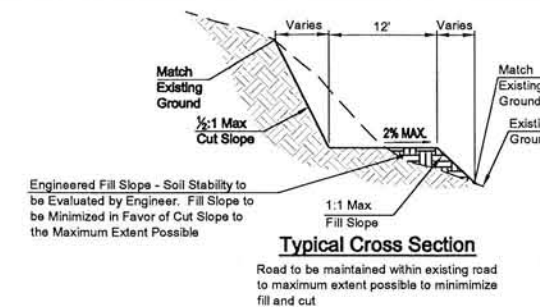
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval: 10'
PVI = Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
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- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience

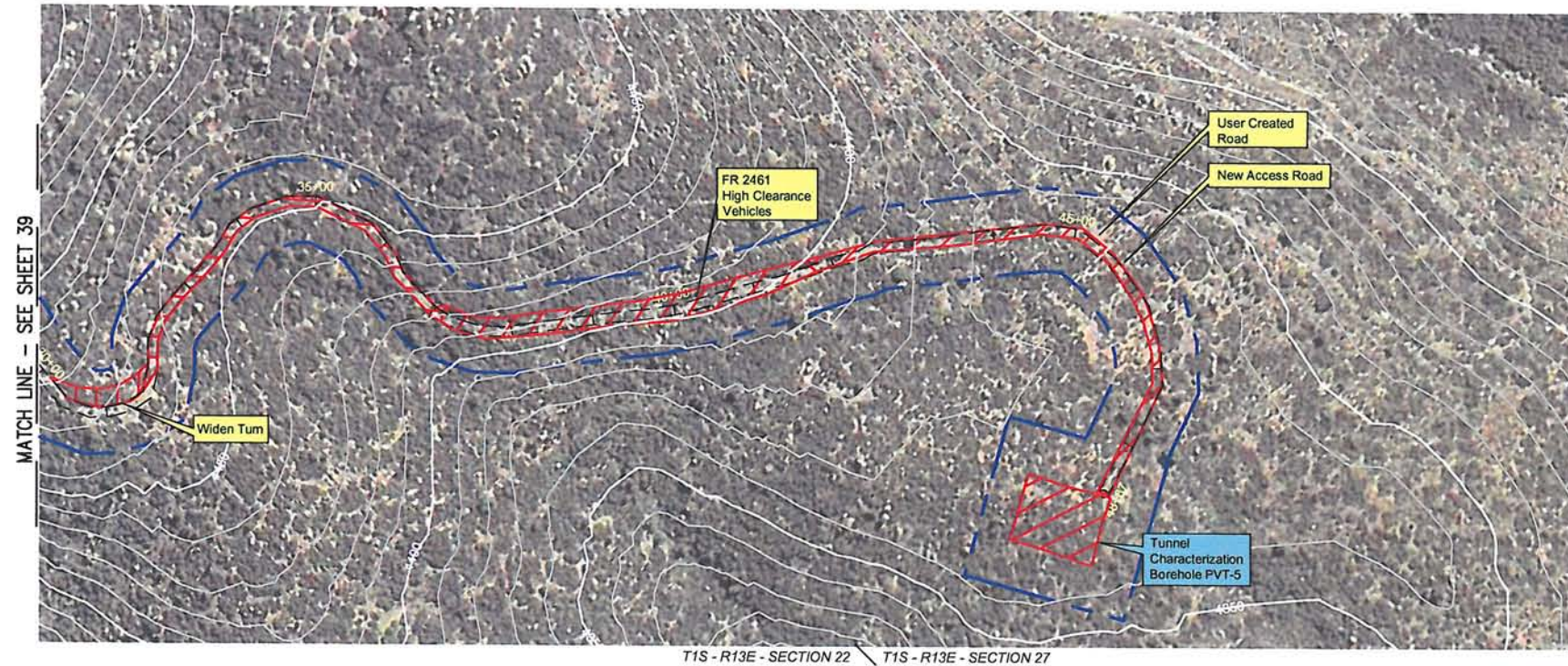


Equipment List

Track Hoe
Hammer Hoe
Front End Loader
Water Truck
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig or Equivalent
Schram 685 Rotary Drill Rig
UDR-1500 Core Drill Rig
Pipe Trucks
Cat Bulldozer
Water Truck

This Sheet:

- Existing Road is Narrow in Places - Using Hammer Hoe to Widen for Equipment Access
- Widening Intersection of FR 2461 and FR 2466 South
- Arizona Hedgehog Cacti Will Be Avoided
- A Biological Monitor Will Be Present During Clearing and Grading Activities Adjacent to Hedgehog Cacti



Equipment List

Track Hoe
Hammer Hoe
Front End Loader
Water Truck
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig or Equivalent
Schram 685 Rotary Drill Rig
UDR-1500 Core Drill Rig
Mud Tank
Pipe Trucks
Water Storage Tank
Generators for Drill Rig
Cat Bulldozer
Water Truck

This Sheet:

- This Section Takes Advantage of an Existing Road
- Some Segments of Roadway Improvement May Require an Extra 3 Feet or More Cut for Required Width and Stability
- Clearing and Grading for PVT-5 Pad

PVT-5 ACCESS PROFILE

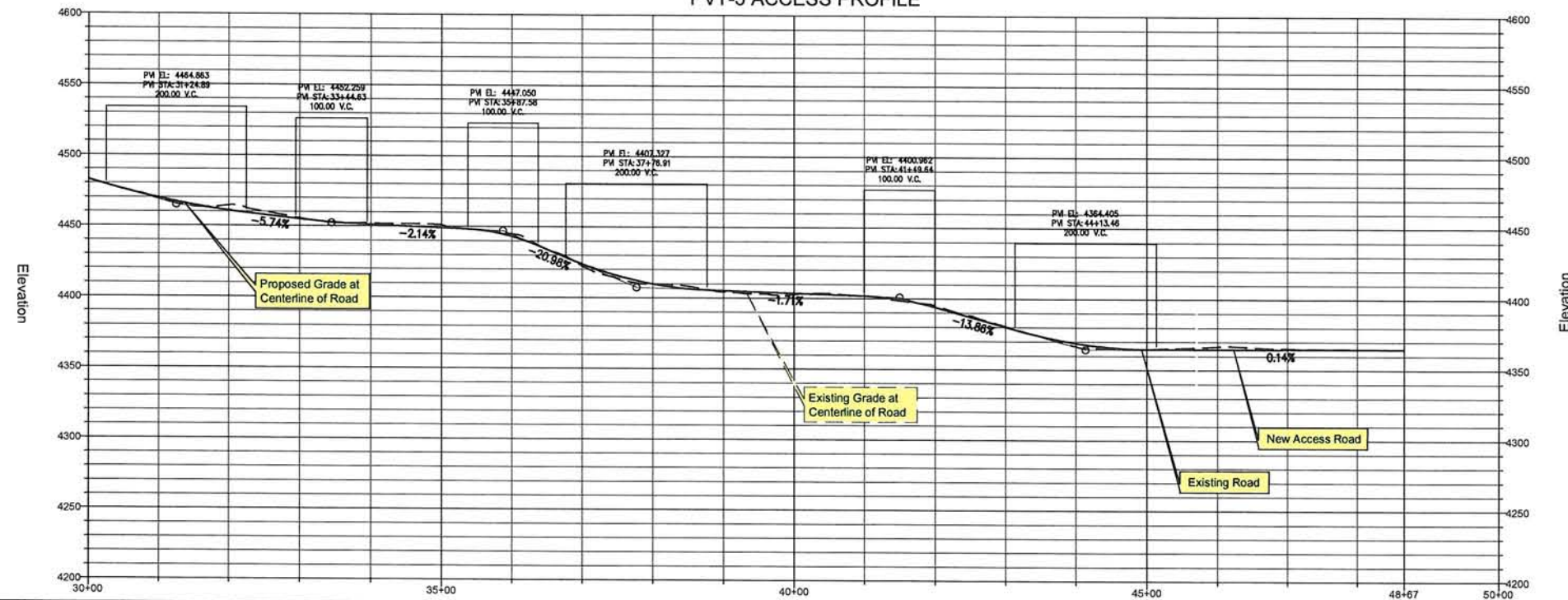


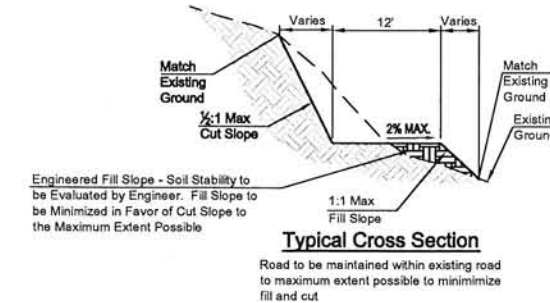
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience

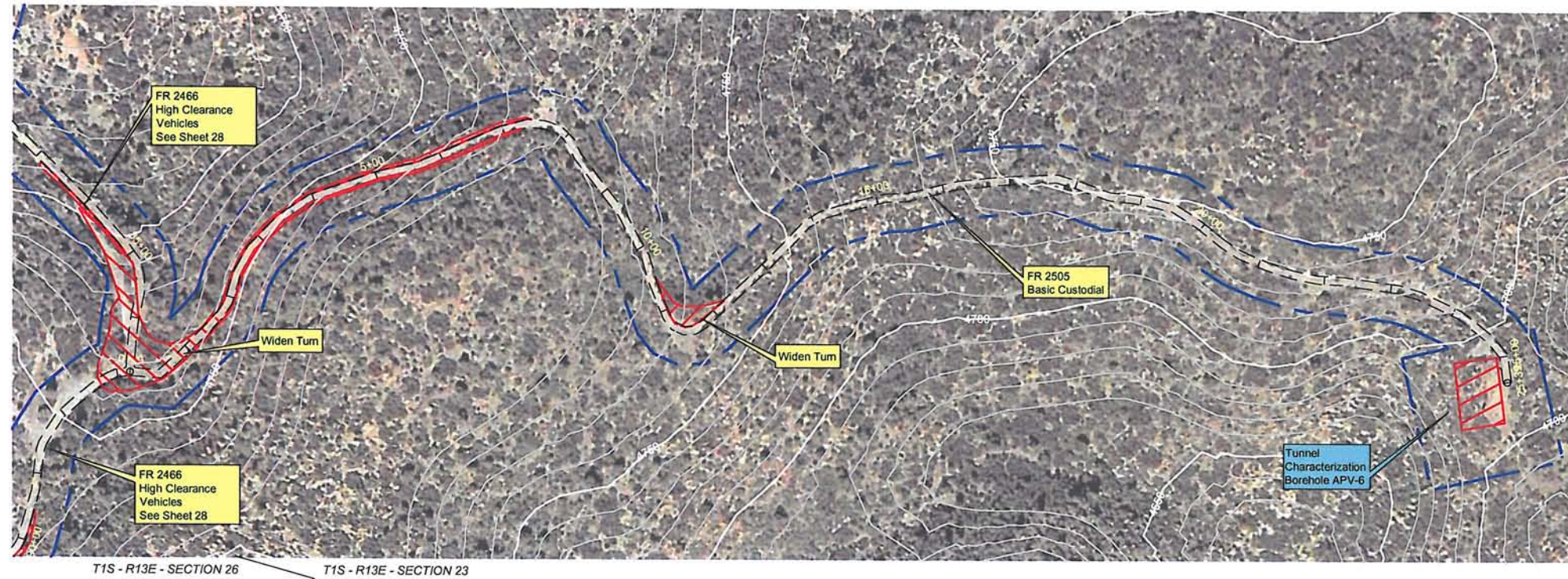


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Resolution Pre-Feasibility Activities
New Access Road Segment
Access To PVT-5

Sheet 40 of 55



Equipment List
Track Hoe
Hammer Hoe
Front End Loader
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig or Equivalent
Schram 685 Rotary Drill Rig
UDR-1500 Core Drill Rig
Mud Tank
Pipe Trucks
Water Storage Tank
Generators for Drill Rig
Cat Bulldozer
Water Truck

- This Sheet:**
- Minimal New Surface Disturbance - Grading of Existing Road
 - Enlarging Junction of FR 2505 and FR 2466 to Prevent Hairpin Turn
 - Clearing and Grading for APV-6 Pad

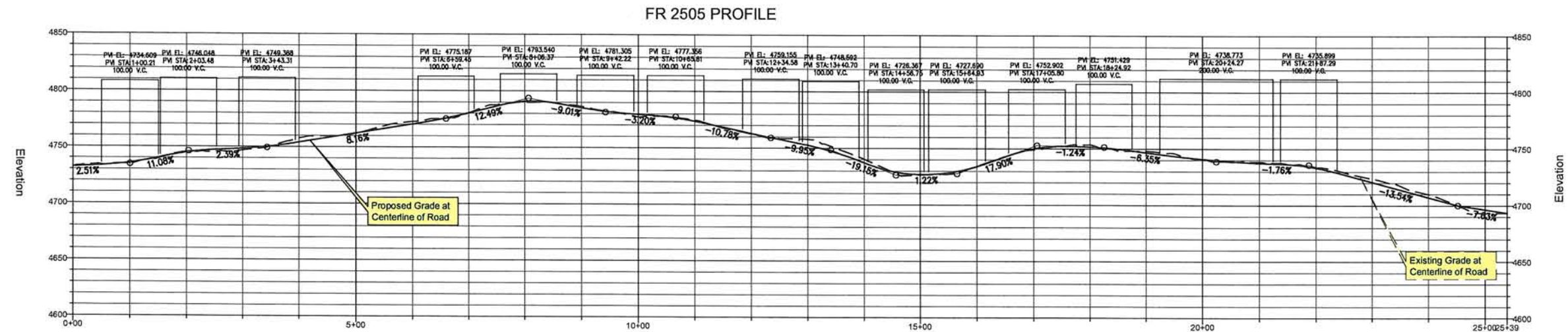


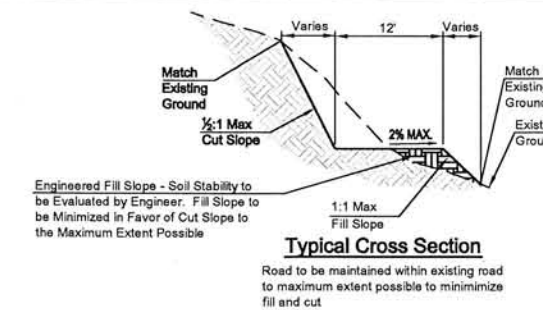
Image Source: Digit, Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

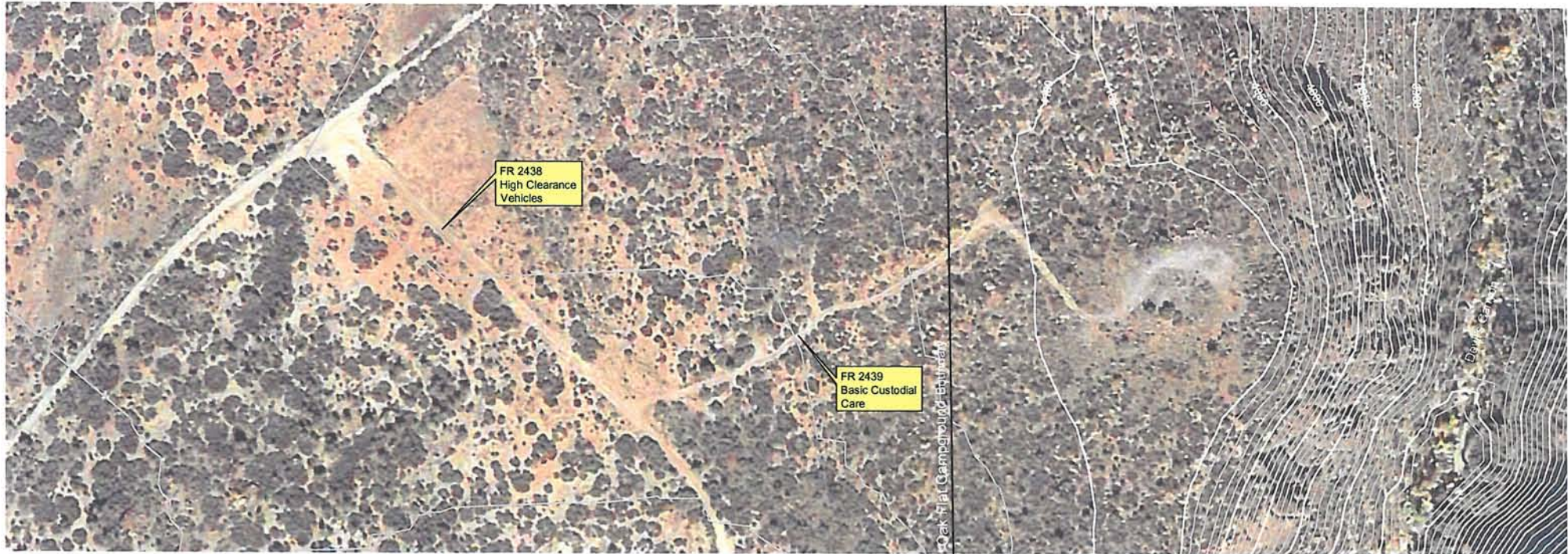
Forest Service Road Designations:

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- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
FR 2466 and FR 2505 Improvements
Access To APV-6



FR 2439 PROFILE

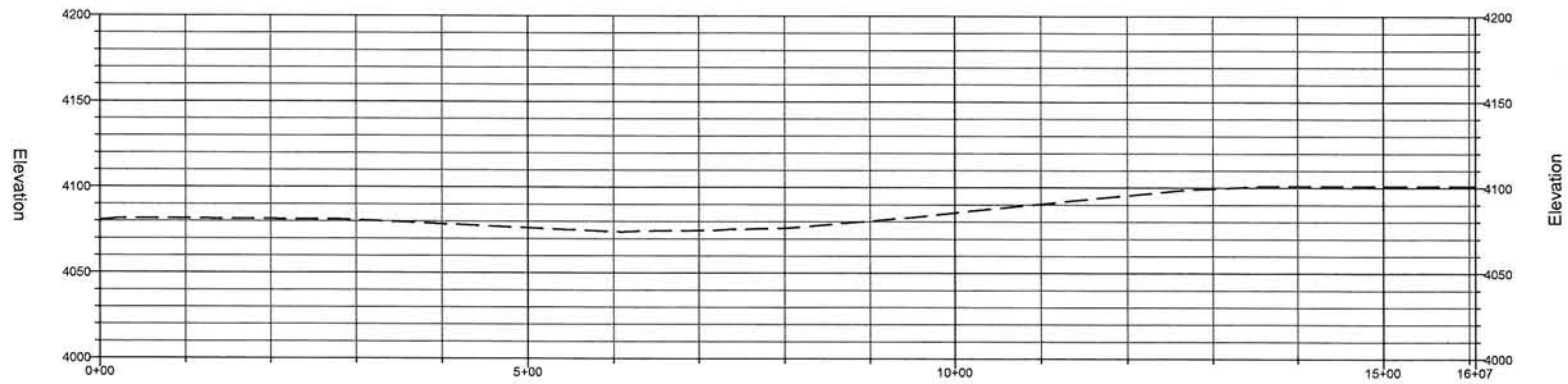


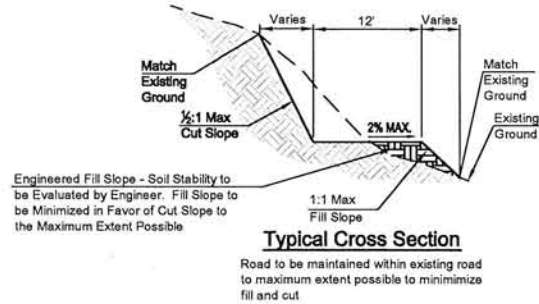
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
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VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

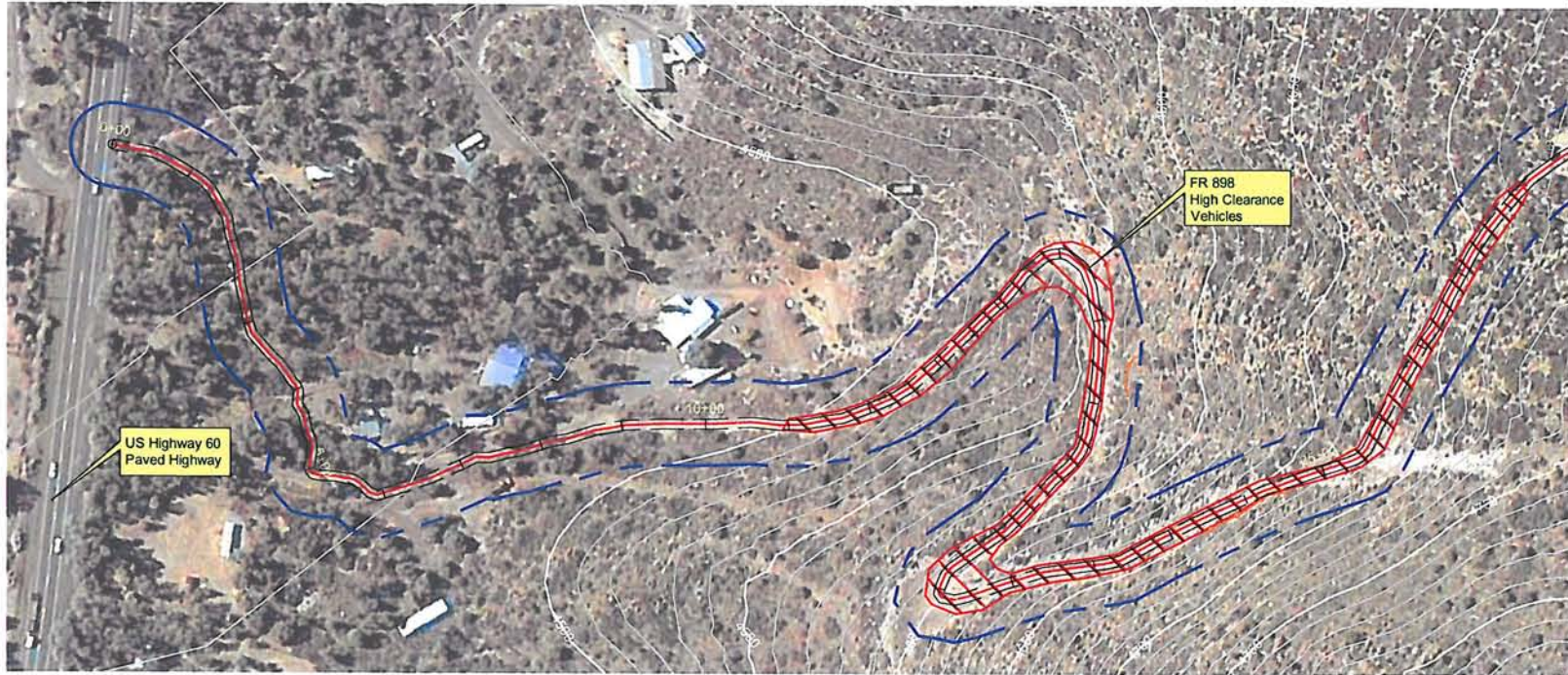
Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience





T1S - R13E - SECTION 14

EXTENSION OF FR 898 PROFILE (ON PRIVATELY OWNED LANDS)

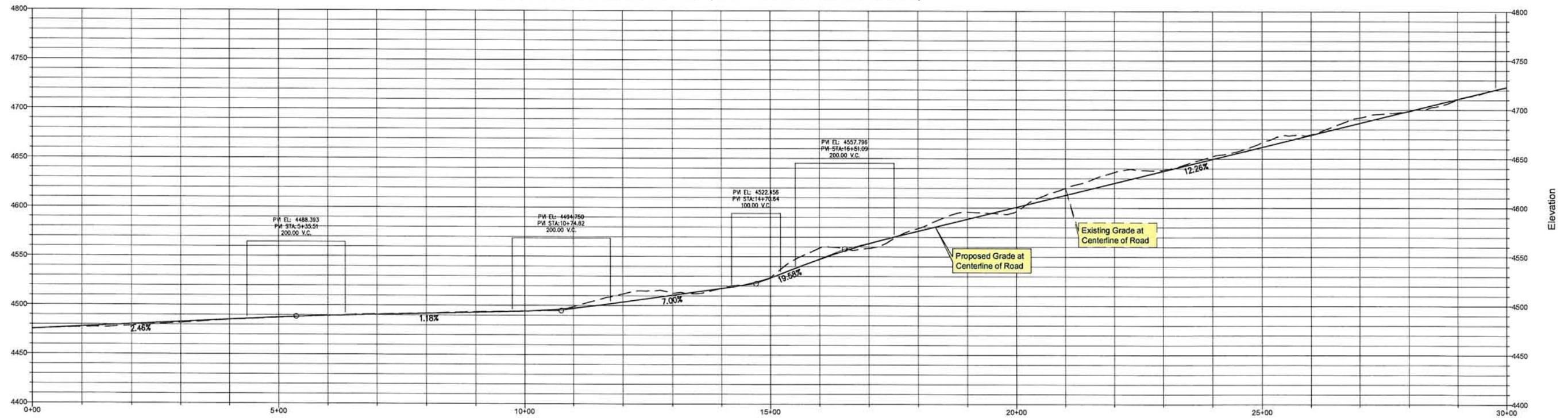


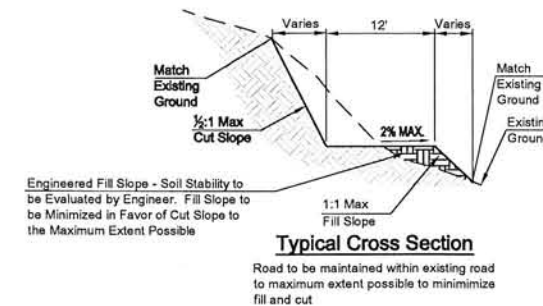
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

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- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



Equipment List

Track Hoe
Hammer Hoe
Front End Loader
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig or equivalent
Schram 685 Rotary Drill Rig
UDR-1500 Core Drill Rig
Pipe Trucks
Water Truck
Cat Bulldozer

This Sheet:

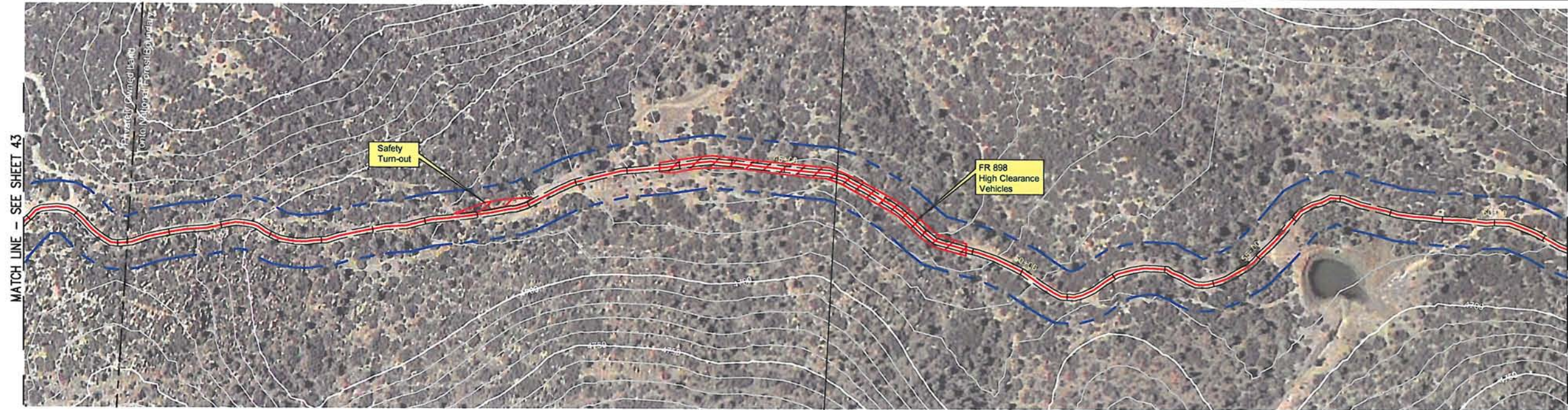
- Widening of Turns for Equipment
- Arizona Hedgehog Cacti Would Be Fenced and Protected with Cactus Guards
- A Biological Monitor Will Be Present During Grading and Clearing Activities
- No Adverse Effect Would Occur to Cultural Site AR-03-12-02-1403(TNF)

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Resolution Pre-Feasibility Activities
FR 898 Improvements
Access To Tunnel Borehole APV-8
on Privately Owned Lands

Sheet 43 of 55



- Equipment List**
- Track Hoe
 - Hammer Hoe
 - Front End Loader
 - Tracked Jaw Crusher
 - Lang LM-140 Series Tophead
 - Rotary Drill Rig or Equivalent
 - Schram 685 Rotary Drill Rig
 - UDR-1500 Core Drill Rig
 - Pipe Trucks
 - Water Truck
 - Cat Bulldozer

- This Sheet:**
- Providing Safety Turn-out
 - Widening Portions of Road for Access
 - Grading of Existing Road

T1S - R13E - SECTION 14 T1S - R13E - SECTION 11

FR 898 PROFILE

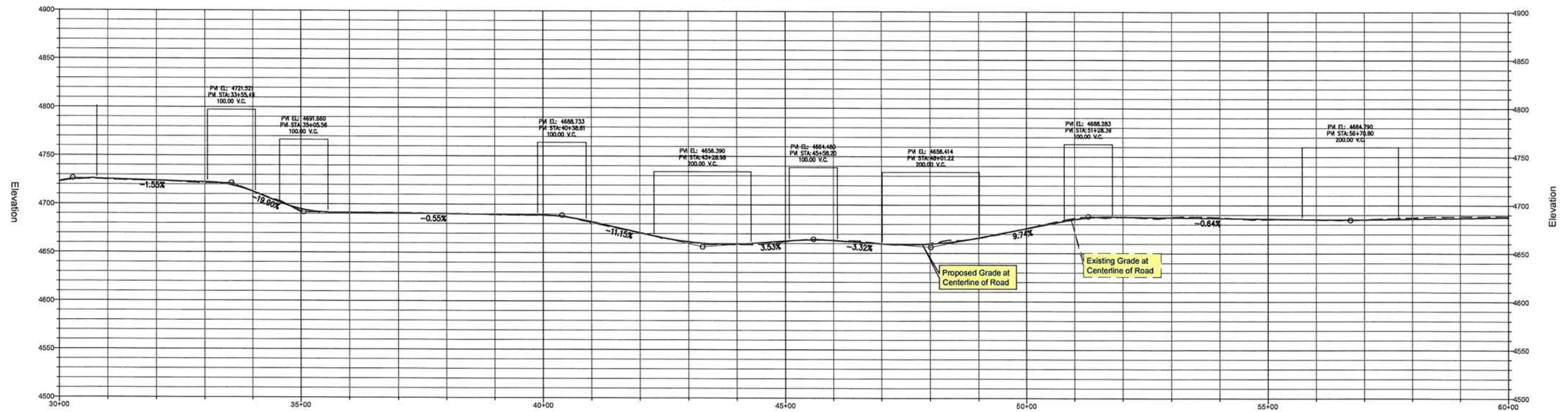


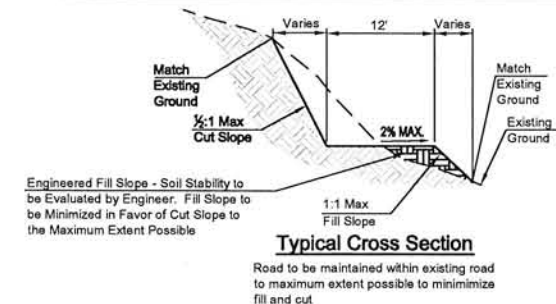
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

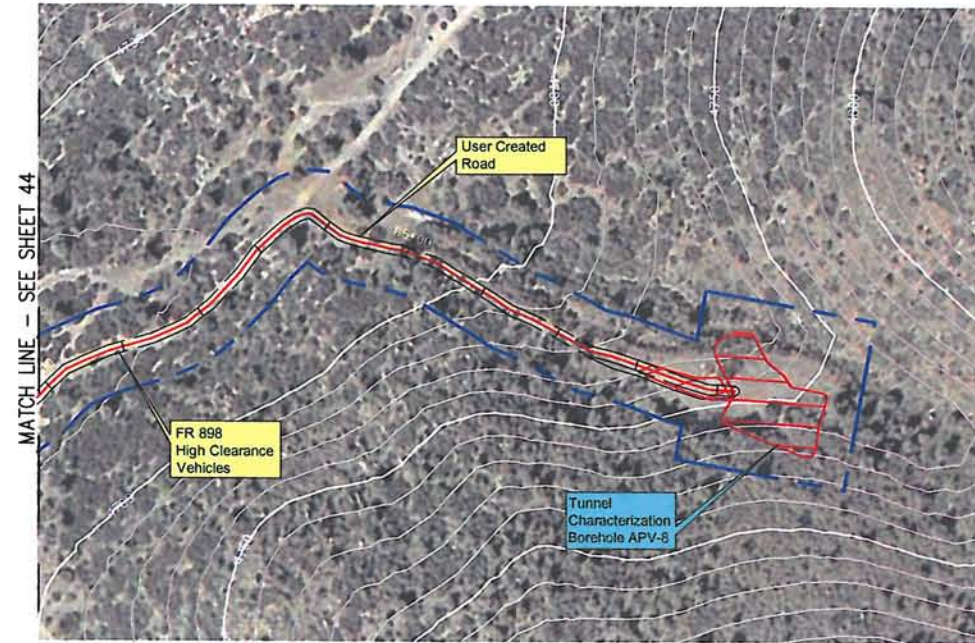
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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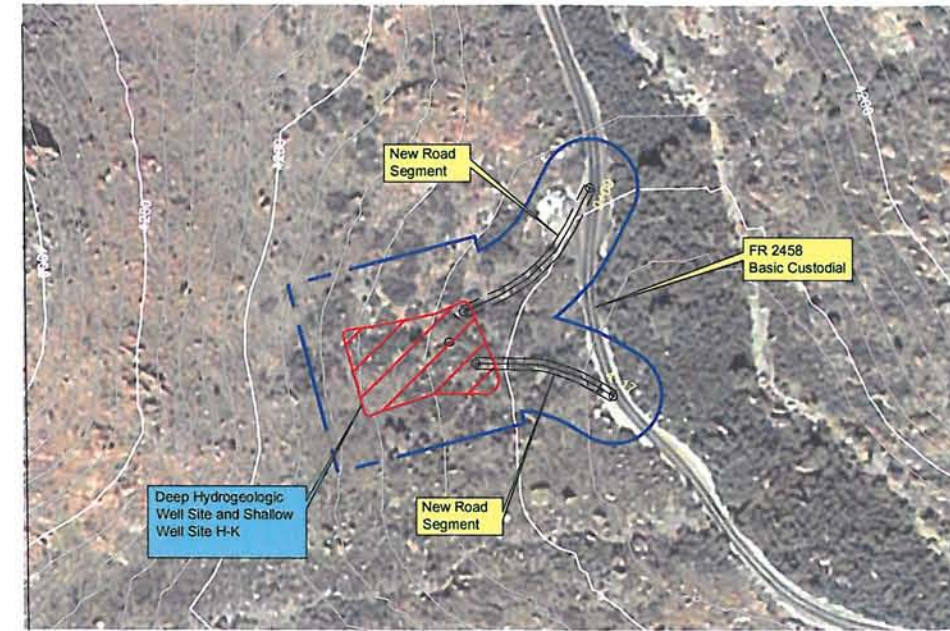
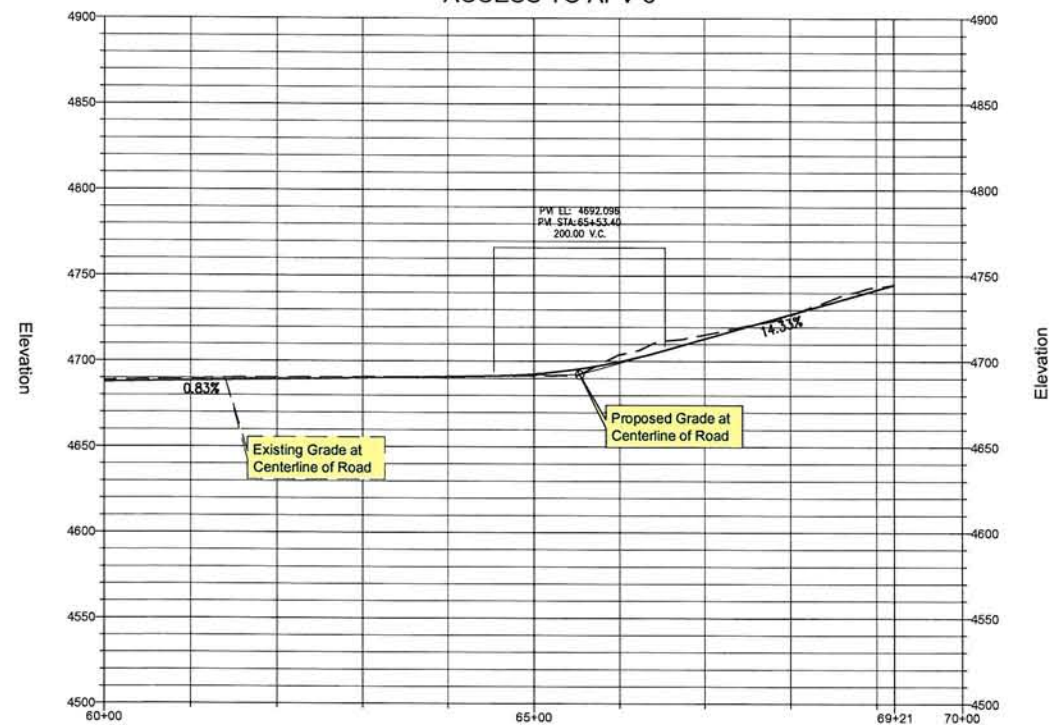
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Resolution Pre-Feasibility Activities
FR 898 Improvements
Access To Tunnel Borehole APV-8



T1S - R13E - SECTION 11

ACCESS TO APV-8



T1S - R13E - SECTION 21

H-K ACCESS PROFILE

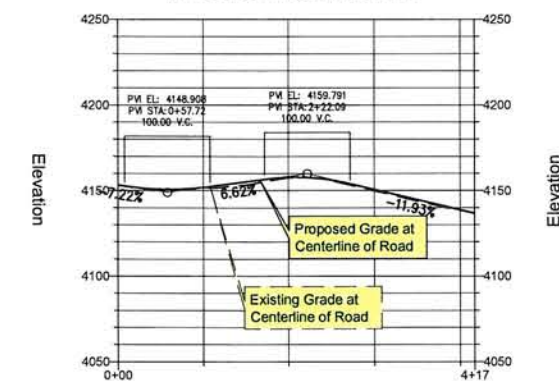


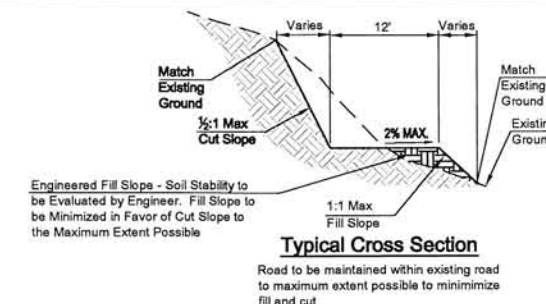
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Topographical Source: USGS NED Dataset
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience

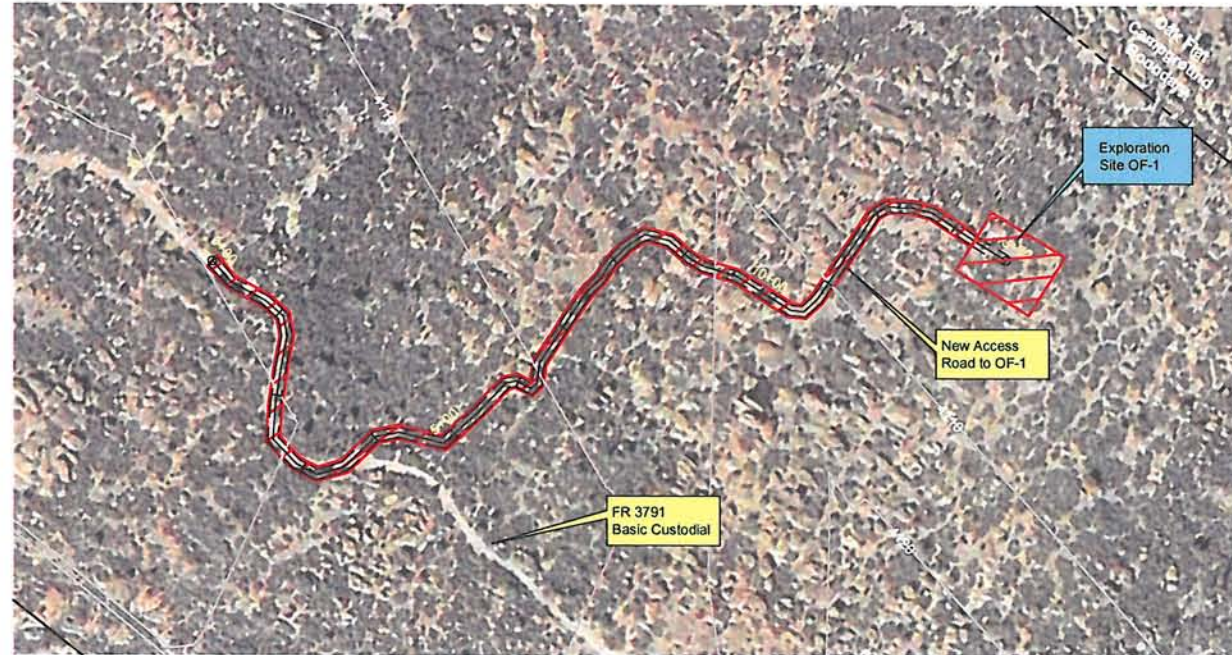


Equipment List

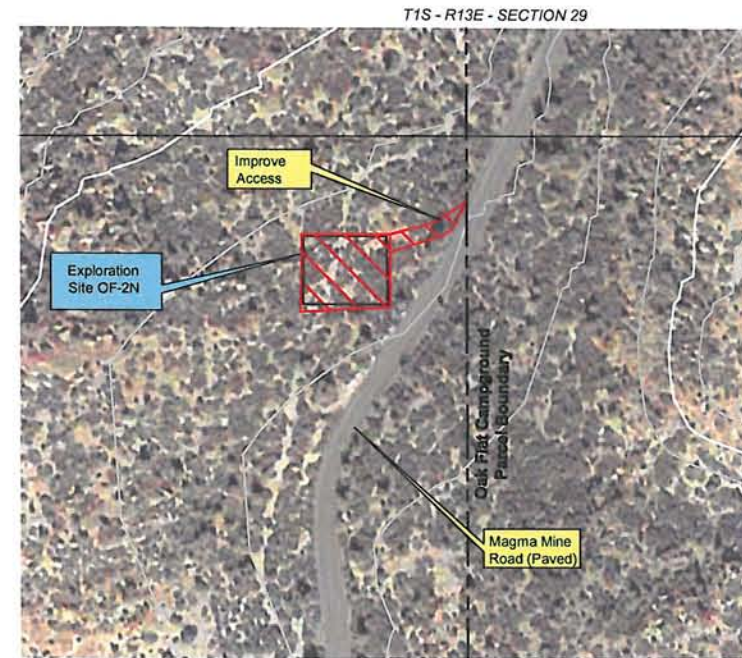
Track Hoe
Hammer Hoe
Front End Loader
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig or Equivalent
Schram 685 Rotary Drill Rig
UDR-1500 Core Drill Rig
Pipe Trucks
Water Truck
Mud Tank

This Sheet:

- Minimal New Surface Disturbance - Grading of Existing Road
- Widening of Tight Spots with Track Hoe
- Clearing and Grading for Drill Pads
- Rock Removed from Excavation of Drill Sites Will Be Crushed and Used to Dress Road Surface



T1S - R13E - SECTION 33



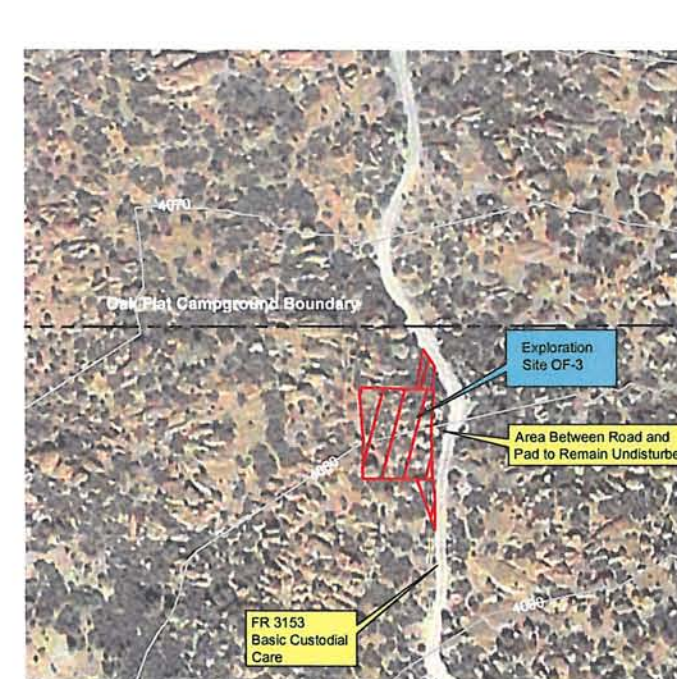
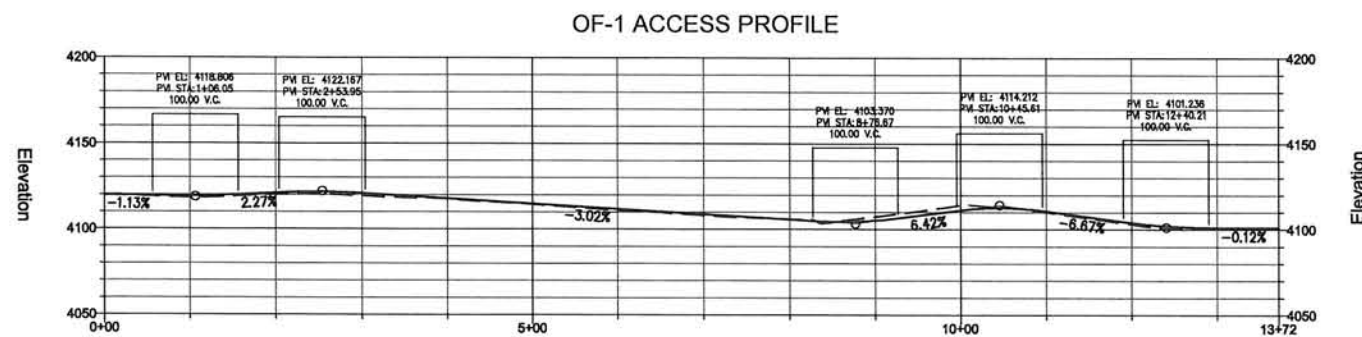
T1S - R13E - SECTION 32

Equipment List

UDR-5000 Core Drill Rig
CP-50 Core Drill Rig
Mud Tank
Schram 885 Rotary Drill Rig
Pipe Trucks
Water Storage Tank
Generators for Drill Rig
Cat Bulldozer
Track Hoe
Water Truck

This Sheet:

- Clearing and Grading for Drill Pads
- Constructing New Access Road to OF-1
- An Archaeological Monitor Will Be Present for Clearing Activities Associated with OF-1 and Access to this Site
- No Features Within AR-03-12-02-125 (TNF) Would Be Impacted



T1S - R13E - SECTION 33

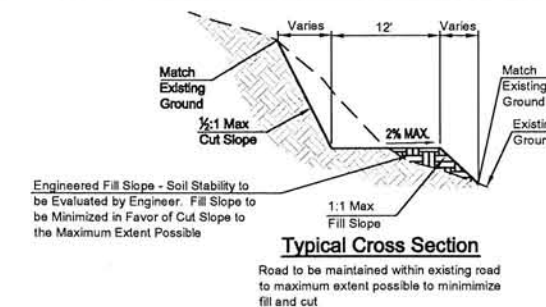
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
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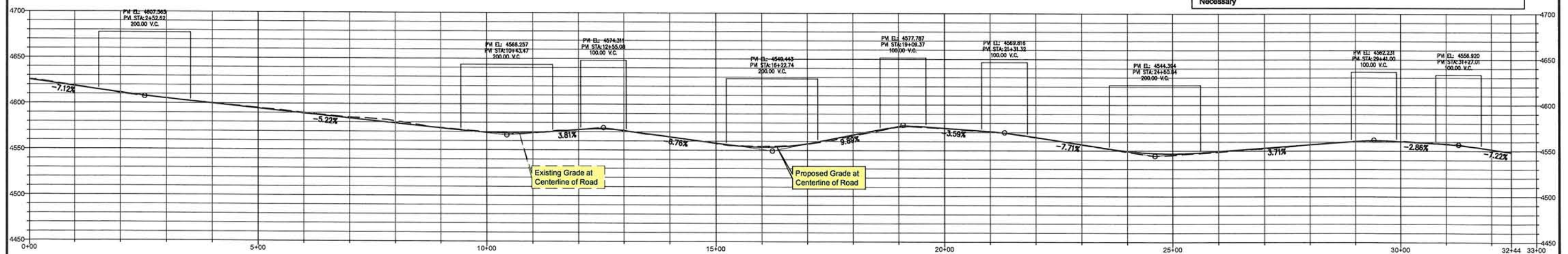
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Resolution Pre-Feasibility Activities
OF-1, OF-2N, AND OF-3, and
OF-1 Access Road Improvements



T1S - R14E - SECTION 7

FR 320 PROFILE



Equipment List

Lang LM-140 Series Tophead
Rotary Drill Rig
UDR-5000 Core Drill Rig
Mud Tank
Schram 685 Rotary Drill Rig
Pipe Trucks
Water Storage Tank
Generators for Drill Rig
Cat Bulldozer
Water Truck
Front End Loader

This Sheet:

FR 320 is Located Within the 1920's Alignment of US 60. No Adverse Impact Would Occur to the Site Due to the Implementation of the Following Procedures:

- Fill Potholes With Fill Dirt
- Use Only Rubber-Tire Vehicles
- Cleanly Remove Ramps Used to Access Drill Pad
- Keep Vegetation Removal to a Minimum

An Archaeologist Will Monitor Site Construction

PVT-8 is Located Within Ineligible Cultural Site AR-03-12-02-1456(TNF)

Arizona Hedgehog Cacti Would Be Fenced and Protected with Cactus Guards where Necessary

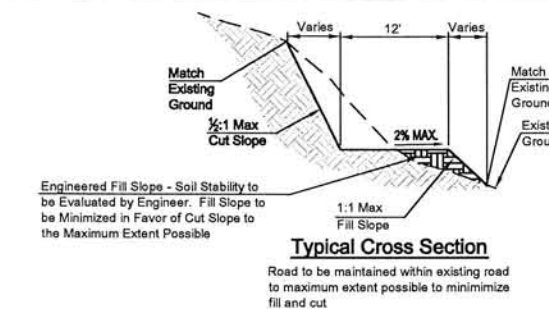
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Topographical Source: USGS NED Dataset
Contour Interval: 10'
PVI= Point of Vertical Intersection of Slopes
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

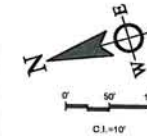
Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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Resolution Pre-Feasibility Activities
FR 320 Improvements
Access To Tunnel Borehole PVT-8



Equipment List

Track Hoe
Hammer Hoe
Front End Loader
Water Truck
Tracked Jaw Crusher
Lang LM-140 Series Tophead
Rotary Drill Rig or Equivalent
UDR-1500 Core Drill Rig
Mud Tank
Schram 685 Rotary Drill Rig
Pipe Trucks
Water Storage Tank
Generators for Drill Rigs
Cat Bulldozer

This Sheet:

- Minor Improvements to Existing Road
- Clearing and Grading for PVT-9 Pad
- Arizona Hedgehog Cacti Will Be Fenced and Protected with Cactus Guards
- A Biological Monitor Will Be Present During Clearing Activities
- Cultural Sites
AR-03-12-02-1448(TNF) and
AR-03-12-02-1449(TNF) are
Ineligible for Inclusion in the
NRHP and Would Not Be
Adversely Affected

PVT-9 ACCESS PROFILE

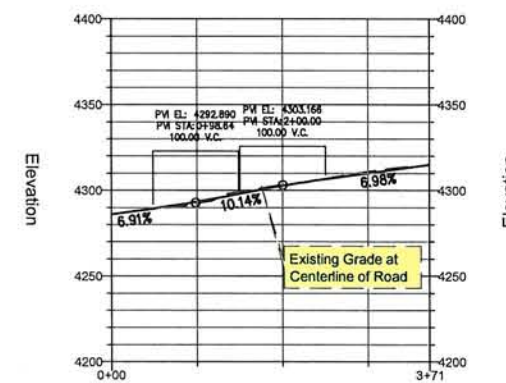


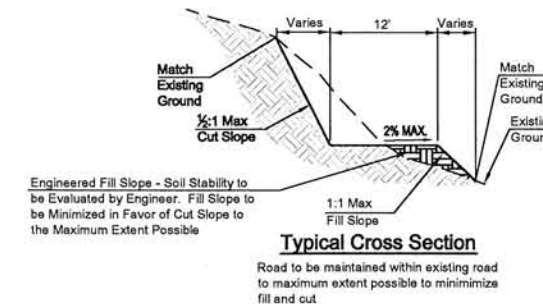
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

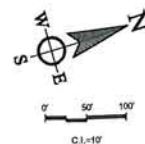
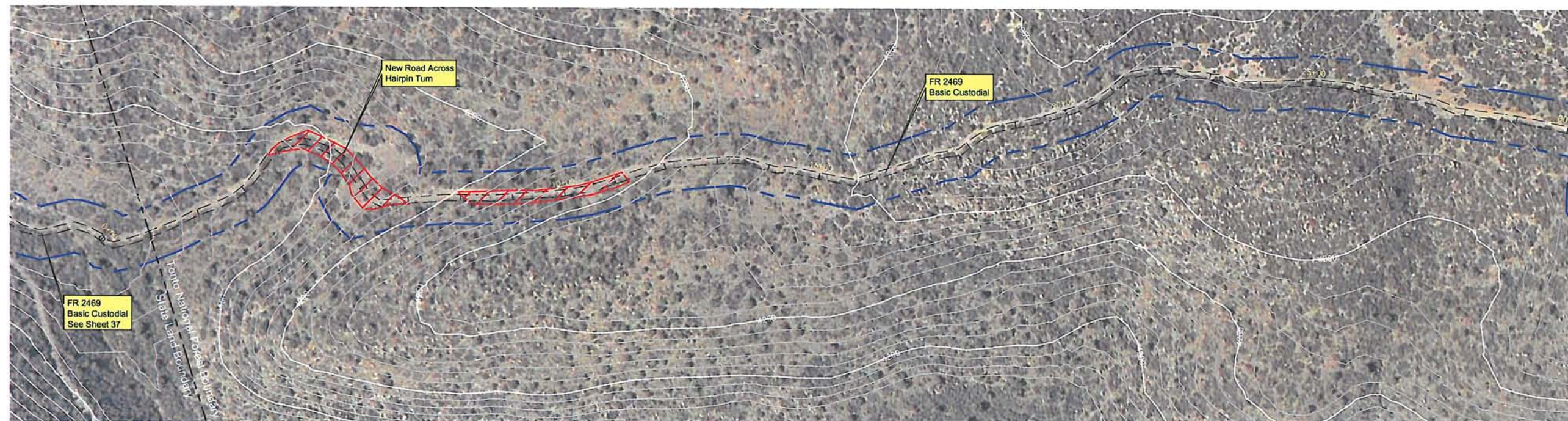
- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
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Resolution Pre-Feasibility Activities
Access To Tunnel Borehole PVT-9



Equipment List

- Lang LM-140 Series Tophead
- Rotary Drill Rig or equivalent
- Pipe Trucks
- Front End Loader
- Backhoe
- Tracked Jaw Crusher
- Water Truck
- Track Hoe

This Sheet

- Minimal New Surface
- Disturbance - Grading of Existing Road
- Widening Turn
- Leveling Small Washboard Area Close to Pad H-H
- Cutting New Road Across Hairpin Turn

FR 2469 PROFILE

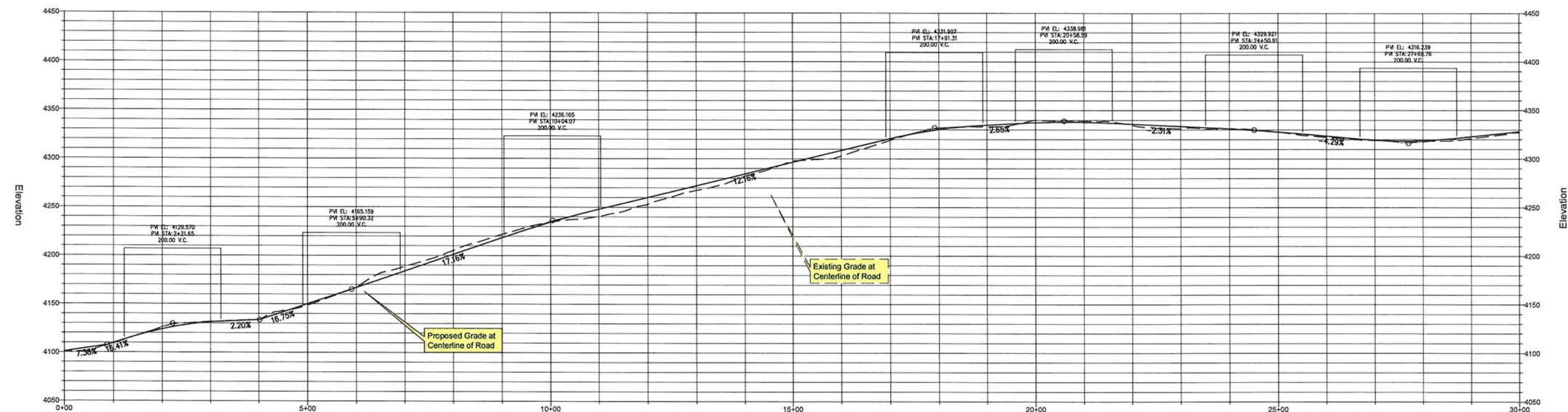


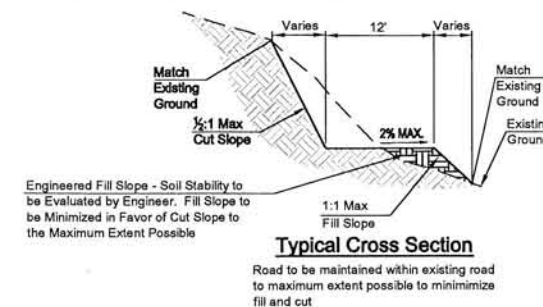
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NEO Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

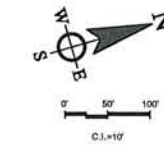
Forest Service Road Designations:

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- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



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Resolution Pre-Feasibility Activities
FR 2469 Improvements
Access to Shallow Well Site H-I



Equipment List

- Lang LM-140 Series Tophead Rotary Drill Rig or Equivalent
- Pipe Trucks
- Front End Loader
- Backhoe
- Tracked Jaw Crusher
- Water Truck
- Track Hoe

This Sheet:

- Minimal New Surface
- Disturbance- Grading of Existing Road.
- Cutting New Road Across Hairpin Turns at Two Locations

T1S - R13E - SECTION 35

FR 2469 PROFILE

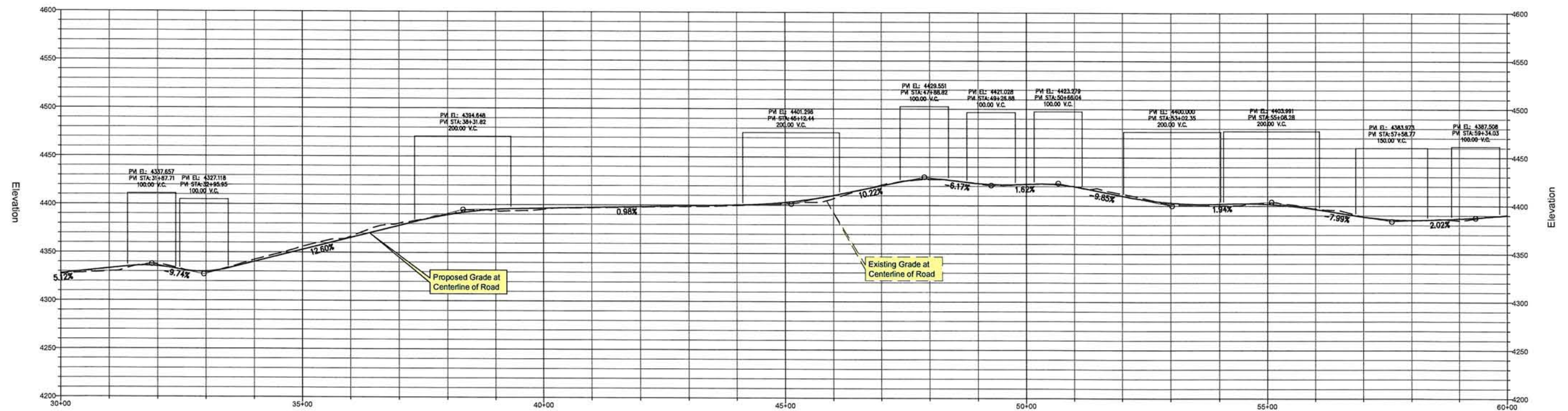


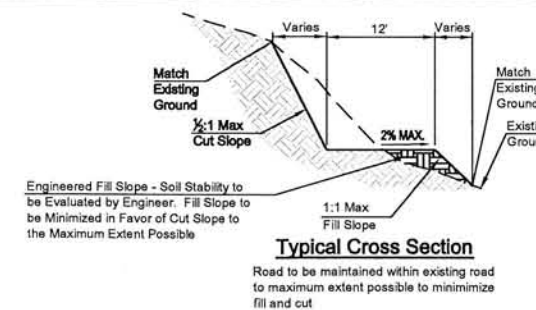
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
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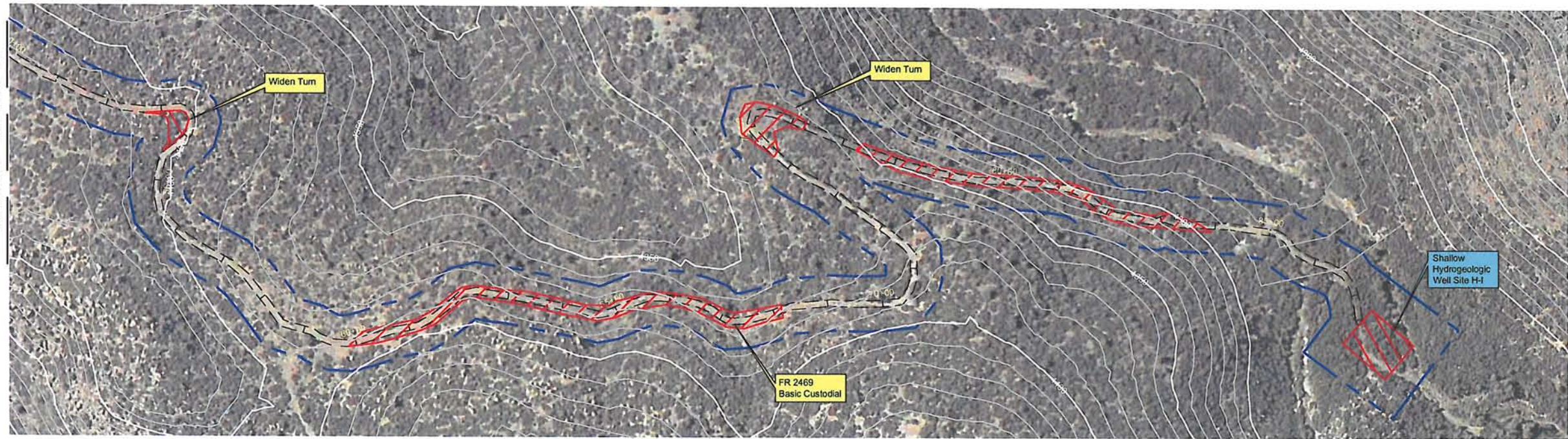


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Resolution Pre-Feasibility Activities
FR 2469 Improvements
Access to Shallow Well Site H-1

MATCH LINE - SEE SHEET 50



T1S - R13E - SECTION 35

Equipment List
 Lang LM-140 Series Tophead
 Rotary Drill Rig or Equivalent
 Mud Tank
 Heavy Duty Air Compressor
 Pipe Trucks
 Water Storage Tank
 Generators for Drill Rig
 Front End Loader
 Backhoe
 Tracked Jaw Crusher
 Water Truck

This Sheet:
 • Grading of Existing Road
 • Widening of Tight Spots with Track Hoe
 • Clearing and Grading for H-1 Pad

FR 2469 PROFILE

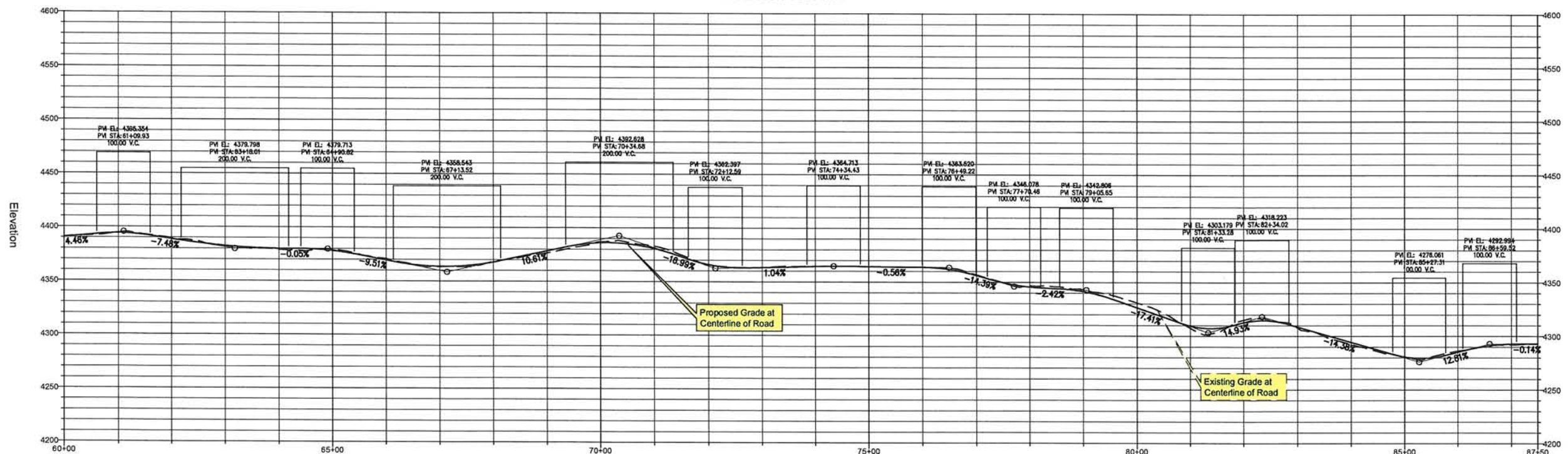


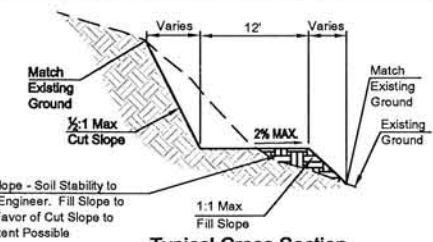
Image Source: Digit. Globe QuickBird Dataset
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
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Forest Service Road Designations:

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- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



Typical Cross Section

Road to be maintained within existing road to maximum extent possible to minimize fill and cut

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Resolution Pre-Feasibility Activities
 FR 2469 Improvements
 and Shallow Well H-1

Sheet 51 of 55



T1S - R13E - SECTION 28



T1S - R13E - SECTION 28

T1S - R13E - SECTION 27

Equipment List

Lang LM-140 Series Tophead
Rotary Drill Rig or Equivalent
UDR-1500 Core Drill Rig
Mud Tank
Schram 685 Rotary Drill Rig
Pipe Trucks
Water Storage Tank
Generators for Drill Rig
Cat Bulldozer
Track Hoe
Tracked Jaw Crusher
Water Truck

This Sheet:

- Rock Removed From Excavation of Drill Sites PVT-3, PVT-4, and H-L Will Be Crushed and Used to Dress Road Surface
- Access to Drill Sites from the South on Existing Roads
- No Improvements to Roads Required

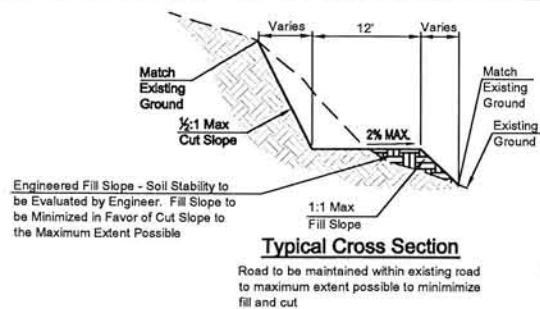
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Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
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Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

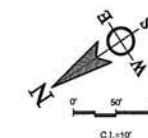
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- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



RESOLUTION COPPER MINING, LLC

Resolution Pre-Feasibility Activities
PVT-3, PVT-4, and H-L



Equipment List

- Track Hoe
- Hammer Hoe
- Front End Loader
- Tracked Jaw Crusher
- Lang LM-140 Series Tophead
- Rotary Drill Rig or Equivalent
- Schram 685 Rotary Drill Rig
- UDR-1500 Core Drill Rig
- Pipe Trucks
- Water Truck
- Mud Tank
- Water Storage Tank
- Generators for Drill Rig
- Cat Bulldozer

This Sheet:

- Minimal New Surface Disturbance - Grading of Existing Road
- Clearing and Grading for PVT-7 Pad
- Clearing and Grading Along FR 2511 for Potential Helped Locations

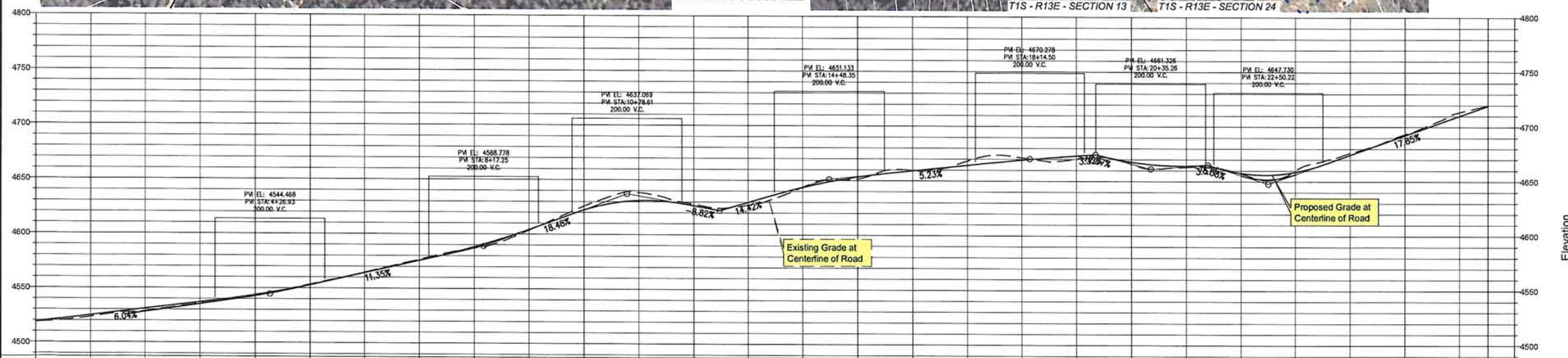


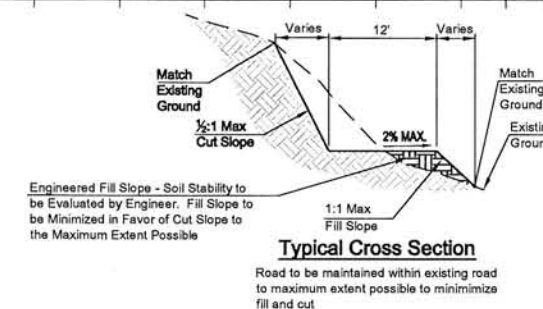
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

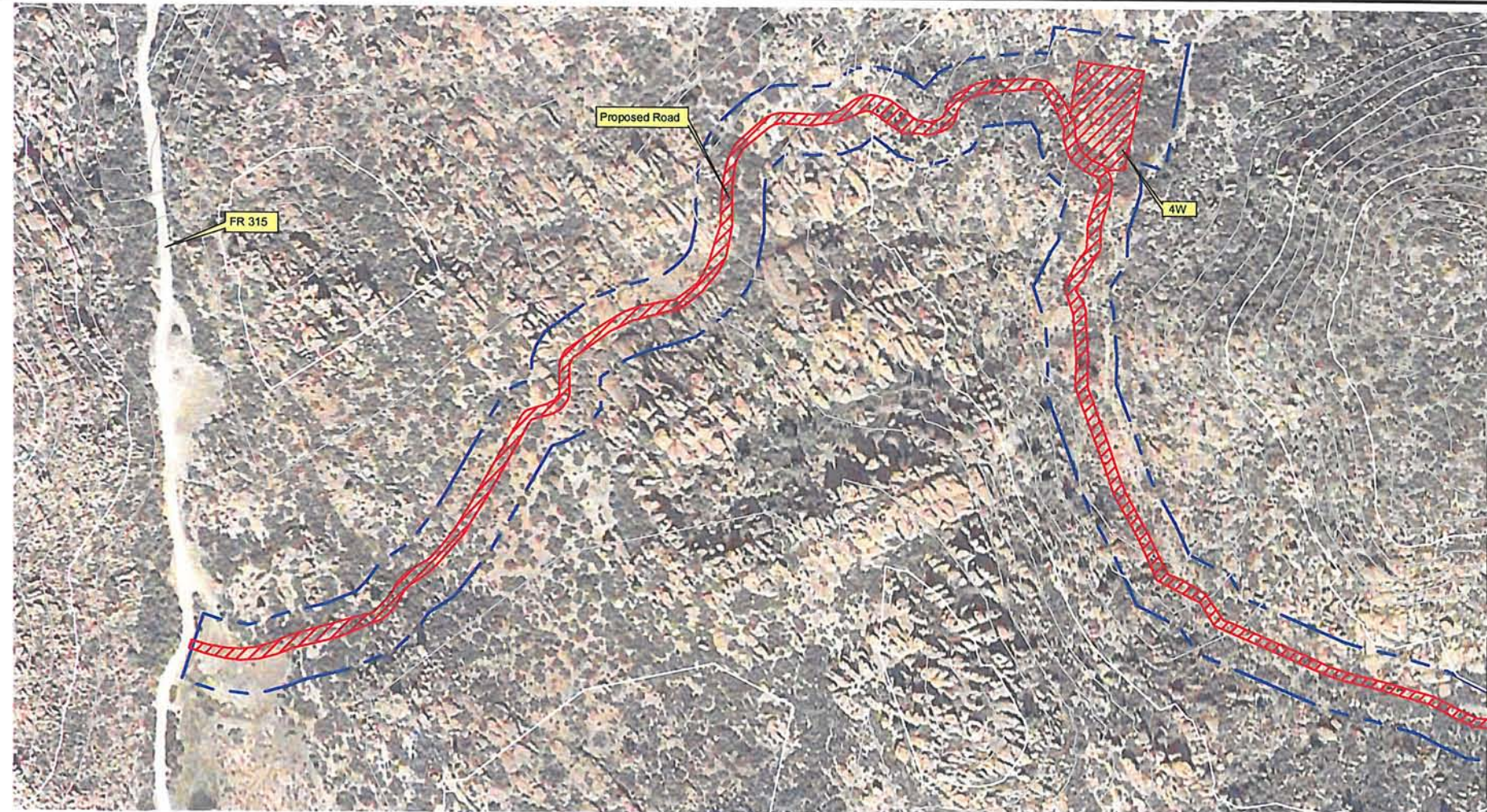
Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

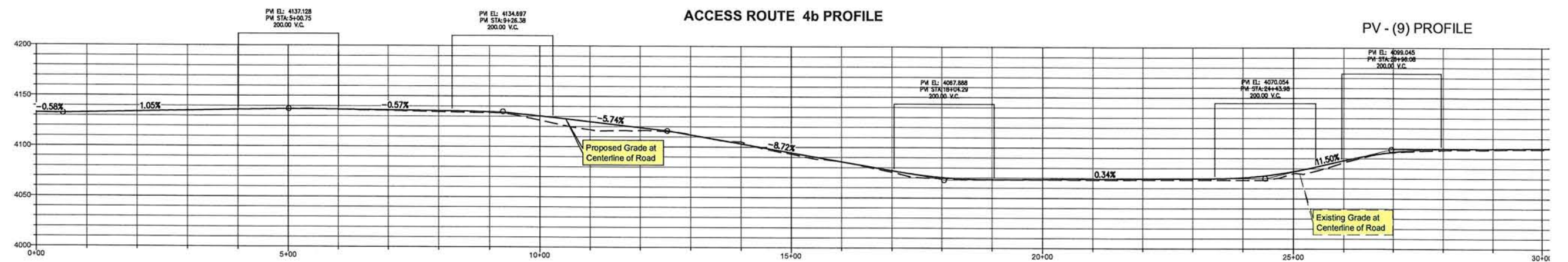
Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience





T2S - R13E - SECTION 6



ACCESS ROUTE 4b PROFILE

PV - (9) PROFILE

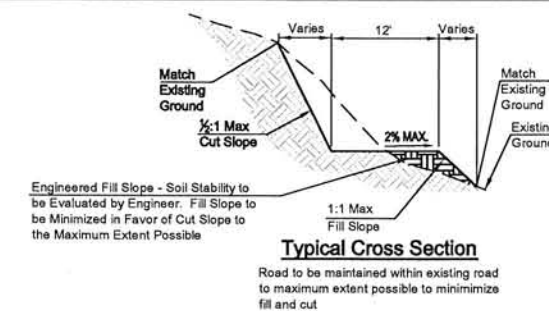
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
- 3- Suitable for Passenger Cars - assigned to roads operated and maintained for travel by a prudent driver in a standard passenger car
- 4- Moderate Degree of User Comfort - assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
- 5- High Degree of User Comfort - assigned to roads that provide a high degree of user comfort and convenience



Typical Cross Section

Road to be maintained within existing road to maximum extent possible to minimize fill and cut

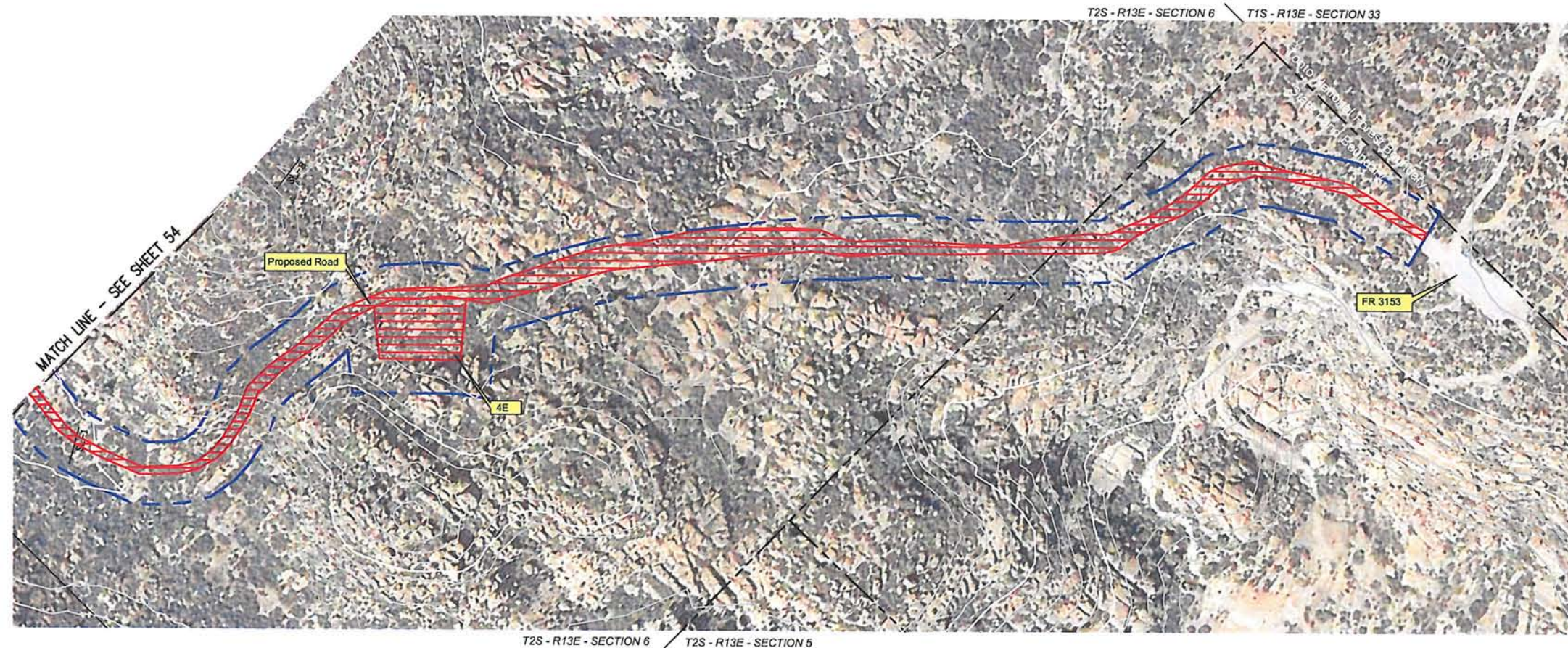
WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 208-8585

RESOLUTION COPPER MINING, LLC

Resolution Pre-Feasibility Activities

Access Route 4b

Sheet 54 of 55



ACCESS ROUTE 4b PROFILE

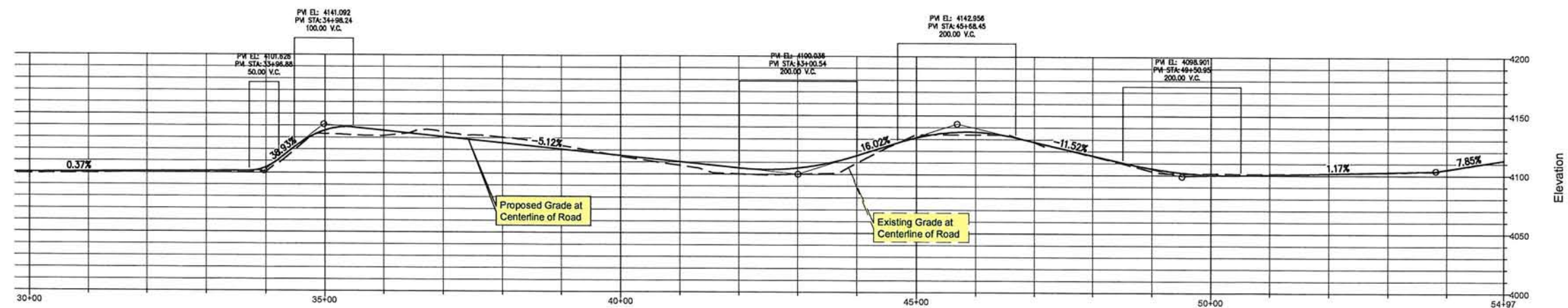


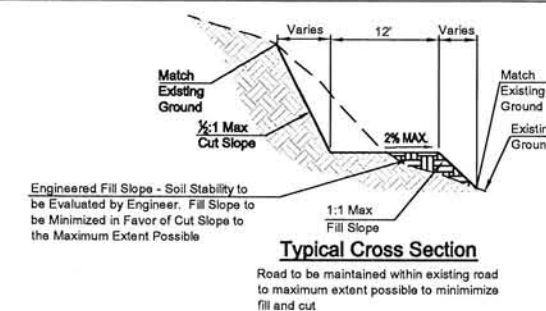
Image Source: Digit. Globe QuickBird Dataset
Topographical Source: USGS NED Dataset
Contour Interval= 10'
PVI= Point of Vertical Intersection of Slopes
VC = Vertical Curve Between Slopes to Avoid
Abrupt Transition Between Grades

Legend

- Existing Road - To Be Improved
- Approximate Area of Cut/ Fill
- T-Post and Wire Clear Limit Fencing
Note: All Fencing to be placed by Qualified Monitors Prior to Construction
- National Forest Boundary
- Resource Survey Area -
Note: 100' Wide or Greater

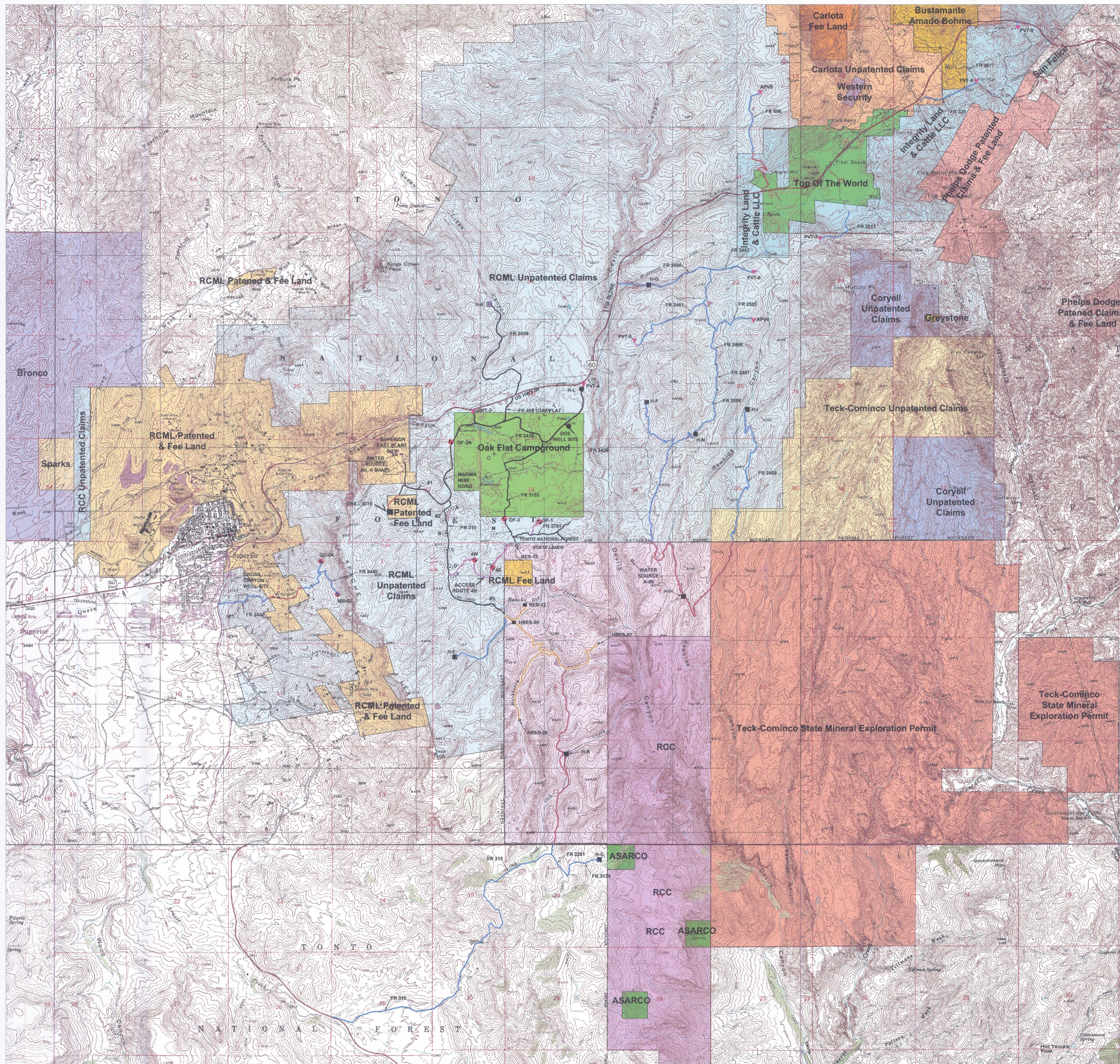
Forest Service Road Designations:

- 1- Basic Custodial Care (closed) - assigned to intermittent service roads during times when they are closed to vehicular traffic
- 2- High Clearance Vehicles - assigned to roads operated for use by high clearance vehicles
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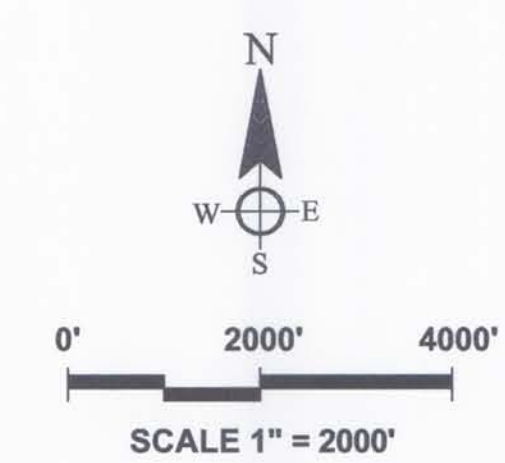


APPENDIX C

MINING CLAIM INFORMATION



- LEGEND**
- Exploration Drill Site
 - ▲ Tunnel Characterization Bore Hole
 - Deep Hydrogeology Testing / Monitor Well
 - Shallow Hydrogeology Well Site
 - Previously Approved Drill Site
 - Existing Access Road (To Be Improved)
 - New Road
 - Other Roadway Improvements
 - Completed State Land Roadway Improvements
 - Existing Road (To Be Maintained)



Pinal County, Arizona
Superior, Pinal Ranch &
Teapot Mountain 7.5'
USGS Maps

WestLand Resources Inc.
Engineering and Environmental Consultants

**RESOLUTION COPPER MINING
PLAN OF OPERATIONS**

LAND AND MINERAL OWNERSHIP
Appendix C

**EXPLORATION SITES
CLAIMS DATA**

EXPLORATION DRILL HOLES

MB-03

T2S, R12E SECTION 1 NW1/4 SW1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC60204	SW	HARD ROCK #6	RESOLUTION COPPER MINING LLC	384101
AMC60224	SW	APACHE LEAP	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO MB-03 FROM HWY 177

FR 3786 (TO BE IMPROVED) LOCATED IN SECTION 1 W1/2

T2S, R12E SECTION 1 W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC356181	SW	DAN 2	RESOLUTION COPPER MINING LLC	384101
AMC356187	SW SE	DAN 8	RESOLUTION COPPER MINING LLC	384101
AMC356188	SE	DAN 9	RESOLUTION COPPER MINING LLC	384101
AMC356196	SW SE	DAN 17	RESOLUTION COPPER MINING LLC	384101
AMC356197	SW SE	DAN 18	RESOLUTION COPPER MINING LLC	384101
AMC356884	NW	LEGAL TENDER 1	RESOLUTION COPPER MINING LLC	384101
AMC356885	NW	LEGAL TENDER 2	RESOLUTION COPPER MINING LLC	384101
AMC356886	SW	LEGAL TENDER 3	RESOLUTION COPPER MINING LLC	384101
AMC356887	SW	LEGAL TENDER 4	RESOLUTION COPPER MINING LLC	384101
AMC356888	NW	LEGAL TENDER 5	RESOLUTION COPPER MINING LLC	384101
AMC356889	NW	LEGAL TENDER 6	RESOLUTION COPPER MINING LLC	384101
AMC356890	NW	LEGAL TENDER 7	RESOLUTION COPPER MINING LLC	384101
AMC356891	NW	LEGAL TENDER 8	RESOLUTION COPPER MINING LLC	384101
AMC359395	SW	GALAXY NO.1	RESOLUTION COPPER MINING LLC	384101
AMC60180	NW	ALTO	RESOLUTION COPPER MINING LLC	384101
AMC60181	NW	ALTO NO 1	RESOLUTION COPPER MINING LLC	384101
AMC60182	NW	ALTO NO 2	RESOLUTION COPPER MINING LLC	384101
AMC60183	NW	ALTO NO 3	RESOLUTION COPPER MINING LLC	384101
AMC60184	NW SW	ALTO NO 4	RESOLUTION COPPER MINING LLC	384101
AMC60185	NW SW	ALTO NO 5	RESOLUTION COPPER MINING LLC	384101
AMC60187	NE NW SW SE	ALTO NO 7	RESOLUTION COPPER MINING LLC	384101
AMC60188	NE NW	ALTO NO 8	RESOLUTION COPPER MINING LLC	384101
AMC60189	NE NW	ALTO NO 9	RESOLUTION COPPER MINING LLC	384101
AMC60190	NE NW	ALTO NO 10	RESOLUTION COPPER MINING LLC	384101
AMC60191	NE NW	ALTO NO 11	RESOLUTION COPPER MINING LLC	384101
AMC60227	SW	CONNECTING LINK	RESOLUTION COPPER MINING LLC	384101
AMC60204	SW	HARD ROCK #6	RESOLUTION COPPER MINING LLC	384101
AMC60224	SW	APACHE LEAP	RESOLUTION COPPER MINING LLC	384101

FR 2440 LOCATED IN SECTION 2 NE & SW AND SECTION 3 SE (SEE BELOW)

T2S, R12E SECTION 2 NE & SW

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC60180	NE	ALTO	RESOLUTION COPPER MINING LLC	384101
AMC60181	NE	ALTO NO 1	RESOLUTION COPPER MINING LLC	384101
AMC60193	NE SE	BIG LEDGE	RESOLUTION COPPER MINING LLC	384101
AMC60198	SW	CHICAGO	RESOLUTION COPPER MINING LLC	384101
AMC60199	NW SW	GARDNER	RESOLUTION COPPER MINING LLC	384101

AMC60200	NW SW	GUSSIE	RESOLUTION COPPER MINING LLC	384101
AMC60203	NE	HARD ROCK #2	RESOLUTION COPPER MINING LLC	384101
AMC60204	NE SE	HARD ROCK #6	RESOLUTION COPPER MINING LLC	384101
AMC60205	NE	HARD ROCK #7	RESOLUTION COPPER MINING LLC	384101
AMC60206	NE NW SW SE	HARD ROCK #11	RESOLUTION COPPER MINING LLC	384101
AMC60207	NE NW	HARD ROCK #12	RESOLUTION COPPER MINING LLC	384101
AMC60208	NE	HORN SILVER	RESOLUTION COPPER MINING LLC	384101
AMC60209	NE	HORN SILVER NO 1	RESOLUTION COPPER MINING LLC	384101
AMC60210	NE	JANE	RESOLUTION COPPER MINING LLC	384101
AMC60213	NE NW	LEGAL TENDER	RESOLUTION COPPER MINING LLC	384101
AMC60214	SW	LIBBIE	RESOLUTION COPPER MINING LLC	384101
AMC60215	SW	LIBBIE NO 1	RESOLUTION COPPER MINING LLC	384101
AMC60216	SW	LIBBIE NO 2	RESOLUTION COPPER MINING LLC	384101
AMC60219	SW	MICHIGAN	RESOLUTION COPPER MINING LLC	384101
AMC60221	SW SE	RUBE	RESOLUTION COPPER MINING LLC	384101
AMC60222	NW SW	RUBY	RESOLUTION COPPER MINING LLC	384101
AMC60244	SW SE	SAN JUAN	RESOLUTION COPPER MINING LLC	384101

PATENTED CLAIMS IN T2S, R12E, SECTION 2

Claims name

David Harum

Gold Crown

Gold Crown #1

Maine #1

Maine #3

Patent Number

524455

1042131

982602

982602

982602

T2S, R12E SECTION 3 SE

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC356180	SE	DAN 1	RESOLUTION COPPER MINING LLC	384101
AMC60199	NE SE	GARDNER	RESOLUTION COPPER MINING LLC	384101

EXPLORATION DRILL HOLES

QC-04

T2S, R12E SECTION 2 NE1/4 NE1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC60205	NE	HARD ROCK #7	RESOLUTION COPPER MINING LLC	384101
AMC60207	NE NW	HARD ROCK #12	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO QC-04 FROM HWY 177

FR 2440 (TO BE IMPROVED) AND UNIDENTIFIED EXISTING ROAD (TO BE IMPROVED)
LOCATED IN SECTION 2 NE & SW

T2S, R12E SECTION 2 NE & SW

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC60180	NE	ALTO	RESOLUTION COPPER MINING LLC	384101
AMC60181	NE	ALTO NO 1	RESOLUTION COPPER MINING LLC	384101
AMC60193	NE SE	BIG LEDGE	RESOLUTION COPPER MINING LLC	384101
AMC60198	SW	CHICAGO	RESOLUTION COPPER MINING LLC	384101
AMC60199	NW SW	GARDNER	RESOLUTION COPPER MINING LLC	384101
AMC60200	NW SW	GUSSIE	RESOLUTION COPPER MINING LLC	384101
AMC60203	NE	HARD ROCK #2	RESOLUTION COPPER MINING LLC	384101
AMC60204	NE SE	HARD ROCK #6	RESOLUTION COPPER MINING LLC	384101
AMC60205	NE	HARD ROCK #7	RESOLUTION COPPER MINING LLC	384101
AMC60206	NE NW SW SE	HARD ROCK #11	RESOLUTION COPPER MINING LLC	384101
AMC60207	NE NW	HARD ROCK #12	RESOLUTION COPPER MINING LLC	384101
AMC60208	NE	HORN SILVER	RESOLUTION COPPER MINING LLC	384101
AMC60209	NE	HORN SILVER NO 1	RESOLUTION COPPER MINING LLC	384101
AMC60210	NE	JANE	RESOLUTION COPPER MINING LLC	384101
AMC60213	NE NW	LEGAL TENDER	RESOLUTION COPPER MINING LLC	384101
AMC60214	SW	LIBBIE	RESOLUTION COPPER MINING LLC	384101
AMC60215	SW	LIBBIE NO 1	RESOLUTION COPPER MINING LLC	384101
AMC60216	SW	LIBBIE NO 2	RESOLUTION COPPER MINING LLC	384101
AMC60219	SW	MICHIGAN	RESOLUTION COPPER MINING LLC	384101
AMC60221	SW SE	RUBE	RESOLUTION COPPER MINING LLC	384101
AMC60222	NW SW	RUBY	RESOLUTION COPPER MINING LLC	384101
AMC60244	SW SE	SAN JUAN	RESOLUTION COPPER MINING LLC	384101

PATENTED CLAIMS IN T2S, R12E, SECTION 2

Claims name

David Harum
Gold Crown
Gold Crown #1
Maine #1
Maine #3

Patent Number

524455
1042131
982602
982602
982602

EXPLORATION DRILL HOLES

OF-1

T1S, R13E SECTION 33 SW1/4 SE1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC60288	SW SE	SUN #40	RESOLUTION COPPER MINING LLC	384101
AMC60289	SW SE	SUN #41	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO OF-1

NEW ROAD LOCATED IN SECTION 33 SE (SEE ABOVE)

FR 3791 (NO IMPROVEMENTS NEEDED) LOCATED IN SECTION 33 S1/2 LEADING FROM SITE-2
AND CONTINUING EASTWARD BEYOND NEW ROAD (SEE ABOVE)

T1S, R13E SECTION 33 S1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC60288	SW SE	SUN #40	RESOLUTION COPPER MINING LLC	384101
AMC60289	SW SE	SUN #41	RESOLUTION COPPER MINING LLC	384101
AMC60290	SE	SUN #44	RESOLUTION COPPER MINING LLC	384101
AMC60291	SE	SUN #45	RESOLUTION COPPER MINING LLC	384101

EXPLORATION DRILL HOLES

OF-2

T1S, R13E SECTION 32 NE1/4 SE1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC60170	NE	OAK NO 43	RESOLUTION COPPER MINING LLC	384101
AMC60171	NE	OAK NO 44	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO OF-2 (NO IMPROVEMENTS NEEDED)

MAGMA MINE ROAD FROM SUPERIOR EAST PLANT SITE LOCATED IN SECTION 32
MAGMA MINE ROAD ALSO PROCEEDS NORTH FROM OF-2 TO STATE HIGHWAY 60

T1S, R13E SECTION 32 NE,SE,NW

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC356872	SE	LEGAL TENDER 22	RESOLUTION COPPER MINING LLC	384101
AMC356933	NW SW	LEGAL TENDER 23	RESOLUTION COPPER MINING LLC	384101
AMC359396	NW	GLADIATOR NO.1	RESOLUTION COPPER MINING LLC	384101
AMC359397	NE NW	GLADIATOR NO.2	RESOLUTION COPPER MINING LLC	384101
AMC359398	NE	GLADIATOR NO.3	RESOLUTION COPPER MINING LLC	384101
AMC359399	NW	GLADIATOR NO.4	RESOLUTION COPPER MINING LLC	384101
AMC359400	NE NW	GLADIATOR NO.5	RESOLUTION COPPER MINING LLC	384101
AMC359401	NE	GLADIATOR NO.6	RESOLUTION COPPER MINING LLC	384101
AMC60136	NW SW	OAK NO 9	RESOLUTION COPPER MINING LLC	384101
AMC60170	NE	OAK NO 43	RESOLUTION COPPER MINING LLC	384101
AMC60171	NE	OAK NO 44	RESOLUTION COPPER MINING LLC	384101
AMC60250	NE NW	SUN #2	RESOLUTION COPPER MINING LLC	384101
AMC60251	NE	SUN #3	RESOLUTION COPPER MINING LLC	384101
AMC60252	NE NW SW SE	SUN #4	RESOLUTION COPPER MINING LLC	384101
AMC60253	NE	SUN #5	RESOLUTION COPPER MINING LLC	384101
AMC60254	SE	SUN #6	RESOLUTION COPPER MINING LLC	384101
AMC60255	SE	SUN #7	RESOLUTION COPPER MINING LLC	384101
AMC60256	SW SE	SUN #8	RESOLUTION COPPER MINING LLC	384101
AMC60257	SE	SUN #9	RESOLUTION COPPER MINING LLC	384101
AMC60258	SW SE	SUN #10	RESOLUTION COPPER MINING LLC	384101
AMC60259	SE	SUN #11	RESOLUTION COPPER MINING LLC	384101
AMC60260	SW SE	SUN #12	RESOLUTION COPPER MINING LLC	384101
AMC60261	SE	SUN #13	RESOLUTION COPPER MINING LLC	384101
AMC60263	SE	SUN #15	RESOLUTION COPPER MINING LLC	384101
AMC60284	SE	SUN #36	RESOLUTION COPPER MINING LLC	384101
AMC60285	SE	SUN #37	RESOLUTION COPPER MINING LLC	384101
AMC60286	SE	SUN #38	RESOLUTION COPPER MINING LLC	384101

PATENTED CLAIMS IN T1S, R13E, SECTION 32

Claims name

East #1
East #2
East #7
Oak #14

Patent Number

02-70-0081
02-70-0081
02-70-0081
02-96-0027

EXPLORATION DRILL HOLES

OF-3

T1S, R13E SECTION 33 SW1/4 SW1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC60288	SW SE	SUN #40	RESOLUTION COPPER MINING LLC	384101
AMC60289	SW SE	SUN #41	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO OF-3

FR 2438 AND FR 3153 (NO IMPROVEMENTS NEEDED) LOCATED IN SECTION 33 N1/2

FR 469 AND FR 2438 LOCATED IN SECTION 28 S1/2

T1S, R13E SECTION 33 N1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC60288	SW SE	SUN #40	RESOLUTION COPPER MINING LLC	384101
AMC60289	SW SE	SUN #41	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 28 S1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC355530	SW	OAK NO 38A	RESOLUTION COPPER MINING LLC	384101
AMC355531	SW	OAK NO 39A	RESOLUTION COPPER MINING LLC	384101
AMC355534	SW	SUN NO 62A	RESOLUTION COPPER MINING LLC	384101
AMC355535	SW	SUN NO 63A	RESOLUTION COPPER MINING LLC	384101
AMC355536	SW SE	SUN NO 64A	RESOLUTION COPPER MINING LLC	384101
AMC359404	NW SW	GLADIATOR NO.9	RESOLUTION COPPER MINING LLC	384101
AMC60165	NW SW	OAK NO 38	RESOLUTION COPPER MINING LLC	384101
AMC60166	NW SW	OAK NO 39	RESOLUTION COPPER MINING LLC	384101
AMC60304	NW SW	SUN #62	RESOLUTION COPPER MINING LLC	384101
AMC60305	NW SW	SUN #63	RESOLUTION COPPER MINING LLC	384101
AMC60306	NE NW SW SE	SUN #64	RESOLUTION COPPER MINING LLC	384101
AMC60307	NE SE	SUN #65	RESOLUTION COPPER MINING LLC	384101
AMC60308	NE SE	SUN #66	RESOLUTION COPPER MINING LLC	384101
AMC60309	NE SE	SUN #67	RESOLUTION COPPER MINING LLC	384101
AMC60310	NE SE	SUN #68	RESOLUTION COPPER MINING LLC	384101

**DEEP HYDROGEOLOGIC
WELL SITES
CLAIMS DATA**

DEEP HYDRO HOLES

DHTW-01

T1S, R13E SECTION 27 NW1/4 SW1/4

AMC60310 NW SW SUN #68

RESOLUTION COPPER MINING LLC 384101

ROAD ACCESS TO DHTW-01

EXISTING UNIDENTIFIED ROAD (NO IMPROVEMENTS NEEDED) LOCATED IN SECTION 27 W1/2
JUST OFF OF HIGHWAY 60.

T1S, R13E SECTION 27 NW1/4 SW1/4

Serial Num	Quad	Claim Name/Number
AMC60300	NW	SUN #58

Claimant(s)	Case Type
RESOLUTION COPPER MINING LLC	384101

DEEP HYDRO HOLES

DHTW-02

T1S, R13E SECTION 21 SW1/4 SW1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC313033	SW	KAY 148	RESOLUTION COPPER MINING LLC	384101
AMC313035	SW	KAY 150	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO DHTW-02 FROM HWY 60
FR 2458 (NO IMPROVEMENTS NEEDED) LOCATED IN SW OF SECTION 21
FR 2458 ALSO LOCATED IN SECTION 28 W1/2 (SEE BELOW)

T1S, R13E SECTION 21 SW

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC313027	SW	KAY 141	RESOLUTION COPPER MINING LLC	384101
AMC313033	SW	KAY 148	RESOLUTION COPPER MINING LLC	384101
AMC313035	SW	KAY 150	RESOLUTION COPPER MINING LLC	384101
AMC357098	SW	KAY 140A	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 28 W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC313035	NW	KAY 150	RESOLUTION COPPER MINING LLC	384101
AMC348057	NW	ERIC #243	RESOLUTION COPPER MINING LLC	384101
AMC348058	NE NW	ERIC #244	RESOLUTION COPPER MINING LLC	384101
AMC348061	NW	ERIC #247	RESOLUTION COPPER MINING LLC	384101
AMC355534	SW	SUN NO 62A	RESOLUTION COPPER MINING LLC	384101
AMC355535	SW	SUN NO 63A	RESOLUTION COPPER MINING LLC	384101
AMC355536	SW SE	SUN NO 64A	RESOLUTION COPPER MINING LLC	384101
AMC359404	NW SW	GLADIATOR NO.9	RESOLUTION COPPER MINING LLC	384101
AMC362903	NW	OLGA 1	RESOLUTION COPPER MINING LLC	384101
AMC362904	NW	OLGA 2	RESOLUTION COPPER MINING LLC	384101
AMC362905	NW	OLGA 3	RESOLUTION COPPER MINING LLC	384101
AMC46016	NE NW	MARGARET # 336	RESOLUTION COPPER MINING LLC	384101
AMC47117	NW	KAY NO 152	RESOLUTION COPPER MINING LLC	384101
AMC60162	NW	OAK NO 35	RESOLUTION COPPER MINING LLC	384101
AMC60163	NW	OAK NO 36	RESOLUTION COPPER MINING LLC	384101
AMC60164	NW	OAK NO 37	RESOLUTION COPPER MINING LLC	384101
AMC60294	NW	SUN #52	RESOLUTION COPPER MINING LLC	384101

DEEP HYDRO HOLES

DHTW-03

T1S, R13E SECTION 26 SW1/4 SW1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC45959	SW	MARGARET # 275	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO DHTW-03

FR 2466 AND FR 2467 (TO BE IMPROVED) LOCATED IN T1S, R13E SECTION 26 W1/2

FR 2466 ALSO LOCATED IN T1S, R13E SECTION 23 W1/2 TO FR 2466

T1S, R13E SECTION 26 W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC45935	NW	MARGARET # 251	RESOLUTION COPPER MINING LLC	384101
AMC45937	NW	MARGARET # 253	RESOLUTION COPPER MINING LLC	384101
AMC45939	NW	MARGARET # 255	RESOLUTION COPPER MINING LLC	384101
AMC45941	NW	MARGARET # 257	RESOLUTION COPPER MINING LLC	384101
AMC45943	NW	MARGARET # 259	RESOLUTION COPPER MINING LLC	384101
AMC45949	SW	MARGARET # 265	RESOLUTION COPPER MINING LLC	384101
AMC45951	SW	MARGARET # 267	RESOLUTION COPPER MINING LLC	384101
AMC45957	SW	MARGARET # 273	RESOLUTION COPPER MINING LLC	384101
AMC45959	SW	MARGARET # 275	RESOLUTION COPPER MINING LLC	384101
AMC45961	SW SE	MARGARET # 277	RESOLUTION COPPER MINING LLC	384101
AMC45962	SW SE	MARGARET # 278	RESOLUTION COPPER MINING LLC	384101
AMC45963	SW SE	MARGARET # 279	RESOLUTION COPPER MINING LLC	384101
AMC45964	SW SE	MARGARET # 280	RESOLUTION COPPER MINING LLC	384101
AMC45965	NE NW	MARGARET # 281	RESOLUTION COPPER MINING LLC	384101
AMC45966	NE NW	MARGARET # 282	RESOLUTION COPPER MINING LLC	384101
AMC45967	NE NW	MARGARET # 283	RESOLUTION COPPER MINING LLC	384101
AMC45968	NE NW	MARGARET # 284	RESOLUTION COPPER MINING LLC	384101
AMC45969	NE NW	MARGARET # 285	RESOLUTION COPPER MINING LLC	384101
AMC45985	SW SE	MARGARET # 305	RESOLUTION COPPER MINING LLC	384101
AMC45986	SW	MARGARET # 306	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 23 W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC347702	NW	ERIC #1	RESOLUTION COPPER MINING LLC	384101
AMC45823	NW	MARGARET #135	RESOLUTION COPPER MINING LLC	384101
AMC45826	NW	MARGARET #137	RESOLUTION COPPER MINING LLC	384101
AMC45828	NW	MARGARET #139	RESOLUTION COPPER MINING LLC	384101
AMC45843	NE NW	MARGARET #154	RESOLUTION COPPER MINING LLC	384101
AMC45844	NE NW	MARGARET #155	RESOLUTION COPPER MINING LLC	384101
AMC45845	NE NW	MARGARET #156	RESOLUTION COPPER MINING LLC	384101
AMC45901	NW	MARGARET # 217	RESOLUTION COPPER MINING LLC	384101
AMC45903	NW	MARGARET # 219	RESOLUTION COPPER MINING LLC	384101
AMC45905	NW	MARGARET # 221	RESOLUTION COPPER MINING LLC	384101
AMC45907	SW	MARGARET # 223	RESOLUTION COPPER MINING LLC	384101
AMC45909	SW	MARGARET # 225	RESOLUTION COPPER MINING LLC	384101
AMC45911	NE NW	MARGARET # 227	RESOLUTION COPPER MINING LLC	384101

AMC45912	NE NW	MARGARET # 228	RESOLUTION COPPER MINING LLC	384101
AMC45913	NE NW	MARGARET # 229	RESOLUTION COPPER MINING LLC	384101
AMC45914	SW SE	MARGARET # 230	RESOLUTION COPPER MINING LLC	384101
AMC45915	SW SE	MARGARET # 231	RESOLUTION COPPER MINING LLC	384101
AMC45931	SW	MARGARET # 247	RESOLUTION COPPER MINING LLC	384101
AMC45933	SW	MARGARET # 249	RESOLUTION COPPER MINING LLC	384101
AMC45935	SW	MARGARET # 251	RESOLUTION COPPER MINING LLC	384101
AMC45969	NW SW	MARGARET # 285	RESOLUTION COPPER MINING LLC	384101
AMC45970	SW SE	MARGARET # 286	RESOLUTION COPPER MINING LLC	384101
AMC45971	SW SE	MARGARET # 287	RESOLUTION COPPER MINING LLC	384101

SHALLOW HYDROGEOLOGIC
WELL SITES
CLAIMS DATA

SHALLOW HYDRO HOLES

H-C

T2S, R13E SECTION 20 NE1/4 NE1/4 NE1/4

PROPERTY OWNER IS THE UNITED STATES FOREST SERVICE; NO UNPATENTED CLAIMS ARE LOCATED WHERE THE DRILL HOLE IS INDICATED ON THE MAP:

ROAD ACCESS TO H-C

FR 315, FR 2261, AND FR 3139 (TO BE IMPROVED) LOCATED IN SECTION 20 N1/2

FR 315 ALSO LOCATED IN SECTION 19 E1/2, SECTION 30 W1/2 AND
T2S, R12E SECTION 25 S1/2 (SEE BELOW)

T2S, R13E SECTION 19 E1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC387998	SW SE	AT 127	TECK COMINCO AMER INC	384101
AMC387999	SE	AT 128	TECK COMINCO AMER INC	384101
AMC388000	SW SE	AT 129	TECK COMINCO AMER INC	384101
AMC388001	SE	AT 130	TECK COMINCO AMER INC	384101
AMC388002	SW SE	AT 131	TECK COMINCO AMER INC	384101
AMC388003	SE	AT 132	TECK COMINCO AMER INC	384101
AMC388004	SW SE	AT 133	TECK COMINCO AMER INC	384101
AMC388005	SE	AT 134	TECK COMINCO AMER INC	384101
AMC388006	NE NW SW SE	AT 135	TECK COMINCO AMER INC	384101
AMC388007	NE SE	AT 136	TECK COMINCO AMER INC	384101

T2S, R13E SECTION 30 NE, W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC387937	SW	AT 66	TECK COMINCO AMER INC	384101
AMC387939	SW	AT 68	TECK COMINCO AMER INC	384101
AMC387941	SW	AT 70	TECK COMINCO AMER INC	384101
AMC387943	SW	AT 72	TECK COMINCO AMER INC	384101
AMC387945	NW SW	AT 74	TECK COMINCO AMER INC	384101
AMC387947	NW	AT 76	TECK COMINCO AMER INC	384101
AMC387949	NW	AT 78	TECK COMINCO AMER INC	384101
AMC387951	NW	AT 80	TECK COMINCO AMER INC	384101
AMC387953	NW	AT 82	TECK COMINCO AMER INC	384101
AMC387980	SW SE	AT 109	TECK COMINCO AMER INC	384101
AMC387982	SW SE	AT 111	TECK COMINCO AMER INC	384101
AMC387984	SW SE	AT 113	TECK COMINCO AMER INC	384101
AMC387986	SW SE	AT 115	TECK COMINCO AMER INC	384101
AMC387988	SW SE	AT 117	TECK COMINCO AMER INC	384101
AMC387990	NE NW SW SE	AT 119	TECK COMINCO AMER INC	384101
AMC387991	NE SE	AT 120	TECK COMINCO AMER INC	384101
AMC387992	NE NW	AT 121	TECK COMINCO AMER INC	384101
AMC387993	NE	AT 122	TECK COMINCO AMER INC	384101
AMC387994	NE NW	AT 123	TECK COMINCO AMER INC	384101
AMC387995	NE	AT 124	TECK COMINCO AMER INC	384101

AMC387996	NE NW	AT 125	TECK COMINCO AMER INC	384101
AMC387997	NE	AT 126	TECK COMINCO AMER INC	384101
AMC387998	NE NW	AT 127	TECK COMINCO AMER INC	384101
AMC387999	NE	AT 128	TECK COMINCO AMER INC	384101

T2S, R12E SECTION 25 S1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC366951	SW	DND 102	COGHLAN DAVID III	384201
AMC366951	SW	DND 102	COGHLAN DAVID JR	384201
AMC387888	SW	AT 17	TECK COMINCO AMER INC	384101
AMC387889	SW SE	AT 18	TECK COMINCO AMER INC	384101
AMC387890	SW	AT 19	TECK COMINCO AMER INC	384101
AMC387891	SW SE	AT 20	TECK COMINCO AMER INC	384101
AMC387892	SW	AT 21	TECK COMINCO AMER INC	384101
AMC387893	SW SE	AT 22	TECK COMINCO AMER INC	384101
AMC387894	SW	AT 23	TECK COMINCO AMER INC	384101
AMC387895	SW SE	AT 24	TECK COMINCO AMER INC	384101
AMC387896	SW	AT 25	TECK COMINCO AMER INC	384101
AMC387897	SW SE	AT 26	TECK COMINCO AMER INC	384101
AMC387898	NW SW	AT 27	TECK COMINCO AMER INC	384101
AMC387899	NE NW SW SE	AT 28	TECK COMINCO AMER INC	384101
AMC387934	SE	AT 63	TECK COMINCO AMER INC	384101
AMC387935	SE	AT 64	TECK COMINCO AMER INC	384101
AMC387936	SE	AT 65	TECK COMINCO AMER INC	384101
AMC387937	SE	AT 66	TECK COMINCO AMER INC	384101
AMC387938	SE	AT 67	TECK COMINCO AMER INC	384101
AMC387939	SE	AT 68	TECK COMINCO AMER INC	384101
AMC387940	SE	AT 69	TECK COMINCO AMER INC	384101
AMC387941	SE	AT 70	TECK COMINCO AMER INC	384101
AMC387942	SE	AT 71	TECK COMINCO AMER INC	384101
AMC387943	SE	AT 72	TECK COMINCO AMER INC	384101
AMC387944	NE SE	AT 73	TECK COMINCO AMER INC	384101
AMC387945	NE SE	AT 74	TECK COMINCO AMER INC	384101

SHALLOW HYDRO HOLES

H-E

T2S, R13E SECTION 7, NW1/4 SW1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC356194	NW	DAN 15	RESOLUTION COPPER MINING LLC	384101
AMC356195	NW	DAN 16	RESOLUTION COPPER MINING LLC	384101
AMC60238	SW	DACITE NO 12	RESOLUTION COPPER MINING LLC	384101
AMC60239	SW	DACITE NO 13	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO H-E

UNIDENTIFIED ROAD (TO BE IMPROVED) LOCATED IN W1/2 AND NE OF SECTION 7

AMC60248	NW	SOUTH SYNDICATE NO 4	RESOLUTION COPPER MINING LLC	384101
AMC60394	NW	SOUTH SYNDICATE NO 6	RESOLUTION COPPER MINING LLC	384101
AMC60395	NW	SOUTH SYNDICATE NO 7	RESOLUTION COPPER MINING LLC	384101
AMC60396	NW	SOUTH SYNDICATE NO 8	RESOLUTION COPPER MINING LLC	384101
AMC60397	NE NW	SOUTH SYNDICATE NO 9	RESOLUTION COPPER MINING LLC	384101
AMC60398	NW SW	SOUTH SYNDICATE NO 10	RESOLUTION COPPER MINING LLC	384101
AMC60399	NE NW SW SE	SOUTH SYNDICATE NO 11	RESOLUTION COPPER MINING LLC	384101
AMC60400	NE NW SE	SOUTH SYNDICATE NO 12	RESOLUTION COPPER MINING LLC	384101
AMC60402	SW	EXTENSION NO 1A	RESOLUTION COPPER MINING LLC	384101
AMC60441	NE	EXTENSION NO 39	RESOLUTION COPPER MINING LLC	384101
AMC60442	NE	EXTENSION NO 40	RESOLUTION COPPER MINING LLC	384101
AMC60443	NE	EXTENSION NO 41	RESOLUTION COPPER MINING LLC	384101

FR 315 (NO IMPROVEMENTS NEEDED) LOCATED IN SECTION 6 S1/2 & NW

T2S, R13E SECTION 6 S1/2 & NW

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC356865	NW	LEGAL TENDER 13	RESOLUTION COPPER MINING LLC	384101
AMC356866	SW SE	LEGAL TENDER 14	RESOLUTION COPPER MINING LLC	384101
AMC356867	SW	LEGAL TENDER 15	RESOLUTION COPPER MINING LLC	384101
AMC356868	NW	LEGAL TENDER 17	RESOLUTION COPPER MINING LLC	384101
AMC356869	NW	LEGAL TENDER 18	RESOLUTION COPPER MINING LLC	384101
AMC356870	SE	LEGAL TENDER 20	RESOLUTION COPPER MINING LLC	384101
AMC356896	SE	LEGAL TENDER 16	RESOLUTION COPPER MINING LLC	384101
AMC60178	NW SW	ACE 5	RESOLUTION COPPER MINING LLC	384101
AMC60179	SW	ACE 6	RESOLUTION COPPER MINING LLC	384101
AMC60248	SW	SOUTH SYNDICATE NO 4	RESOLUTION COPPER MINING LLC	384101
AMC60249	SW	SOUTH SYNDICATE NO 5	RESOLUTION COPPER MINING LLC	384101
AMC60262	NW	SUN #14	RESOLUTION COPPER MINING LLC	384101
AMC60263	NE NW	SUN #15	RESOLUTION COPPER MINING LLC	384101
AMC60264	NW	SUN #16	RESOLUTION COPPER MINING LLC	384101
AMC60265	NE NW	SUN #17	RESOLUTION COPPER MINING LLC	384101
AMC60266	NW	SUN #18	RESOLUTION COPPER MINING LLC	384101
AMC60267	NE NW	SUN #19	RESOLUTION COPPER MINING LLC	384101
AMC60268	NW	SUN #20	RESOLUTION COPPER MINING LLC	384101
AMC60269	NE NW	SUN #21	RESOLUTION COPPER MINING LLC	384101
AMC60270	NW SW	SUN #22	RESOLUTION COPPER MINING LLC	384101
AMC60271	NW SW	SUN #23	RESOLUTION COPPER MINING LLC	384101
AMC60272	SW	SUN #24	RESOLUTION COPPER MINING LLC	384101

AMC60273	SW SE	SUN #25	RESOLUTION COPPER MINING LLC	384101
AMC60274	SW	SUN #26	RESOLUTION COPPER MINING LLC	384101
AMC60275	SW SE	SUN #27	RESOLUTION COPPER MINING LLC	384101
AMC60276	SW SE	SUN #28	RESOLUTION COPPER MINING LLC	384101
AMC60277	SE	SUN #29	RESOLUTION COPPER MINING LLC	384101
AMC60278	SE	SUN #30	RESOLUTION COPPER MINING LLC	384101
AMC60279	SE	SUN #31	RESOLUTION COPPER MINING LLC	384101
AMC60280	NE SE	SUN #32	RESOLUTION COPPER MINING LLC	384101
AMC60397	SW	SOUTH SYNDICATE NO 9	RESOLUTION COPPER MINING LLC	384101
AMC60441	SE	EXTENSION NO 39	RESOLUTION COPPER MINING LLC	384101
AMC60442	SE	EXTENSION NO 40	RESOLUTION COPPER MINING LLC	384101
AMC60443	SE	EXTENSION NO 41	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO H-E FROM SUPERIOR EAST PLANT SITE IN SECTION 32 OF T1S, R13E
T1S, R13E SECTION 32 S1/2

MAGMA MINE ROAD LOCATED IN SECTION 32 S1/2 AND NW
T1S, R13E SECTION 32 S1/2 & NW

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC356872	SE	LEGAL TENDER 22	RESOLUTION COPPER MINING LLC	384101
AMC356897	SW	LEGAL TENDER 19	RESOLUTION COPPER MINING LLC	384101
AMC356933	NW SW	LEGAL TENDER 23	RESOLUTION COPPER MINING LLC	384101
AMC359396	NW	GLADIATOR NO.1	RESOLUTION COPPER MINING LLC	384101
AMC359397	NE NW	GLADIATOR NO.2	RESOLUTION COPPER MINING LLC	384101
AMC359399	NW	GLADIATOR NO.4	RESOLUTION COPPER MINING LLC	384101
AMC359400	NE NW	GLADIATOR NO.5	RESOLUTION COPPER MINING LLC	384101
AMC60136	NW SW	OAK NO 9	RESOLUTION COPPER MINING LLC	384101
AMC60141	SW	OAK NO 18	RESOLUTION COPPER MINING LLC	384101
AMC60142	SW	OAK NO 19	RESOLUTION COPPER MINING LLC	384101
AMC60144	SW	OAK NO 21	RESOLUTION COPPER MINING LLC	384101
AMC60145	SW	OAK NO 22	RESOLUTION COPPER MINING LLC	384101
AMC60146	SW	OAK NO 23	RESOLUTION COPPER MINING LLC	384101
AMC60175	SW	ACE 2	RESOLUTION COPPER MINING LLC	384101
AMC60250	NE NW	SUN #2	RESOLUTION COPPER MINING LLC	384101
AMC60252	NE NW SW SE	SUN #4	RESOLUTION COPPER MINING LLC	384101
AMC60254	SE	SUN #6	RESOLUTION COPPER MINING LLC	384101
AMC60255	SE	SUN #7	RESOLUTION COPPER MINING LLC	384101
AMC60256	SW SE	SUN #8	RESOLUTION COPPER MINING LLC	384101
AMC60257	SE	SUN #9	RESOLUTION COPPER MINING LLC	384101
AMC60258	SW SE	SUN #10	RESOLUTION COPPER MINING LLC	384101
AMC60259	SE	SUN #11	RESOLUTION COPPER MINING LLC	384101
AMC60260	SW SE	SUN #12	RESOLUTION COPPER MINING LLC	384101
AMC60261	SE	SUN #13	RESOLUTION COPPER MINING LLC	384101
AMC60263	SE	SUN #15	RESOLUTION COPPER MINING LLC	384101
AMC60284	SE	SUN #36	RESOLUTION COPPER MINING LLC	384101
AMC60285	SE	SUN #37	RESOLUTION COPPER MINING LLC	384101
AMC60286	SE	SUN #38	RESOLUTION COPPER MINING LLC	384101

SHALLOW HYDRO HOLES

H-F

T1S, R13E SECTION 27 NW1/4 SE1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC45945	SW SE	MARGARET # 261	RESOLUTION COPPER MINING LLC	
AMC45947	SW SE	MARGARET # 263	RESOLUTION COPPER MINING LLC	

ROAD ACCESS TO H-F FROM FR 2466

UNIDENTIFIED ROAD (TO BE IMPROVED) LOCATED IN SE OF SECTION 27 AND NE OF SECTION 34
FR 2466 (TO BE IMPROVED) LOCATED IN SECTION 34 NE
FR 2466 ALSO LOCATED IN SECTION 26 W1/2 AND SECTION 23 W1/2

T1S, R13E SECTION 27 NW1/4 SE1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC45945	SW SE	MARGARET # 261	RESOLUTION COPPER MINING LLC	384101
AMC45947	SW SE	MARGARET # 263	RESOLUTION COPPER MINING LLC	384101
AMC45950	SE	MARGARET # 266	RESOLUTION COPPER MINING LLC	384101
AMC45952	SE	MARGARET # 268	RESOLUTION COPPER MINING LLC	384101
AMC45953	SW SE	MARGARET # 269	RESOLUTION COPPER MINING LLC	384101
AMC45955	SW SE	MARGARET # 271	RESOLUTION COPPER MINING LLC	384101
AMC45958	SE	MARGARET # 274	RESOLUTION COPPER MINING LLC	384101
AMC45960	SE	MARGARET # 276	RESOLUTION COPPER MINING LLC	384101
AMC45993	SE	MARGARET # 313	RESOLUTION COPPER MINING LLC	384101
AMC45994	SW SE	MARGARET # 314	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 34 NE

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC347774	NE	ERIC #73	RESOLUTION COPPER MINING LLC	384101
AMC347775	NE	ERIC #74	RESOLUTION COPPER MINING LLC	384101
AMC347837	NE	ERIC #138	RESOLUTION COPPER MINING LLC	384101
AMC347838	NE	ERIC #139	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 26 W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC45935	NW	MARGARET # 251	RESOLUTION COPPER MINING LLC	384101
AMC45937	NW	MARGARET # 253	RESOLUTION COPPER MINING LLC	384101
AMC45939	NW	MARGARET # 255	RESOLUTION COPPER MINING LLC	384101
AMC45941	NW	MARGARET # 257	RESOLUTION COPPER MINING LLC	384101
AMC45943	NW	MARGARET # 259	RESOLUTION COPPER MINING LLC	384101
AMC45949	SW	MARGARET # 265	RESOLUTION COPPER MINING LLC	384101
AMC45951	SW	MARGARET # 267	RESOLUTION COPPER MINING LLC	384101
AMC45957	SW	MARGARET # 273	RESOLUTION COPPER MINING LLC	384101
AMC45959	SW	MARGARET # 275	RESOLUTION COPPER MINING LLC	384101
AMC45961	SW SE	MARGARET # 277	RESOLUTION COPPER MINING LLC	384101
AMC45962	SW SE	MARGARET # 278	RESOLUTION COPPER MINING LLC	384101
AMC45963	SW SE	MARGARET # 279	RESOLUTION COPPER MINING LLC	384101
AMC45964	SW SE	MARGARET # 280	RESOLUTION COPPER MINING LLC	384101

AMC45965	NE NW	MARGARET # 281	RESOLUTION COPPER MINING LLC	384101
AMC45966	NE NW	MARGARET # 282	RESOLUTION COPPER MINING LLC	384101
AMC45967	NE NW	MARGARET # 283	RESOLUTION COPPER MINING LLC	384101
AMC45968	NE NW	MARGARET # 284	RESOLUTION COPPER MINING LLC	384101
AMC45969	NE NW	MARGARET # 285	RESOLUTION COPPER MINING LLC	384101
AMC45985	SW SE	MARGARET # 305	RESOLUTION COPPER MINING LLC	384101
AMC45986	SW	MARGARET # 306	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 23 W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC347702	NW	ERIC #1	RESOLUTION COPPER MINING LLC	384101
AMC45823	NW	MARGARET #135	RESOLUTION COPPER MINING LLC	384101
AMC45826	NW	MARGARET #137	RESOLUTION COPPER MINING LLC	384101
AMC45828	NW	MARGARET #139	RESOLUTION COPPER MINING LLC	384101
AMC45843	NE NW	MARGARET #154	RESOLUTION COPPER MINING LLC	384101
AMC45844	NE NW	MARGARET #155	RESOLUTION COPPER MINING LLC	384101
AMC45845	NE NW	MARGARET #156	RESOLUTION COPPER MINING LLC	384101
AMC45901	NW	MARGARET # 217	RESOLUTION COPPER MINING LLC	384101
AMC45903	NW	MARGARET # 219	RESOLUTION COPPER MINING LLC	384101
AMC45905	NW	MARGARET # 221	RESOLUTION COPPER MINING LLC	384101
AMC45907	SW	MARGARET # 223	RESOLUTION COPPER MINING LLC	384101
AMC45909	SW	MARGARET # 225	RESOLUTION COPPER MINING LLC	384101
AMC45911	NE NW	MARGARET # 227	RESOLUTION COPPER MINING LLC	384101
AMC45912	NE NW	MARGARET # 228	RESOLUTION COPPER MINING LLC	384101
AMC45913	NE NW	MARGARET # 229	RESOLUTION COPPER MINING LLC	384101
AMC45914	SW SE	MARGARET # 230	RESOLUTION COPPER MINING LLC	384101
AMC45915	SW SE	MARGARET # 231	RESOLUTION COPPER MINING LLC	384101
AMC45931	SW	MARGARET # 247	RESOLUTION COPPER MINING LLC	384101
AMC45933	SW	MARGARET # 249	RESOLUTION COPPER MINING LLC	384101
AMC45935	SW	MARGARET # 251	RESOLUTION COPPER MINING LLC	384101
AMC45969	NW SW	MARGARET # 285	RESOLUTION COPPER MINING LLC	384101
AMC45970	SW SE	MARGARET # 286	RESOLUTION COPPER MINING LLC	384101
AMC45971	SW SE	MARGARET # 287	RESOLUTION COPPER MINING LLC	384101

SHALLOW HYDRO HOLES

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T1S, R13E SECTION 22 SW1/4 NE1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC45853	NW	MARGARET #162	RESOLUTION COPPER MINING LLC	384101
AMC45855	SW SE	MARGARET #163	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO H-G FROM HWY 60

FR 2466 RUNS E & W THROUGH MIDDLE OF SECTION 22

T1S, R13E SECTION 22

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC45852	NE NW	MARGARET #161	RESOLUTION COPPER MINING LLC	384101
AMC45853	NW	MARGARET #162	RESOLUTION COPPER MINING LLC	384101
AMC45855	SW SE	MARGARET #163	RESOLUTION COPPER MINING LLC	384101
AMC45856	SW	MARGARET #164	RESOLUTION COPPER MINING LLC	384101
AMC45906	NE	MARGARET # 222	RESOLUTION COPPER MINING LLC	384101
AMC45908	SE	MARGARET # 224	RESOLUTION COPPER MINING LLC	384101

SHALLOW HYDRO HOLES

H-I

T1S, R13E SECTION 26 NW1/4 SE1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC348158	SE	ERIC #345	RESOLUTION COPPER MINING LLC	384101
AMC348159	NE SE	ERIC #346	RESOLUTION COPPER MINING LLC	384101
AMC348160	SE	ERIC #347	RESOLUTION COPPER MINING LLC	384101
AMC348161	NE SE	ERIC #348	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO H-I

FR 2469 (TO BE IMPROVED) LOCATED IN SE AND SW OF SECTION 26
FR 2469 ALSO LOCATED IN W1/2 OF SECTION 35,
AND SE OF SECTION 34

T1S, R13E SECTION 26 S1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC348156	SE	ERIC #343	RESOLUTION COPPER MINING LLC	384101
AMC348157	NE SE	ERIC #344	RESOLUTION COPPER MINING LLC	384101
AMC348158	SE	ERIC #345	RESOLUTION COPPER MINING LLC	384101
AMC348159	NE SE	ERIC #346	RESOLUTION COPPER MINING LLC	384101
AMC348160	SE	ERIC #347	RESOLUTION COPPER MINING LLC	384101
AMC348161	NE SE	ERIC #348	RESOLUTION COPPER MINING LLC	384101
AMC45949	SW	MARGARET # 265	RESOLUTION COPPER MINING LLC	384101
AMC45951	SW	MARGARET # 267	RESOLUTION COPPER MINING LLC	384101
AMC45957	SW	MARGARET # 273	RESOLUTION COPPER MINING LLC	384101
AMC45959	SW	MARGARET # 275	RESOLUTION COPPER MINING LLC	384101
AMC45961	SW SE	MARGARET # 277	RESOLUTION COPPER MINING LLC	384101
AMC45962	SW SE	MARGARET # 278	RESOLUTION COPPER MINING LLC	384101
AMC45963	SW SE	MARGARET # 279	RESOLUTION COPPER MINING LLC	384101
AMC45964	SW SE	MARGARET # 280	RESOLUTION COPPER MINING LLC	384101
AMC45985	SW SE	MARGARET # 305	RESOLUTION COPPER MINING LLC	384101
AMC45986	SW	MARGARET # 306	RESOLUTION COPPER MINING LLC	384101
AMC47276	NE SE	LD NO 5	RESOLUTION COPPER MINING LLC	384101
AMC47277	SE	LD NO 6	RESOLUTION COPPER MINING LLC	384101
AMC47278	SE	LD NO 7	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 35 W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC348169	NE NW SW SE	ERIC #356	RESOLUTION COPPER MINING LLC	384101
AMC348170	NW SW	ERIC #357	RESOLUTION COPPER MINING LLC	384101
AMC348171	NW SW	ERIC #358	RESOLUTION COPPER MINING LLC	384101
AMC348172	NW SW	ERIC #359	RESOLUTION COPPER MINING LLC	384101
AMC348173	NW SW	ERIC #360	RESOLUTION COPPER MINING LLC	384101
AMC348174	SW	ERIC #361	RESOLUTION COPPER MINING LLC	384101
AMC348175	SW	ERIC #362	RESOLUTION COPPER MINING LLC	384101
AMC348176	SW	ERIC #363	RESOLUTION COPPER MINING LLC	384101
AMC355464	SW	RESOLUTION NO. 9	RESOLUTION COPPER MINING LLC	384101

AMC355465 SW	RESOLUTION NO. 10	RESOLUTION COPPER MINING LLC	384101
AMC355474 SW	RESOLUTION NO. 19	RESOLUTION COPPER MINING LLC	384101
AMC358074 SW	RAW 1	TECK COMINCO AMER INC	384101
AMC358075 SW	RAW 2	TECK COMINCO AMER INC	384101
AMC358076 SW	RAW 3	TECK COMINCO AMER INC	384101
AMC358077 SW	RAW 4	TECK COMINCO AMER INC	384101
AMC358168 SW	RAW 95	TECK COMINCO AMER INC	384101
AMC358169 SW	RAW 96	TECK COMINCO AMER INC	384101
AMC45985 NE NW	MARGARET # 305	RESOLUTION COPPER MINING LLC	384101
AMC45986 NW	MARGARET # 306	RESOLUTION COPPER MINING LLC	384101
AMC45987 NE NW	MARGARET # 307	RESOLUTION COPPER MINING LLC	384101
AMC45988 NW	MARGARET # 308	RESOLUTION COPPER MINING LLC	384101
AMC45989 NE NW	MARGARET # 309	RESOLUTION COPPER MINING LLC	384101
AMC45990 NW	MARGARET # 310	RESOLUTION COPPER MINING LLC	384101
AMC45991 NE NW	MARGARET # 311	RESOLUTION COPPER MINING LLC	384101
AMC45992 NW	MARGARET # 312	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 34 SE

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC355461	NE SE	RESOLUTION NO. 6	RESOLUTION COPPER MINING LLC	384101
AMC355462	NE SE	RESOLUTION NO. 7	RESOLUTION COPPER MINING LLC	384101
AMC355463	SE	RESOLUTION NO. 8	RESOLUTION COPPER MINING LLC	384101
AMC355464	SE	RESOLUTION NO. 9	RESOLUTION COPPER MINING LLC	384101
AMC355465	SE	RESOLUTION NO. 10	RESOLUTION COPPER MINING LLC	384101
AMC355466	SE	RESOLUTION NO. 11	RESOLUTION COPPER MINING LLC	384101
AMC355467	SE	RESOLUTION NO. 12	RESOLUTION COPPER MINING LLC	384101
AMC355468	SE	RESOLUTION NO. 13	RESOLUTION COPPER MINING LLC	384101
AMC355469	SW SE	RESOLUTION NO. 14	RESOLUTION COPPER MINING LLC	384101
AMC355474	SE	RESOLUTION NO. 19	RESOLUTION COPPER MINING LLC	384101
AMC355475	SE	RESOLUTION NO. 20	RESOLUTION COPPER MINING LLC	384101

SHALLOW HYDRO HOLES

H-K

T1S, R13E SECTION 21 SW1/4 SW1/4

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC313033	SW	KAY 148	RESOLUTION COPPER MINING LLC	384101
AMC313035	SW	KAY 150	RESOLUTION COPPER MINING LLC	384101

ROAD ACCESS TO H-K FROM HWY 60

FR 2458 (NO IMPROVEMENTS NEEDED) LOCATED IN SW OF SECTION 21

FR 2458 ALSO LOCATED IN SECTION 28 W1/2 (SEE BELOW)

T1S, R13E SECTION 21 SW

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC313027	SW	KAY 141	RESOLUTION COPPER MINING LLC	384101
AMC313033	SW	KAY 148	RESOLUTION COPPER MINING LLC	384101
AMC313035	SW	KAY 150	RESOLUTION COPPER MINING LLC	384101
AMC357098	SW	KAY 140A	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 28 W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC313035	NW	KAY 150	RESOLUTION COPPER MINING LLC	384101
AMC348057	NW	ERIC #243	RESOLUTION COPPER MINING LLC	384101
AMC348058	NE NW	ERIC #244	RESOLUTION COPPER MINING LLC	384101
AMC348061	NW	ERIC #247	RESOLUTION COPPER MINING LLC	384101
AMC355534	SW	SUN NO 62A	RESOLUTION COPPER MINING LLC	384101
AMC355535	SW	SUN NO 63A	RESOLUTION COPPER MINING LLC	384101
AMC355536	SW SE	SUN NO 64A	RESOLUTION COPPER MINING LLC	384101
AMC359404	NW SW	GLADIATOR NO.9	RESOLUTION COPPER MINING LLC	384101
AMC362903	NW	OLGA 1	RESOLUTION COPPER MINING LLC	384101
AMC362904	NW	OLGA 2	RESOLUTION COPPER MINING LLC	384101
AMC362905	NW	OLGA 3	RESOLUTION COPPER MINING LLC	384101
AMC46016	NE NW	MARGARET # 336	RESOLUTION COPPER MINING LLC	384101
AMC47117	NW	KAY NO 152	RESOLUTION COPPER MINING LLC	384101
AMC60162	NW	OAK NO 35	RESOLUTION COPPER MINING LLC	384101
AMC60163	NW	OAK NO 36	RESOLUTION COPPER MINING LLC	384101
AMC60164	NW	OAK NO 37	RESOLUTION COPPER MINING LLC	384101
AMC60294	NW	SUN #52	RESOLUTION COPPER MINING LLC	384101

TUNNEL CHARACTERIZATION
BOREHOLES
CLAIMS DATA

TUNNEL BOREHOLES

PVT-3

T1S, R13E SECTION 29 SE1/4 SE1/4

AMC355532 SE

OAK NO 40A

RESOLUTION COPPER MINING LLC

384101

ROAD ACCESS TO PVT-3

MAGMA MINE ROAD (NO IMPROVEMENTS NEEDED) LOCATED IN SECTION 29 SE
NEXT TO HIGHWAY 60

T1S, R13E SECTION 29 SE

Serial Num Quad
AMC355532 SE

Claim Name/Number
OAK NO 40A

Claimant(s)
RESOLUTION COPPER MINING LLC

Case Type
384101

TUNNEL BOREHOLES

PVT-4

T1S, R13E SECTION 27 NW1/4 SW1/4

AMC60310 NW SW SUN #68

RESOLUTION COPPER MINING LLC 384101

ROAD ACCESS TO PVT-4

EXISTING UNIDENTIFIED ROAD (NO IMPROVEMENTS NEEDED) LOCATED IN SECTION 27 W1/2
JUST OFF OF HIGHWAY 60.

T1S, R13E SECTION 27 NW1/4 SW1/4

Serial Num	Quad	Claim Name/Number
AMC60300	NW	SUN #58

Claimant(s)	Case Type
RESOLUTION COPPER MINING LLC	384101

TUNNEL BOREHOLES

PVT-5

T1S, R13E SECTION 27 NE1/4 NW1/4

AMC45924 NW

MARGARET # 240

RESOLUTION COPPER MINING LLC

384101

ROAD ACCESS TO PVT-5

NEW ROAD LOCATED IN SECTION 27 N1/2

NEW ROAD ALSO LOCATED IN SECTION 22 SE

FR 2461 LOCATED IN SECTION 22 SE AND SECTION 23 W1/2

T1S, R13E SECTION 27 N1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC45923	NE NW	MARGARET # 239	RESOLUTION COPPER MINING LLC	384101
AMC45924	NW	MARGARET # 240	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 22 SE

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC45855	SW SE	MARGARET #163	RESOLUTION COPPER MINING LLC	384101
AMC45858	SW SE	MARGARET #165	RESOLUTION COPPER MINING LLC	384101
AMC45908	SE	MARGARET # 224	RESOLUTION COPPER MINING LLC	384101
AMC45910	SE	MARGARET # 226	RESOLUTION COPPER MINING LLC	384101
AMC45916	SW SE	MARGARET # 233	RESOLUTION COPPER MINING LLC	384101
AMC45919	SW SE	MARGARET # 235	RESOLUTION COPPER MINING LLC	384101
AMC45921	SW SE	MARGARET # 237	RESOLUTION COPPER MINING LLC	384101
AMC45932	SE	MARGARET # 248	RESOLUTION COPPER MINING LLC	384101
AMC45934	SE	MARGARET # 250	RESOLUTION COPPER MINING LLC	384101
AMC45936	SE	MARGARET # 252	RESOLUTION COPPER MINING LLC	384101

T1S, R13E SECTION 23 W1/2

Serial Num	Quad	Claim Name/Number	Claimant(s)	Case Type
AMC347702	NW	ERIC #1	RESOLUTION COPPER MINING LLC	384101
AMC45823	NW	MARGARET #135	RESOLUTION COPPER MINING LLC	384101
AMC45826	NW	MARGARET #137	RESOLUTION COPPER MINING LLC	384101
AMC45828	NW	MARGARET #139	RESOLUTION COPPER MINING LLC	384101
AMC45843	NE NW	MARGARET #154	RESOLUTION COPPER MINING LLC	384101
AMC45844	NE NW	MARGARET #155	RESOLUTION COPPER MINING LLC	384101
AMC45845	NE NW	MARGARET #156	RESOLUTION COPPER MINING LLC	384101
AMC45901	NW	MARGARET # 217	RESOLUTION COPPER MINING LLC	384101
AMC45903	NW	MARGARET # 219	RESOLUTION COPPER MINING LLC	384101
AMC45905	NW	MARGARET # 221	RESOLUTION COPPER MINING LLC	384101
AMC45907	SW	MARGARET # 223	RESOLUTION COPPER MINING LLC	384101
AMC45909	SW	MARGARET # 225	RESOLUTION COPPER MINING LLC	384101
AMC45911	NE NW	MARGARET # 227	RESOLUTION COPPER MINING LLC	384101
AMC45912	NE NW	MARGARET # 228	RESOLUTION COPPER MINING LLC	384101
AMC45913	NE NW	MARGARET # 229	RESOLUTION COPPER MINING LLC	384101
AMC45914	SW SE	MARGARET # 230	RESOLUTION COPPER MINING LLC	384101
AMC45915	SW SE	MARGARET # 231	RESOLUTION COPPER MINING LLC	384101
AMC45931	SW	MARGARET # 247	RESOLUTION COPPER MINING LLC	384101
AMC45933	SW	MARGARET # 249	RESOLUTION COPPER MINING LLC	384101
AMC45935	SW	MARGARET # 251	RESOLUTION COPPER MINING LLC	384101

APPENDIX D

**RESOLUTION
2007 FIRE RESTRICTION
RESPONSE PLAN;
RESOURCE
EVALUATION PROJECT**

2007 Fire Restriction Response Plan: Resource Evaluation Project.

The following Fire Plan is to be posted at each drill site. In addition to this plan document, all requirements described in the USFS Fire Prevention document sent by fax to Carl Hehnke at the No. 9 site on June 13, 2001, and the document sent to RCML by Brad Johnson USFS on May 6, 2006 will form the basis of the Fire Plan. Major's drill foreman will be provided a copy of, and will become familiar with the USFS Fire Prevention requirements.

- Britton Kiefer, Senior Geologist is the contractor manager for the RCML Exploration Drilling Operations and will be designated as the Chief Fire Guard and Fire Plan Representative. During drilling operations, one member of the drilling crew will be designated as a Fire Guard in order to assure on-site guard duties are performed 24 hours per day. These fire guards will also act as fire lookouts to spot lightning-caused fires, or any other fires in the general area.
- A fire toolbox consisting of four shovels, two axes, one Pulaski and one five gallon backpack water pump will be provided at each drill site. This equipment is for the sole purpose of firefighting.
- Each drill site will be equipped with a fire hose at least 100 feet long. The water pressure will be provided either by the water lines at the drill rig, or by a portable pump operating with a large the water storage tank at each drill rig.
- Each drill site and each pickup or service truck will be equipped with a backpack water pump.
- Each drill site will be carefully cleared of brush.
- The drilling plan is for operating 24 hours per day, 7 days per week. Shutting down drill rigs operating at the depths anticipated has the potential to cause drill rods to become stuck in the hole. Therefore RCML has obtained a waiver that will allow continued operations during Stage D fire danger.
- RCML has also been issued a waiver that allows small welding jobs to be completed on site during Stage D fire danger. Prior to any welding, a 30-foot diameter area is to be thoroughly soaked down with water and kept wet during the entire length of the welding or cutting operations. In addition a RCML hot work permit outlining the procedures for fire watch and other safety precautions will be filled out and made available for inspection at all times during the Welding or Cutting operations. The Hot Work Permits will be turned into the Major Drilling Safety Manager at the end of the shift. No welding or cutting will be done when wind speeds exceed 10 mph. Whenever it is possible Hot Work will be done in the yard at Magma Shaft #9 instead of at the drill sites. The area adjacent to the welding/cutting operations shall be thoroughly checked for fires for one hour after the project has been completed.
- Smoking is allowed only in enclosed areas such as vehicles with the windows shut or the driller's barn.
- In addition to calling 911, all fires will be reported to Forest Dispatcher's office at 602-225-5355 even if fire is extinguished.
- No fires or cook stoves are permitted at the drill sites.
- Employee's who are found in violation of the conditions of this waiver will be subject to discipline up to and including discharge from the site.

APPENDIX E

DUSTREAT DC9112 DESCRIPTION AND MATERIAL SAFETY DATA SHEET

GE Infrastructure Water & Process Technologies

DusTreat™ DC9112

Dust Control Binding Agent

- Provides excellent control of fugitive emissions on unpaved roads.
- Effective on a broad range of access and mine haul roads.
- Reduces costs associated with typical dust suppression programs.
- Effective on coal, ores, and other bulk solid materials
- Controls dust in active storage piles

Description and Use

DusTreat™ DC9112 is a binder specifically formulated to control fugitive dust from storage piles and haul roads. This product is biodegradable and does not contain corrosive chloride compounds or waste oils. DusTreat DC9112 solutions are particularly effective in reducing respirable dust.

Fugitive dust is typically generated by moving vehicles and wind. These dust emissions can be a safety hazard, an environmental nuisance, and can increase maintenance of material handling equipment. In addition, these emissions can represent a substantial loss of valuable fuel.

Fugitive emissions can be significantly reduced by applying DusTreat DC9112 as a dilute solution from a water truck equipped with sprays. Dilution range will range from 1 -50% and depends on the type of traffic and road material.

Treatment and Feeding Requirements

Proper treatment levels for DusTreat DC9112 depend on many factors, such as severity of the problem, environmental influences and operating characteristics of the system. Therefore, this product should be used in accordance with the control parameters that GEWPT establishes for the application.

Maximum efficiency and minimum cost is ensured by using GEWPT wet suppression systems. These systems are fully automated and custom sized per site specifications to provide reliable and economical chemical treatment. While optimal

results are obtained with GEWPT equipment, DusTreat DC9112 can be used in other feed systems. Check with your GEWPT representative for material compatibility information.

For contact with neat product, recommended materials of construction include stainless steel and PVC. For dilute aqueous solutions, use of mild steel is acceptable.

General Properties & Safety

Physical properties of DusTreat DC9112 are shown on the Material Safety Data Sheet, a copy of which is available on request.

Storage

DusTreat DC9112 should be stored at temperatures above freezing. To ensure maximum activity, use this product within six months.

Packaging Information

DusTreat DC9112 is a liquid blend available in a wide variety of customized containers and delivery methods. Contact your GEWPT representative for details.

General Electric Company
4635 Somerset Rd., PO Box 3002
Trevose, PA 19053-6783
1 215.355.3300

imagination at work





GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
Business telephone: (215) 355-3300

Material Safety Data Sheet

Issue Date: 29-MAR-2002

EMERGENCY TELEPHONE (Health/Accident): (800) 877-1940

1 PRODUCT IDENTIFICATION

PRODUCT NAME:

DUSTREAT DC9112

PRODUCT APPLICATION AREA:

DUST CONTROL AGENT.

2 COMPOSITION / INFORMATION ON INGREDIENTS

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

This product is not hazardous as defined by OSHA regulations.

No component is considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration at OSHA thresholds for carcinogens.

3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION

May cause slight irritation to the skin. May cause moderate irritation to the eyes. Mists/aerosols may cause irritation to upper respiratory tract.

DOT hazard is not applicable
Emergency Response Guide is not applicable
Odor: Sweet; Appearance: Dark Brown, Liquid

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type). Proper fire-extinguishing media: dry chemical, carbon dioxide, foam or water

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; May cause slight irritation to the skin.

ACUTE EYE EFFECTS:

May cause moderate irritation to the eyes.

ACUTE RESPIRATORY EFFECTS:

Mists/aerosols may cause irritation to upper respiratory tract.

INGESTION EFFECTS:

No adverse effects expected. If more than several mouthfuls are swallowed, abdominal discomfort, nausea, diarrhea and weakness may occur.

TARGET ORGANS:

No evidence of potential chronic effects.

MEDICAL CONDITIONS AGGRAVATED:

Asthma.

SYMPTOMS OF EXPOSURE:

May cause redness or itching of skin.

4 FIRST AID MEASURES

SKIN CONTACT:

Wash thoroughly with soap and water. Remove contaminated clothing. Get medical attention if irritation develops or persists.

EYE CONTACT:

Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get immediate medical attention.

INHALATION:

If nasal, throat or lung irritation develops - remove to fresh air and get medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Dilute contents of stomach using 3-4 glasses milk or water.

NOTES TO PHYSICIANS:

No special instructions

5 FIRE FIGHTING MEASURES

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

dry chemical, carbon dioxide, foam or water

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.
FLASH POINT:
 > 200F > 93C P-M(CC)

6 ACCIDENTAL RELEASE MEASURES

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 HANDLING & STORAGE

HANDLING:

Normal chemical handling.

STORAGE:

Keep containers closed when not in use. Reasonable and safe chemical storage. Protect from freezing.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

This product is not hazardous as defined by OSHA regulations.

ENGINEERING CONTROLS:

adequate ventilation

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.

USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.

If air-purifying respirator use is appropriate, use a respirator with dust/mist filters.

SKIN PROTECTION:

neoprene gloves-- Wash off after each use. Replace as necessary.

EYE PROTECTION:

splash proof chemical goggles

9 PHYSICAL & CHEMICAL PROPERTIES

Specific Grav. (70F, 21C)	1.311	Vapor Pressure (mmHG)	- 18.0
Freeze Point (F)	20	Vapor Density (air=1)	< 1.00
Freeze Point (C)	-7		
Viscosity(cps 70F, 21C)	250	% Solubility (water)	- 100.0

Odor : Sweet

Appearance	Dark Brown
Physical State	Liquid
Flash Point	P-M(CC) > 200F > 93C
pH As Is (approx.)	6.4
Evaporation Rate (Ether=1)	< 1.00

NA = not applicable ND = not determined

10 STABILITY & REACTIVITY

STABILITY:

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with strong oxidizers.

DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"A"

11 TOXICOLOGICAL INFORMATION

Oral LD50 RAT: >5,000 mg/kg

Dermal LD50 RABBIT: >2,000 mg/kg

NOTE - Estimated value

Skin Irritation Score RABBIT: 0

Ames Assay : NEGATIVE

Non-Ames Mutagenicity : NEGATIVE

NOTE - Mouse Micronucleus; Unscheduled DNA Synthesis

12 ECOLOGICAL INFORMATION

AQUATIC TOXICOLOGY

Daphnia magna 48 Hour Static Screen

0% Mortality= 2000 mg/L

Fathead Minnow 48 Hour Static Screen

0% Mortality= 2000 mg/L

Rainbow Trout 96 Hour Static Bioassay with 48-Hour Renewal

0% Mortality= 2000 mg/L

BIODEGRADATION

BOD-28 (mg/g): 208

BOD-5 (mg/g): 110

COD (mg/g): 750

TOC (mg/g): 240

13 DISPOSAL CONSIDERATIONS

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
Not applicable.

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding

the proper disposal of this material.

14 TRANSPORT INFORMATION

DOT HAZARD: Not Applicable
UN / NA NUMBER: Not applicable
DOT EMERGENCY RESPONSE GUIDE #: Not applicable

15 REGULATORY INFORMATION

TSCA:

All components of this product are listed in the TSCA inventory.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

No regulated constituent present at OSHA thresholds

SARA SECTION 312 HAZARD CLASS:

Product is non-hazardous under Section 311/312

SARA SECTION 302 CHEMICALS:

No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

No regulated constituent present at OSHA thresholds

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC

ENFORCEMENT ACT (PROPOSITION 65) CHEMICALS PRESENT:

No regulated constituent present at OSHA thresholds

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 OTHER INFORMATION

NFPA/HMIS

CODE TRANSLATION

Health	1	Slight Hazard
Fire	1	Slight Hazard
Reactivity	0	Minimal Hazard
Special	NONE	No special Hazard
(1) Protective Equipment	B	Goggles, Gloves

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
MSDS status:	29-JAN-1997		** NEW **
	25-FEB-1998	12	29-JAN-1997
	30-APR-1998	8;EDIT:9	25-FEB-1998
	20-JUL-1998	8;EDIT:9	30-APR-1998
	29-MAR-2002	4.12	20-JUL-1998

APPENDIX F

STORMWATER POLLUTION PREVENTION PLAN

APPENDIX G

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

RESOLUTION PRE-FEASIBILITY ACTIVITIES

**SPILL PREVENTION, CONTROL,
AND COUNTERMEASURE PLAN**

Resolution Copper Mining, LLC

August 2010



Prepared by:

WestLand Resources, Inc.
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(520) 206-9585

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APPENDICES

Appendix A – Regulatory Requirement Cross-Reference Table

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1.0 INTRODUCTION

This draft Spill Prevention, Control, and Countermeasure (SPCC) Plan was prepared for the Resolution Copper Mining, LLC (Resolution) Pre-Feasibility Activities in accordance with 40 Code of Federal Regulations (CFR), Part 112, Oil Pollution Prevention and this draft plan is being required for the proposed pre-feasibility activities as directed by the United States Forest Service (Forest Service). Once the proposed activities begin it is anticipated that for all the areas which make up the project, more than 1,320 gallons of oil and petroleum products will be stored in aboveground containers. This SPCC Plan describes the procedures followed by Resolution to prevent, control, and mitigate releases of oil-based products to the environment for the pre-feasibility activities (located near Superior, Arizona).

Resolution has developed this SPCC Plan to meet the majority of the requirements of the December 5, 2008 revisions of the 40 CFR Part 112. This SPCC Plan does not follow the exact order presented in 40 CFR Part 112. Section headings identify, where appropriate, the relevant section(s) of the SPCC regulations. Additionally, Appendix A provides a cross-reference table for the applicable requirements of 40 CFR Part 112 and the corresponding sections in this SPCC Plan where the requirements are addressed.

This SPCC plan also includes oil-filled containers located within a large area with minimal activity other than planned access roads and drill sites. Where appropriate, the plan will note that the mud pits and earthen berms around the drill sites provide secondary or tertiary containment as well as equivalent environmental protection for other SPCC requirements.

2.0 APPROVAL AND CERTIFICATION [40 CFR 112.3(d)]

2.1 Management Approval

Resolution is committed to the prevention of discharges of oil or oily wastewater to navigable waters and the environment. Resolution will maintain the highest standards for spill prevention through regular review, updating, and implementation of this SPCC Plan for the proposed Pre-feasibility activities. Once all environmental permitting is complete and the final locations of the access roads and drill sites have been decided, Resolution will commit the required equipment, material, and human resources to expeditiously control and remove discharges of oil in harmful quantities.

Name: To be determined

Signature: _____

Title: _____

Date: _____

2.2 Professional Engineer Certification [40 CFR 112.3(d)]

In order for this SPCC Plan to be effective and meet the requirements of Title 40, Part 112 of the Code of Federal Regulations (40 CFR Part 112), a Registered Professional Engineer must attest the following:

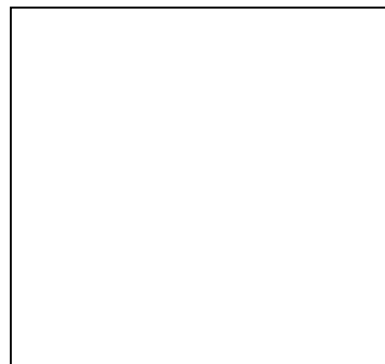
- He/She is familiar with the requirements of 40 CFR Part 112;
- He/She has visited and examined the site, or has supervised examination of the site by appropriately qualified personnel;
- This Spill Prevention, Control, and Countermeasures Plan has been prepared consistent with good engineering practice, including consideration of applicable industry standards and the requirements of 40 CFR Part 112;
- That procedures for required inspections and testing have been established; and
- That this SPCC Plan is adequate for this site.

Name: To be determined

Signature: _____

Registration Number: _____

Date: _____



Seal

The final plan will be prepared once all environmental permitting is complete. Once this certification is made it shall in no way relieve Resolution of the responsibility to prepare and fully implement this SPCC Plan in accordance with 40 CFR Part 112.

3.0 SUBSTANTIAL HARM EVALUATION

In accordance with 40 CFR 112.20, a determination if the proposed activities have the potential to cause substantial harm to the environment by discharging oil into or on navigable waters or adjoining shorelines has been conducted. Based on this determination and as recorded below, Resolution has determined that this site does not pose a risk of substantial harm under 40 CFR Part 112.

1. Do the proposed activities transfer oil over water to or from vessels and are the proposed activities anticipated to have a total oil storage capacity greater than or equal to 42,000 gallons?

☐ Yes ☒ No

2. Are the proposed activities anticipated to have a total oil storage capacity greater than or equal to 1 million gallons and do the proposed activities lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation?

☐ Yes ☒ No

3. Are the proposed activities anticipated to have a total oil storage capacity greater than or equal to 1 million gallons and are the proposed activities located at a distance such that a discharge from the activities could cause injury to fish, wildlife, and sensitive environments?

☐ Yes ☒ No

4. Are the proposed activities anticipated to have a total oil storage capacity greater than or equal to 1 million gallons and is the site located at a distance such that a discharge from the proposed activities would shut down a public drinking water intake?

☐ Yes ☒ No

5. Are the proposed activities anticipated to have a total oil storage capacity greater than or equal to 1 million gallons and have the activities experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?

☐ Yes ☒ No

Once all environmental permitting has been completed and the drill sites and access roads are completed, this SPCC will be updated to reflect all of the current information and the following certification will be made:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate, and complete.

Name: To be determined
Signature: _____
Title: _____
Date: _____

4.0 PLAN MAINTENANCE [40 CFR 112.3 & 112.5]

4.1 Location of SPCC Plan [40 CFR 112.3(e)]

A complete controlled copy of this draft SPCC Plan and associated records will be kept in the environmental files within the Resolution Environmental Office, at 102 Magma Heights. The Environmental Office is attended during normal business hours, Monday through Friday.

4.2 Plan Review and Amendments [40 CFR 112.5]

4.2.1 Changes in Activity Configuration [40 CFR 112.5(a)]

The SPCC Plan Coordinator for the proposed activities (identified in Appendix D) will amend the final SPCC Plan whenever a change in design, construction, operation, or maintenance materially affects the activities potential for the discharge of oil or petroleum products in quantities that may be harmful. These changes may include, but not be limited to:

- Commissioning or decommissioning containers;
- Replacement, reconstruction, or movement of containers;
- Reconstruction, replacement, or installation of piping systems;
- Construction or demolition that might alter secondary containment structures; or
- Changes of product or service, revisions to standard operation, modification of testing/inspection procedures, and use of new or modified industry standards or maintenance procedures.

Technical amendments to the final SPCC Plan must be certified by a registered Professional Engineer. Decommissioning or removing containers, or replacing a container with a similar type of container, may not necessarily constitute a technical amendment to the SPCC Plan that requires recertification by a registered Professional Engineer if the change does not materially affect the potential for a discharge. This determination will be made using best professional judgment of the SPCC Plan Coordinator on a case-by-case basis.

The SPCC Plan Coordinator must make the needed revisions to the final SPCC Plan based on changes no later than six months after the changes occur. The revised SPCC Plan must be implemented as soon as possible, but not later than six months following preparation of a revised SPCC Plan.

4.2.2 Non-Technical Amendments

Minor changes (e.g., non-technical amendments) can be made by the SPCC Plan Coordinator and do not require certification by a registered Professional Engineer. These amendments may include, but not be limited to:

- Change in the name or contact information of individuals responsible for the implementation of this SPCC Plan;
- Change in the name or contact information of spill response or cleanup contractors; or
- Changes in text, tables, figures, forms or other information in the main body and appendices of the final SPCC Plan that do not materially affect the potential for a discharge.

4.2.3 Scheduled Plan Reviews [40 CFR 112.5(b)]

In addition to the requirement (discussed above in Section 4.2.1) to make changes to the final SPCC Plan whenever there are certain changes in design, construction, operation, or maintenance, the final SPCC Plan will be reviewed and evaluated at least once every five years by the SPCC Plan Coordinator or a designated agent. As a result of this review and evaluation, the SPCC Plan Coordinator will amend the SPCC Plan within six months of the review to include more effective prevention and control technology if the technology has been field-proven at the time of the review and will significantly reduce the likelihood of a discharge of oil in quantities that are harmful. Amendments to the plan will be fully implemented as soon as possible, but not later than six months after the date of the amendments. Technical amendments to the final SPCC Plan must be certified by a registered Professional Engineer. Once environmental permitting is complete and a final Plan is developed, a plan review will be scheduled to take place on or prior to the five year compliance date.

The SPCC Plan Coordinator will be responsible for initiating and coordinating scheduled SPCC Plan reviews and amendments once it is finalized. Completion of each scheduled SPCC plan review and evaluation will be documented in the log of SPCC plan reviews and amendment found in Appendix B. The documentation will include a signed statement as to whether the SPCC Plan will be amended as a result of the schedule review and evaluation. The statement will include the following words:

“I have completed review and evaluation of the SPCC Plan for the pre-feasibility activities on [INSERT DATE] and will (will not) amend the Plan as a result.”

4.3 Facilities, Procedures, Methods, or Equipment Not Yet Fully Operational [40 CFR 112.7]

Resolution currently has many facilities, procedures, methods or equipment regulated by 40 CFR 112 that are not yet fully operational which will support the pre-feasibility activities. Once a final plan is developed, all of these items will be discussed in separate paragraphs and will explain separately the details of installation and operational start-up.

4.4 Deviations and Equivalent Environmental Protection [40 CFR 112.7(a)(2)]

4.4.1 Deviations for Integrity Testing

The EPA’s SPCC Guidance for Regional Inspectors, Version 1.1 (November 2005), states that in lieu of integrity testing, environmental equivalence can be achieved via monthly inspections for elevated drums and elevated shop-built containers with a capacity less than 30,000 gallons, where all sides of the container are visible. In addition, the guidance states that the EPA recognizes that industry standards typically only require visual inspection for single-use bulk storage containers; therefore, containers that meet these criteria will not be integrity tested.

The preamble to the SPCC Rule revisions issued by the EPA on July 17, 2002 lists the Steel Tank Institute (STI) Standard SP001 as an industry standard that may be used to assist with the integrity testing guidelines required by 40 CFR 112.8(c)(6). STI’s Standard SP001 does not require integrity testing for certain aboveground storage tank configurations that are inspected on a regular basis. Further, the EPA’s SPCC Guidance for Regional Inspectors also notes that certain tank sizes and configurations may only require frequent visual inspection, in lieu of integrity testing. Therefore,

regular inspections will be considered equivalent environmental protection for certain bulk storage containers that meet the STI Standard SP001 criteria.

Deviations and equivalent protection associated with integrity testing are outlined in Section 16.6.3 of the SPCC Plan.

5.0 SITE DESCRIPTION [40 CFR 112.7(a)(3)]

5.1 Site Operations

The Resolution Pre-Feasibility Activities project is in the planning and environmental review stage. The project area is located on Forest Service lands within Township 1 South, Range 13 East, portions of Sections 11, 13, 14, 21 through 24, 26 through 29, and 32 through 35; Township 1 South, Range 14 East; portions of Sections 5, 7, and 8; Township 2 South, Range 12 East, portions of Sections 1, 2, 3, and 25; Township 2 South, Range 13 East, portions of Sections 3 through 8, 6, 7, 18, 19, 20, and 30, Gila and Salt River Baseline and Meridian, (Appendix A, General Location Map).

Some information is not yet available as the planning process for the project has not yet been completed. Currently, the project-specific plans for the new proposed activities include:

1) Constructing seven exploration drill sites that would impact approximately 1.78 acres and directional drilling on those sites; 2) Constructing eight drill sites to accommodate a total of three deep and six shallow groundwater testing and monitoring wells that would impact approximately 1.86 acres; 3) Constructing nine drill sites that would impact approximately 1.8 acres to accommodate a total of nine geotechnical characterization boreholes; 4) Continuing exploratory and monitoring activities at previously authorized drill sites that have impacted approximately 3.02 acres; 5) Completing necessary roadway improvements on approximately 16.67 miles of existing roads on National Forest System Lands that would impact approximately 29.51 acres; 6) Construction of 0.33 mile of new roads that would impact 0.59 acre; 7) Road maintenance for access to previously authorized drill sites and new drill sites on public land administered by the Forest Service (National Forest System Lands), Arizona State Land Department (State Trust land) and private lands; 8) Completing road improvements on approximately 4.28 miles of existing roads that would impact approximately 5.75 acres on State Trust land and on approximately 1.05 miles of existing roads that would impact approximately 2.48 acres on privately owned land; 9) Constructing new drill sites and monitoring wells on three sites that would impact approximately 0.39 acre of State Trust land and 0.18 acre of private land. Areas of disturbance provided here are based on conservative estimates of the maximum area that would be required for proposed activities.

Oil-based products will primarily be used to fuel and maintain equipment supporting planned activities such as access road creation and maintenance, and drill site installation and operation. This equipment will include drill rigs, earth moving equipment, mud accumulators, generators, water trucks, and support vehicles. Used oil is transported off site for recycling.

The General Location Map (Figure 1) shows the overall location and Figure 2 displays the proposed layout of all the access roads and drill sites throughout the project. The site diagrams included in Figures 3 through 5 show the anticipated location of all regulated oil containers (including aboveground storage tanks, mobile portable containers, oil-filled electrical transformers or other similar equipment, and any other oil-filled equipment), and loading and unloading and transfer areas. These layouts are typical as the activities have not yet been approved.

5.2 Oil Storage

Oil storage facilities will be located in the following areas:

- Boart Longyear contractor yard
- Major Excavation contractor yard
- Drill sites

A table which will list all oil storage containers and capacities will be in Appendix C-2, arranged according to the above categories. All containers with capacity of 55 gallons or more will be included. Containment and drainage patterns for each of these areas are discussed in Section 8.0 and included in Appendix C. To support the continual update of quickly changing sites, daily in most instances, the existing daily checklist for drilling contractors will be updated to include SPCC concerns.

Any out-of-service containers will remain in the SPCC Plan inventory and will require periodic inspections per Section 9.0 until they are “permanently closed” or removed from the site. “Permanently closed” is defined by the SPCC regulations as a container for which:

- All liquid and sludge has been removed from the container and connecting lines
- All connecting lines and piping have been disconnected and blanked off
- All valves (except ventilation valves) have been closed and locked,
- Conspicuous signs have been posted on each container stating that it is a permanently closed container and noting the date of closure.

The SPCC Plan Coordinator will be informed of any “permanent closure” activities at the proposed project so that the SPCC Plan may be updated accordingly.

Mobile tanks and service vehicles will be used for the pre-feasibility activities; a complete list will be maintained in Appendix C. The mobile tanks and service vehicles will be typically stationed in the contractor yards but will travel throughout the proposed project areas as needed. They will be filled in the contractor’s yards.

5.3 Routine Handling Procedures

Proposed procedures for petroleum product loading and unloading at bulk storage tanks are discussed in Section 12.0. Small, incidental releases that may result from transfer operations will be handled by SPCC-trained Resolution employees or contractors employees using an appropriate absorbent. Spill kits, absorbent materials, empty drums, and shovels will be located throughout the project for this purpose. Inventories of spill control materials will be checked periodically during routine SPCC inspections (see Section 9.0).

Resolution or contractors personnel responsible for receiving/accepting bulk petroleum product containers (i.e., drums and totes) will be trained in visual inspection procedures. Drums and totes containing petroleum products which will be delivered to the proposed project by outside vendors will be visually inspected for signs of leaks and corrosion prior to acceptance. Petroleum products in damaged containers will not be accepted.

Resolution or contractors employees that handle drums will be instructed to keep lids on drums closed except when adding or removing product. Resolution or contractors employees will not be permitted to transport used oil off of the proposed project area or on public roads.

6.0 RELEASE RESPONSE [40 CFR 112.7(a)(3-5)]

6.1 Release Response Procedures

The following release response procedures were developed to assist Resolution or contractors employees in responding to releases in an efficient manner, while providing for the protection of employees, facilities, and the surrounding environment. No employee will be required to respond to any type of release if conditions are unsafe. A list of contact names and phone numbers will be provided in Appendix D.

Response procedures are listed below:

1. Identify the character, source, amount, and extent of the release. ***Do not enter*** a hazardous area until hazards have been assessed and controlled. ***Stay upwind/uphill*** of any release.
2. Evaluate the situation from a distance and assess whether a fire or explosion is possible. If there is a risk of fire or explosion, move a safe distance away from the area and evacuate personnel in the area. Turn off nearby sources of ignition (***if this can be done safely***).
3. ***Immediately notify the front desk at 520-689-9374 or security at 520-689-0115 for any of the following discharges:***
 - Discharge of any quantity that poses an imminent danger or involves injured personnel;
 - Discharge of any quantity that reaches a wash, creek, or stream; or
 - Discharge of any quantity that is not contained by a secondary containment basin or diversionary structure.
4. If you have not been trained to respond to releases, take no further action and wait for emergency responders.
5. If you have been trained to respond to releases take active measures to contain the release ***without undue risk of personal injury***. Make sure that proper personal protective equipment (PPE) is worn to provide skin and respiratory protection from the hazards involved with spill containment, cleanup and disposal. PPE may include hard hat, boots, safety glasses, gloves, and respirators (as necessary).
 - Attempt to extinguish any incipient stage fires.
 - Shut off pumps, close valves, etc. if material is still being released.
 - For releases in a diked area, make sure any valves in the containment wall are closed.
 - For small releases in undiked areas, place absorbent materials directly on the spilled oil.
 - For large releases in undiked areas, develop a security perimeter around the impacted area, construct makeshift dikes of absorbent materials, booms, or other available materials around the release.

A flow chart outlining release response procedures is included in Appendix E.

6.2 Disposal of Recovered Materials

Sorbent material, temporary earthen berms, and/or heavy equipment may be utilized by Resolution or its contractors to contain and recover the released oil. Used absorbent material and contained oil from releases will be placed in 55-gallon metal drums or appropriate containers and stored in an appropriate containment. Drums will be appropriately labeled and kept closed except when adding waste. If necessary, Resolution may also contract a disposal company to assist with waste recovery and removal. **The Environmental Department will coordinate all waste disposal** and will ensure that a shipping receipt or manifest is received from the disposal contractor and properly filed. Resolution or contractor employees may not transport used oil off of the site or on public roads.

6.3 Incidental Releases

Small, incidental releases resulting from transfer operations will be cleaned up by Resolution or contractors employees using an appropriate absorbent. Spill kits will be located throughout the site for this purpose. Notification of the front desk or security is required for incidental releases.

Any release that poses an imminent danger, involves injured personnel, reaches a wash, creek, or stream; or is not contained by a secondary containment basin or diversionary structure, ***regardless of quantity***, is not considered an incidental release and must be reported to the front desk or security and site manager.

7.0 RELEASE NOTIFICATIONS [40 CFR 112.7(a)(3-5)]

7.1 Verbal Notifications to Government Agencies

Government agencies may need to be notified of oil releases that are not contained within a dike, berm, or other containment structure. **All verbal and written notifications to government agencies are to be made by the Site Manager (or designate) only.** The following notifications must be made as soon as possible after learning of an oil discharge.

7.1.1 Verbal Notifications to Local Agencies

Notification to Pinal County Emergency Management (520-509-3555) must be made if the discharge is released off-site.

7.1.2 Verbal Notifications to State Agencies

Notify the Arizona Department of Environmental Quality (ADEQ) at 800-234-5677 for reportable discharges of petroleum.

7.1.3 Verbal Notifications to Federal Agencies

The National Response Center (NRC) will be verbally notified following a discharge of oil ***of any quantity*** that meets ***any*** of the following conditions:

- Violates applicable water quality standards,
- Causes a film or sheen upon or discoloration of the surface of navigable waters. (e.g., a wash, creek, or stream) or adjoining shorelines, or
- Causes a sludge or emulsion to be deposited beneath the surface of navigable waters or upon adjoining shorelines.

Notifications are to be made as soon as possible.

The telephone number for NRC notifications is 1-800-424-8802.

Refer to the internal notification requirements outlined in Appendix E prior to any release notifications to the NRC.

7.2 Information to Provide During Verbal Notifications

When notifying a government agency of a release, the following information should be gathered as soon as possible and provided:

1. Name and location of the site.
2. Specific location where the oil discharge occurred.
3. Your name, position, and telephone number.
4. Date and time of the oil discharge.
5. Information on the oil discharge:
 - Type of material discharged (e.g., diesel fuel);

- Source of discharge (e.g., aboveground storage tank);
 - Estimated total quantity discharged, including the estimated total quantity of oil discharged to navigable waters or adjoining shorelines;
 - Cause of discharge;
 - Affected media (e.g., soil, surface water);
 - Damages or injuries caused by the discharge;
 - Response actions being used to stop, contain, or clean-up the discharge;
 - Whether the discharge has been stopped; and
 - Whether an evacuation may be needed.
6. Names of other individuals or agencies that were contacted.

Record the following information when making a notification:

- Name and position of person contacted.
- Agency contacted.
- Date and time of notification.
- Information provided to agency.

7.3 Written Notifications to Government Agencies

In addition to verbal notifications, written follow-up reports may need to be submitted to State and Federal agencies.

7.3.1 Written Notifications to State Agencies

Refer to written notifications to Federal agencies in Section 7.3.2 below.

7.3.2 Written Notifications to Federal Agencies

A spill report will be submitted to the U.S. Environmental Protection Agency (EPA) Region VI Administrator if either of the following conditions are met:

- A single discharge of more than 1,000 gallons of oil which could reasonably be expected to discharge into or upon ***navigable waters or adjoining shorelines*** in a single event.
- A discharge of more than 42 gallons of oil in each of two events within any 12 month period which could reasonably be expected to discharge into or upon ***navigable waters or adjoining shorelines***.

The spill report to the U.S. EPA must be submitted ***within 60 days of the release*** and contain the following information:

- Name of the site.
- Name of the owner/operator of the site.
- Location of the site.

- Maximum storage or handling capacity of the site and normal daily throughput.
- Corrective actions and countermeasures taken, including a description of equipment repairs and replacements.
- An adequate description of the site, including maps, flow diagrams, and topographic maps, as necessary.
- The cause of the discharge, including a failure analysis of the system or subsystem in which the failure occurred.
- Additional preventive measures taken or contemplated to minimize the possibility of recurrence.
- Such other information as the U.S. EPA Regional Administrator may reasonably require pertinent to the SPCC Plan or discharge.

A copy of the above information also must be submitted to ADEQ in accordance with 40 CFR 112.4(c).

7.4 Incident Termination

Once a release has been contained and cleaned-up, and any required verbal notifications have been made, the SPCC Plan Coordinator will take the following actions:

1. If the spill was a reportable release, complete the spill report form in Appendix F and file it with the SPCC Plan in the environmental files (General Office).
2. Verify that spill kits have been re-stocked.
3. Verify that the used oil is properly containerized, labeled, and stored for disposal.
4. Review the cause of and response to the release with supervisors, witnesses, and contractors, if appropriate. Determine additional requirements necessary to prevent recurrence of the incident. Amend the SPCC Plan if necessary (refer to Section 4.0).

8.0 EVALUATION OF DISCHARGE POTENTIAL [40 CFR 112.7(b)&(c)]

8.1 Potential Discharge Volumes [40 CFR 112.7(b)]

For potential releases due to containment failure, it will be conservatively assumed that the worst case scenario would result in the entire contents of a container being released within one hour. Container contents, volumes, secondary containment systems, as well as the resultant flow direction, will be listed in Appendix C-2.

8.2 Direction of Flow [40 CFR 112.7(b)]

The project area consists of widely spaced drill pads and associated roads. Drainages occurring in the proximity of proposed activities include Rawhide Canyon, Oak Creek Canyon, Cross Canyon, Devils Canyon, Queen Creek, and other unnamed drainages. As the project undergoes National Environmental Policy Act review with the Forest Service and the location of drill pads and access road disturbance areas are confirmed, detailed information regarding topography, drainage and receiving waters will be provided.

8.3 Discharge Containment [40 CFR 112.7(c)]

Methods of secondary containment at this site include a combination of control structures, land-based spill response equipment, and backup containment areas to prevent petroleum from reaching navigable waters.

8.3.1 Containment and Diversionary Structures

Secondary containment and diversionary structures for the pre-feasibility activities include:

- Engineered secondary containment structures
- Double walled tanks
- Earthen berms (high fines content; sufficiently impervious to oil)
- Culverts/drainage trenches
- Spill pallets

Containment and diversionary structures which will be associated with each bulk oil storage vessel planned for the pre-feasibility activities will be presented in Appendix C-1.

8.3.2 Spill Response Equipment

Spill response equipment which will be available for the pre-feasibility activities includes:

- 55-gallon steel drums
- Sorbent pads
- Sorbent socks
- Sorbent granular materials
- Sorbent diapers
- Heavy equipment (e.g., backhoes, front-end loaders, etc) for temporary berm construction.

Spill kits will be located throughout the site to contain or clean-up releases from portable containers. Once all locations are selected, the SPCC figures will be updated with all the locations of spill kits.

Due to the potential for discharges during tank truck loading and unloading operations, Resolution has established minimum “active” containment measures or procedures for petroleum transfer operations. These operations are outlined in Appendix I. The procedures will also be posted at each loading/unloading area. The procedures were developed to safeguard against potential discharges associated with poor connections, overfilling, and premature departure. Fuel delivery training will be provided to all drivers to ensure that drivers understand the site layout and know the protocol for entering the site and unloading the product.

Delivery drivers will be required to visually inspect all drains, outlets, and valves for leaks prior to filling and departing the loading/unloading areas. Should there be a spill, appropriate equipment will be available at the site to dike and absorb the spill.

8.4 Practicability of Secondary Containment [40 CFR 112.7(d)]

Resolution management has determined that secondary containment will be practicable at this site and will implement appropriate secondary containment as needed.

8.5 Alternative Requirements to General Secondary Containment for Qualified Oil-Filled Equipment [40 CFR 112.7(k)]

This section does not apply to the Resolution pre-feasibility Activities. Oil-filled equipment (e.g., transformers) will meet the general secondary containment requirements of §§112.7(c).

9.0 INSPECTIONS, TESTS, AND RECORDS [40 CFR 112.7(e)]

9.1 Inspection Frequency

External visual inspections of oil storage containers, associated piping and valves, spill kits, and general housekeeping will be conducted on a variable schedule. The inspection schedule considers the potential for a release from a bulk storage container to reach navigable waters and the frequency of bulk storage container usage. The planned storage container inspection frequency for the pre-feasibility activities is described in the following sections.

9.1.1 Daily Inspections

Resolution or contractor employees will perform daily inspections of their work area on each shift, if operational. This daily visual inspection includes:

- Tank/piping damage or leakage
- Stained or discolored soils
- Excessive accumulation of water or solution in containment areas

Currently Resolution or contractor employees are required to conduct daily inspections of drilling activities. It is anticipated that SPCC concerns will be added to this existing form to better document daily changes in equipment or bulk storage. This form will be included in the final SPCC as an attachment once it has been developed.

9.1.2 Quarterly Inspections

Bulk storage containers located within secondary containment structures will be visually inspected on a quarterly basis. Refer to Appendix G for the form.

9.1.3 Annual Inspections

Visual inspections will be performed on an annual basis for operational-use containers, which include oil-filled transformers. In addition, out-of-service tanks that have not been “permanently closed” will be inspected on an annual basis until permanent closure is complete and the containers are removed from the site’s inventory.

The inspection checklists are in Appendix G. If deficiencies in equipment or in procedures are discovered during the inspections, they will be recorded on the checklist and relayed to the appropriate manager. Signed and dated inspection checklists will be maintained with the SPCC Plan in the Environmental Office. The SPCC Plan Coordinator will be responsible for ensuring that deficiencies noted on the checklist are addressed and that corrective actions are noted.

9.2 Certified Inspections

An additional inspection of field-erected steel tanks with a storage capacity greater than 50,000 gallons, if one is required onsite, that could potentially discharge to navigable waters will be conducted by a certified inspector at intervals of 10 years, as specified in API 653. If the tank bottom thickness can be determined externally, an external inspection by a certified inspector may be used in lieu of the internal inspection. No containers in excess of 50,000-gallon capacity are anticipated for the pre-feasibility activities.

9.3 Recordkeeping

Inspection records and other documentation related to oil release prevention, such as training records, corrective actions, spill reports, and maintenance records will be maintained with the SPCC Plan in the Environmental Office. The SPCC Plan Coordinator will be responsible for ensuring that records are properly filed and retained for at least three years.

10.0 EMPLOYEE TRAINING [40 CFR 112.7(f)]

Resolution and contractor employees that will handle oil will be required to attend release prevention and response training prior to working in areas where petroleum products are stored or handled. The objective of the training program will be to reduce the likelihood and impact of oil releases.

10.1 SPCC Training

The SPCC training program for new employees and/or existing employees assigned to oil-handling duties includes the following:

- Overview of the SPCC Plan contents;
- Overview of applicable pollution control laws, rules, and regulations;
- Operation and maintenance of equipment to prevent discharges;
- General site operations;
- Review of oil management activities at the site;
- Spill response procedures;
- Release notification procedures; and
- Disposal procedures for spilled materials.

Training for fuel delivery drivers is anticipated to be provided during the initial Hazard Recognition training. The training will focus on loading and unloading operations, spill response procedures, and emergency notification procedures. If fuel delivery drivers do not participate in the training, then they must be accompanied by a trained Resolution or contractor's employee during the fuel loading/unloading activities.

10.2 Discharge Prevention Briefings

At least once a year, oil-handling employees will be briefed on any known discharges that have occurred at the site over the past year as well as a review of any failures, malfunctioning components, or recently developed precautionary measures.

On-the-job discharge prevention briefings will also be provided to site personnel handling petroleum whenever there is a change in equipment or procedures relating to any element of this SPCC Plan.

10.3 Training Records

Attendance at SPCC training classes and discharge prevention briefings will be recorded on the SPCC training attendance forms in Appendix H and maintained with this SPCC Plan for a period of three years. Training records will be maintained with the SPCC Plan in the Environmental Office.

11.0 SECURITY [40 CFR 112.7(g)]

11.1 Fencing

The pre-feasibility activities will occur largely on rarely used existing and planned dirt access roads. Unauthorized access to the proposed drill sites where SPCC related materials will be stored will be restricted by Resolution or contractors employees who will be working 24-hours a day seven days a week. Additionally, the contractor's yards are located on the Resolution East Plant Site, which is monitored at all times by security personnel.

11.2 Valves

Master flow, drain and any other valves that would permit flow of oil out of a bulk storage container will be kept locked in the closed position when in a non-operating, non-standby mode. All outward flow control valves associated with bulk storage containers will be within a secure area (i.e., restricted public access) and will be accessible only by authorized personnel.

11.3 Starter Controls

Oil storage tanks and pumps equipped with starter controls will be kept locked when not in use. Pumps equipped with electric motor drives will be within a secure area (i.e., restricted public access) and will be accessible only by authorized personnel.

11.4 Pipeline Connections

Pipeline connections will be securely capped when they are not in use and when they are in standby service for an extended period of time. All out-of-service pipelines will be evacuated of their contents and capped.

11.5 Lighting

Adequate lighting will be present at the contractor yards and at each drill site.

12.0 LOADING AND UNLOADING RACKS [40 CFR 112.7(h)]

There will be no loading/unloading racks associated with the pre-feasibility activities. The November 28, 2005 USEPA “*SPCC Guidance for Regional Inspectors*” states that “[l]oading/unloading areas utilizing a single hose and connection or standpipe are not considered ‘racks.’”

Due to the potential for discharges during tank truck loading and unloading operations, Resolution has established minimum procedures for petroleum transfer operations. These operations are outlined in Appendix I and discussed in Section 8.3.2 (Spill Response Equipment) and Section 18 (site Transfer Operations). The procedures were developed to safeguard against potential discharges associated with poor connections, overfilling, and premature departure.

Delivery drivers will be required to deliver during daylight work hours and visually inspect all drains, outlets, and valves for leaks prior to filling and departing the loading/unloading areas. Should there be a spill, appropriate equipment is available at the site to dike and absorb the spill.

13.0 BRITTLE FRACTURE EVALUATION [40 CFR 112.7(i)]

Brittle fracture evaluation will be performed on field-erected aboveground containers undergoing repair, alteration, reconstruction or a change-in-service that might affect the risk of failure prior to being returned to service. Field-erected tanks are not anticipated for the pre-feasibility activities.

14.0 CONFORMANCE WITH REGULATIONS [40 CFR 112.7(j)]

14.1 State Regulations

There are no anticipated applicable more stringent State rules, regulations or guidelines.

15.0 SITE DRAINAGE [40 CFR 112.8(b)]

Most bulk storage containers will be stored within an engineered secondary containment structure. Any that are not will be stored either within a contractor's yard or within a bermed containment at the drill sites to prevent discharge offsite.

Rainwater that collects in secondary containment areas will typically be allowed to evaporate. Most secondary containment areas do not have valves, piping, or other outlets. If secondary containments are installed for the pre-feasibility activities that have outlets, they will be manually released if necessary.

If rainwater accumulation within a secondary containment area is excessive, the accumulated rainwater in will be inspected, prior to evacuation, to ensure no oil will be discharged offsite. The procedures for rainwater discharge from secondary containment areas are summarized in Section 16.3.

16.0 BULK STORAGE CONTAINERS [40 CFR 112.8(c)]

16.1 Material of Construction [40 CFR 112.8(c)(1)]

The design and construction of all bulk storage containers at the site will be compatible with the characteristics of the oil product they contain, and with temperature and pressure conditions.

16.2 Secondary Containment [40 CFR 112.8(c)(2)]

Bulk storage containers will be provided with secondary containment designed to hold the entire contents of the largest container with sufficient freeboard to contain the rainfall from a 25-year, 24-hour storm event. Secondary containment features plastic containment pallets, double walled tanks, engineered metal structures, and earthen berms (lined and unlined). The earthen bermed areas will be constructed of native soils with a plastic (HDPE) liner and would retain an oil discharge long enough to allow for spill response and cleanup. Secondary containment systems are listed in Appendix C-2 for bulk storage containers.

As previously noted, most bulk storage containers will be located in areas where a breach in the secondary containment would result in a release to the open pit or engineered stormwater collection ponds in Section House Canyon (as indicated in the tables in Appendix C-2).

16.3 Rainwater Discharge from Diked Areas [40 CFR 112.8(c)(3)]

Rainwater that collects in containment areas will typically be allowed to evaporate. If rainwater accumulation is excessive, uncontaminated rainwater will be pumped out onto the ground. Prior to discharge, the SPCC Plan Coordinator will be notified and the rainwater will be visually observed for sheen, discoloration, and any sludge or oil. If rainwater will be discharged to a storm drain, open watercourse, lake or pond, these observations are to be recorded on the form in Appendix J. Completed records will be maintained with the SPCC Plan in the General Office. Any discharges of uncontaminated rainwater to the storm sewer system must comply with all applicable National Pollutant Discharge Elimination System (NPDES) permitting requirements.

If the water has a sheen or other signs of contamination, it will be pumped into drums for disposal off site or the oil will be removed using an absorbent prior to discharge.

16.4 Completely Buried Metallic Storage Tanks [40 CFR 112.8(c)(4)]

There will be no completely buried metallic storage tanks at the site.

16.5 Partially Buried Metallic Storage Tanks [40 CFR 112.8(c)(5)]

There will be no partially buried metallic storage tanks at the site.

16.6 Integrity Testing [40 CFR 112.8(c)(6)]

In addition to the visual inspections described in Section 9.0, bulk storage containers will be regularly tested for integrity in accordance with the schedule outlined in Section 16.6.1, Integrity testing will also be performed when material repairs are made to bulk storage containers. The SPCC Plan Coordinator must be notified whenever material repairs to bulk storage containers are complete. The purpose of integrity testing is to detect cracks, leaks, corrosion, or wall thinning to ensure sufficient structural strength. Integrity testing is accomplished through ultrasonic thickness tests,

acoustic emission tests, or another type of non-destructive shell testing. Should the results of an integrity test indicate a significant reduction in structural strength; the container will be repaired or removed from service.

16.6.1 Integrity Testing Guidelines

Integrity testing will be performed by qualified outside contractors. Integrity testing for bulk storage containers with a capacity greater than 50,000 gallons shall follow guidelines established by the American Petroleum Institute (API) in Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction. There are no bulk storage containers with a capacity in excess of 50,000 gallons anticipated for the pre-feasibility activities. Integrity testing of bulk storage tanks with a capacity less than 50,000 gallons shall follow the guidelines established by the Steel Tank Institute (STI) Standard SP001 Standard for the Inspection of Aboveground Storage Tanks. Records of integrity tests will be maintained in the environmental files located in the General Office until the subsequent test is performed, but not for less than three years.

16.6.2 Integrity Testing Exclusions

Integrity testing is not required for operational use containers, such as oil-filled transformers. Operational use containers will be visually inspected in accordance with Section 9.0.

Environmental equivalence guidelines can be implemented in lieu of integrity testing for some bulk storage containers at the site. Environmental equivalence guidelines are discussed in the next section.

16.6.3 Environmental Equivalence

The following guidelines will be used by Resolution to determine which containers satisfy the integrity testing requirement through environmental equivalence:

- Drums and totes - Drums and totes are not subject to integrity testing if the following measures are implemented to provide environmental equivalence.

Environmental equivalence measures for multi-use drums and totes (i.e., containers that are refilled/reused; not intended for single-use) management may include:

- Perform visual inspections of multi-use drums and totes monthly.
- Elevate multi-use totes so that all sides can be visually inspected.
- Replace the multi-use drums and totes within 10 years of use, or sooner if they are not in good condition or have been damaged.

Environmental equivalence measures for single-use drums and totes management may include:

- Perform visual inspections of single-use drums and totes during the regular site inspections outlined in this draft SPCC plan.
- Elevate single-use drums and totes (using pallets or other support structures).

- Elevated tanks - Integrity testing will not be performed on tanks that are elevated high enough off the ground to allow visual inspection of all sides. To provide environmental equivalence, these tanks will have secondary containment and will be visually inspected for leaks and signs of corrosion on a monthly basis. The visual inspection includes observation of the bottom of the tank. Tanks with a capacity of more than 30,000 gallons will undergo integrity testing regardless of whether they are elevated.
- Tanks with capacities less than 5,000 gallons - The STI Standard SP001, 4th Edition, classifies shop-built aboveground storage tanks (ASTs) with a secondary containment dike/berm as a Category 1 AST (Table 5.4, Example Tank Configuration and AST Category, Standard SP001). Category 1 ASTs with capacities less than or equal to 5,000 gallons only require periodic inspection (Table 5.5, Table of Inspection Schedules, Standard SP001). The guidance does not recommend formal external/internal inspections (which include integrity testing) by certified inspectors or leak testing for Category 1 ASTs.

16.6.4 Integrity Testing Schedule

Integrity testing will be performed when reasonable suspicion of structural integrity is raised by deficiencies identified during inspections, by maintenance records, or by age or design life. At minimum, bulk storage containers that are not exempt from integrity testing requirements as described in the previous sections above will be tested every 10 years.

16.7 Heating Coils [40 CFR 112.8(c)(7)]

There are no internal heating coils in storage tanks anticipated for the pre-feasibility activities.

16.8 Discharge Warning Devices [40 CFR 112.8(c)(8)]

Bulk storage tanks at this site will be equipped with overfill warning devices, such as vision gauges, warning lights, and/or audible alarms. Electronic liquid level sensing devices (e.g., float switches, ultrasonic sensors, etc.) will be tested during the routine inspections for proper operation. Any deficiencies noted during the testing will be recorded on the inspection checklist. Dip sticks are not considered to provide adequate overfill warning.

16.9 Effluent Treatment Facilities [40 CFR 112.8(c)(9)]

There are no effluent treatment facilities anticipated for the pre-feasibility activities.

16.10 Visible Discharges [40 CFR 112.8(c)(10)]

Visible discharges of oil from any container or appurtenance, including seams, gaskets, piping, pumps, valves, rivets, and bolts, will be noted during inspections so that repairs can be promptly made. Additionally, any accumulation of oil will be removed from diked areas and managed by properly trained Resolution employees following the procedures listed in Section 6.0. The SPCC Plan Coordinator will be notified of petroleum discharges, as necessary, according to the release response procedures.

17.0 PORTABLE OIL STORAGE CONTAINERS [40 CFR 112.8(c)(11)]

Mobile tanks and service vehicles will be used at this site; a complete list will be provided in Appendix C-2. The mobile tanks and service vehicles will typically be stationed in the contractor's yards, but will travel throughout the site as needed. When not in use, these portable containers will be parked in locations where a discharge would be contained by lined, earthen berms in the contractor's yards. These secondary containment structures will be sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. The normal parking locations are also listed in Appendix C.

To help prevent discharges, portable containers will be regularly inspected (refer to Section 9.0), employees will be required to attend annual training (refer to Section 10.0), and specific procedures must be followed during loading and unloading (refer to Section 12.0). Additionally, spill kits will be located throughout the site to contain or clean-up releases from portable containers.

18.0 SITE TRANSFER OPERATIONS [40 CFR 112.8(d)]

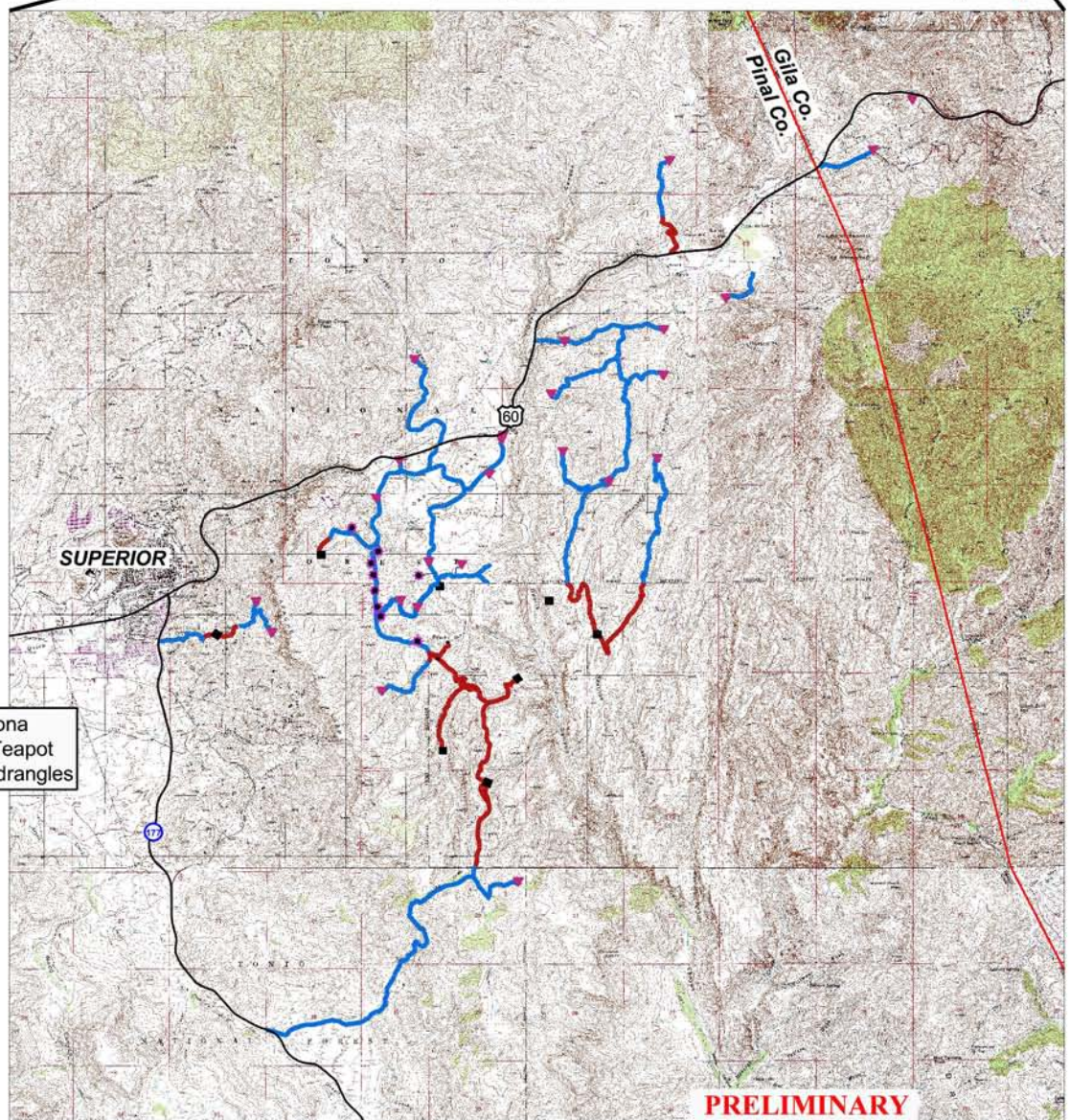
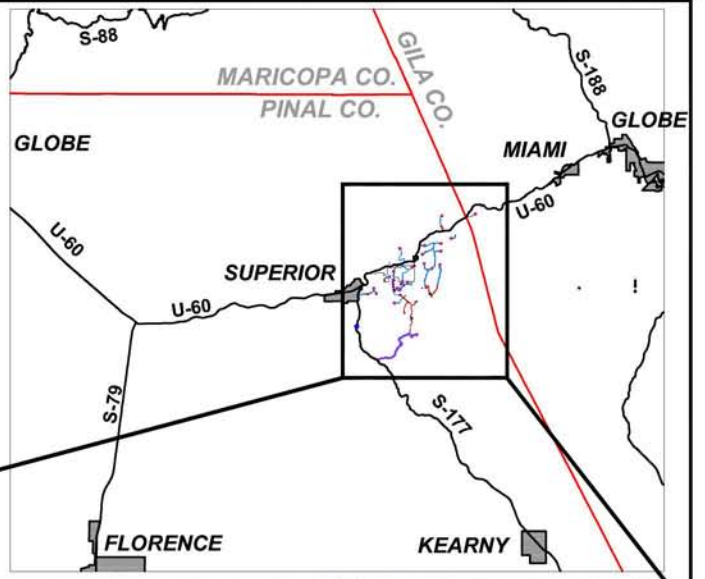
Buried oil piping is not anticipated to be used for the pre-feasibility activities. Oil and oil product transfer lines that are not in service or are on standby for an extended period of time will be capped or blank-flanged and marked as to their origin.

Aboveground piping and valves will be visually inspected as described in Section 9.0 at the same frequency as the tanks to which they are connected. Inspection checklists are provided in Appendix G for this purpose. During such inspections, the general conditions of items such as flange joints expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces will be noted. Inspection records will be maintained with the SPCC Plan in the Environmental Office.

In addition to external visual inspections, employees will be trained to look for potential oil-related problems on a day-to-day basis in their respective work areas and to report these to their supervisor or the SSO. Examples of potential problems include aboveground pipes that are continually submerged in water or in contact with soil.

Resolution employees and contractors accessing oil storage locations in a vehicle will be notified to proceed with caution so as to not endanger aboveground oil piping and other oil transfer operations. Appropriate precautions are also discussed in the training provided to delivery drivers (refer to Section 10.0).

FIGURES



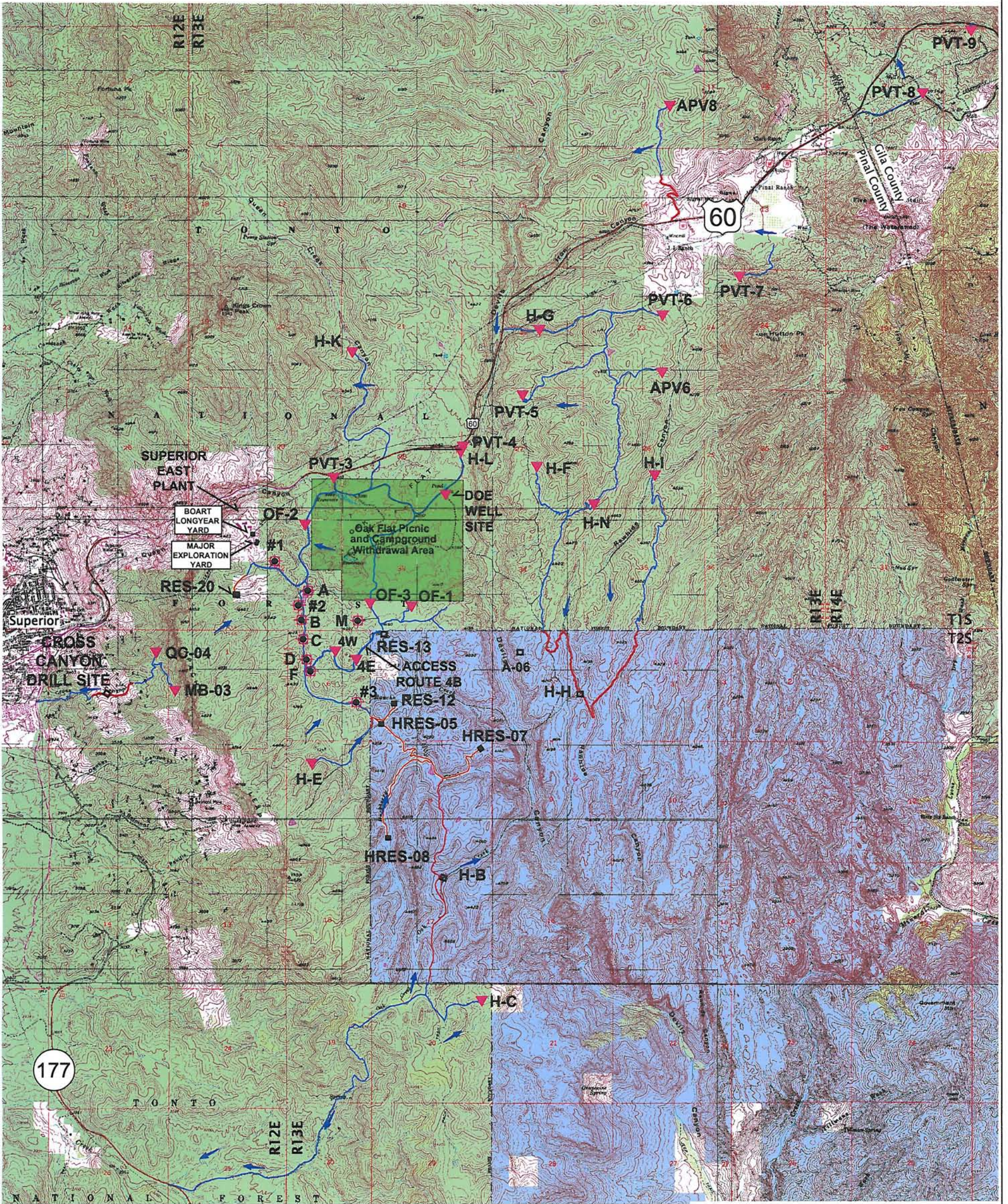
**PRELIMINARY
RESOLUTION
PRE-FEASIBILITY ACTIVITIES**

General Location Map
Spill Prevention Control & Countermeasure

Figure 1

0 5000' 10000'
APPROX. SCALE: 1" = 10000 feet

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LEGEND

- Forest System and User-created Roads Utilized for Pre-feasibility Activities
- Roadway Improvements on State Trust & Private Lands
- Completed State Trust Land Roadway Improvements
- Completed Drill Site on State Trust or Private Lands
- Drill Site
- Drill Site on State Trust or Private Lands
- Previously Approved Drill Site
- Direction of Flow
- Oak Flat Picnic and Campground Withdrawal Area
- Tonto National Forest Land
- State Trust Land
- Private Land



0' 2200' 4400'

**PRELIMINARY
RESOLUTION
PRE-FEASIBILITY ACTIVITIES**

Drill Site & Roadway Locations
Spill Prevention Control & Countermeasure
Figure 2

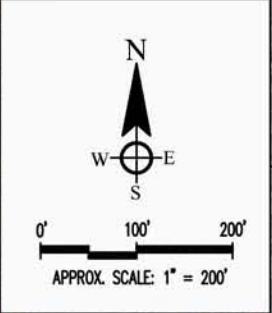
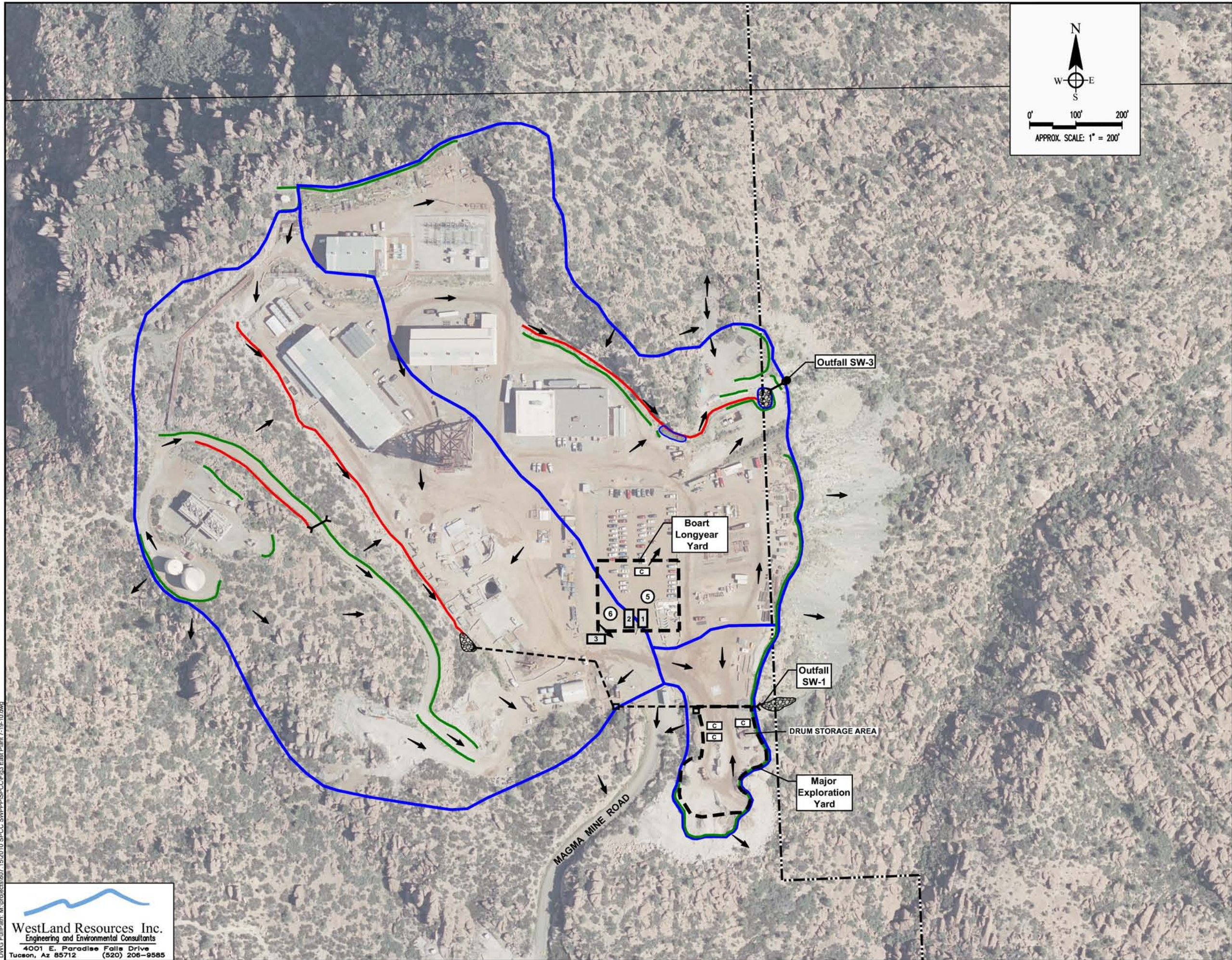


Photo Number	Tank ID	Materials Stored	Maximum Capacity
1	No ID; Green Diesel	Diesel	9,000 gallons
2	No ID	Diesel	2,200 gallons
3	LP194	Diesel; various petroleum products	240 gallons Diesel; other products less than 55-gallons
4	LP185	Diesel; various petroleum products	240 gallons Diesel; other products less than 55-gallons
5	LGD7 Accumulator	Diesel	100 gallons
6	No ID; Ingersoll-Rand 1170 Generator	Diesel	260 gallons

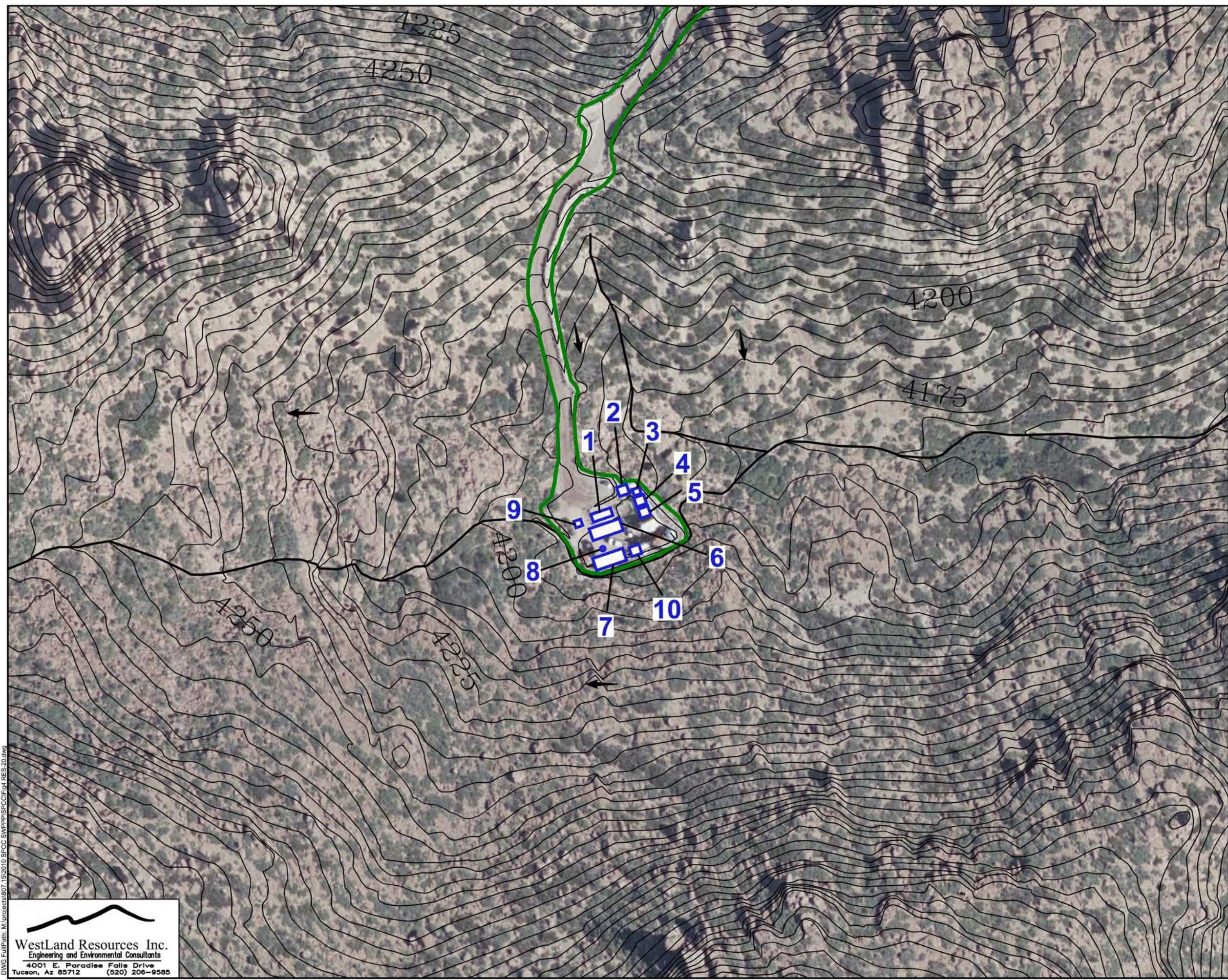
T.1S., R.13E., Portion of Section 32
Pinal County, Arizona
Photo Source: Cooper Aerials, 2008

- Channel
- Berm
- Basin Boundary
- Sediment Pond
- Rip Rap
- Property Boundary
- Direction of Flow
- Culvert
- Underground Pipeline
- Conex
- Tank
- Storage Area

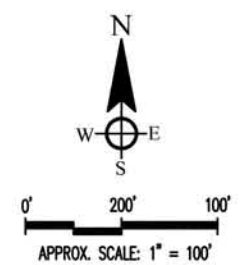
**PRELIMINARY
RESOLUTION
PRE-FEASIBILITY ACTIVITIES**

Contractors Storage Yards
Spill Prevention Control & Countermeasure
Figure 3

D:\WG_FullPath_M\Projects\807_152010_SPCO_SWPPP\SPCCE\Fig3_East Plant 7-19-10.dwg



- WestLand Notes**
- There are no drywells known onsite.
 - There are no offsite materials or waste storage or borrow areas used solely by this project other than the laydown yards at the Resolution East Plant Site as noted on Figure 2.
 - There are no wetlands located onsite.
 - Placement of structural practices in floodplains shall be avoided to the degree attainable.
 - Keep soil cast off away from washes or channels to the degree attainable.
 - No concrete washout areas will be used for the road construction or drill pad construction activities.
 - All uncontaminated water discharges will be directed through BMP's such as rock berms or settling areas to reduce pollutant migration.
 - Any soil stockpiles required will be protected by correctly installed straw wattles or other effective BMP if left overnight.



Pinal County, Arizona
Photo Source: Cooper Aerials, 2008

- Berm\Disturbance Limits
- ← Direction of Flow

1. Parts Trailer (with spill kit)
2. Mud Pit
3. Generator
4. Mud Mixer
5. Water Tank
6. Drill Rig
7. Petroleum Storage Area (with absorbant material)
8. Vehical & Equipment Parking
9. Light Plant
10. Port-o-let

**PRELIMINARY
RESOLUTION
PRE-FEASIBILITY ACTIVITIES**

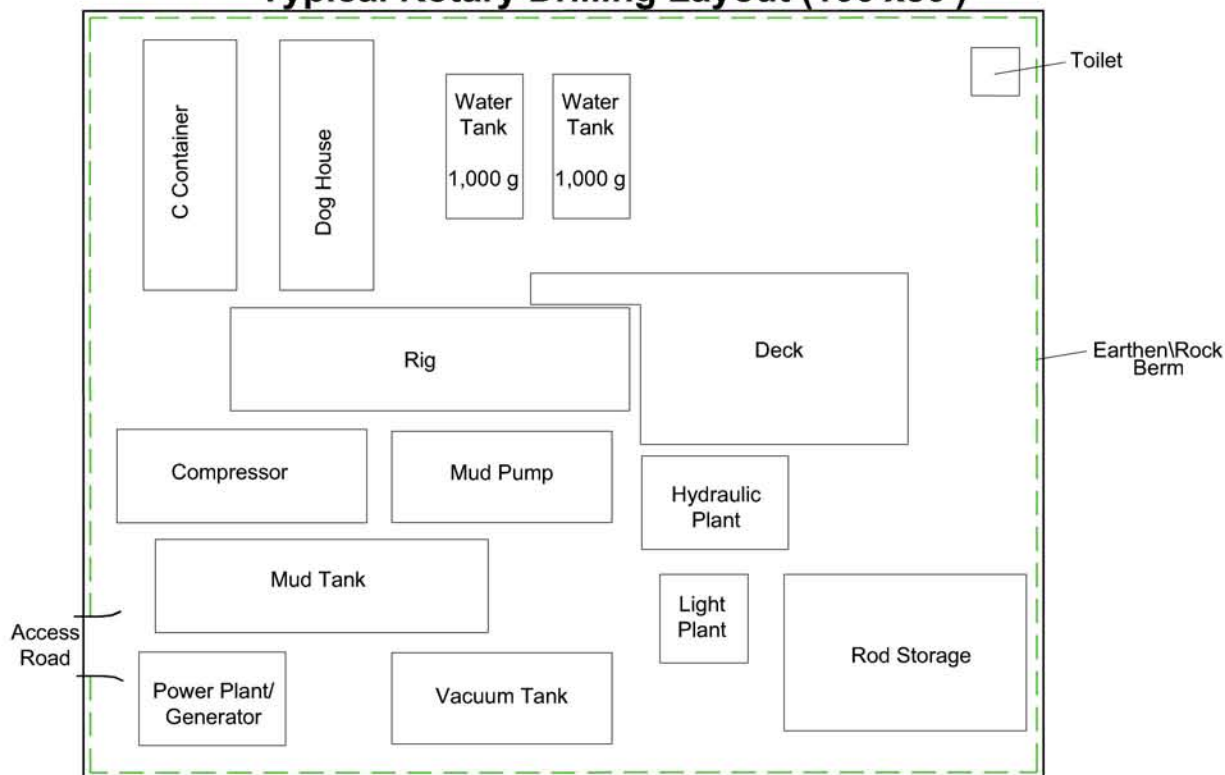
RES-20 Typical Drill Site Plan
Spill Prevention Control & Countermeasure
Figure 4

DWG File Path: M:\projects\152010 SPCC SWPPP\SPCC\Fig4 RES-20.dwg

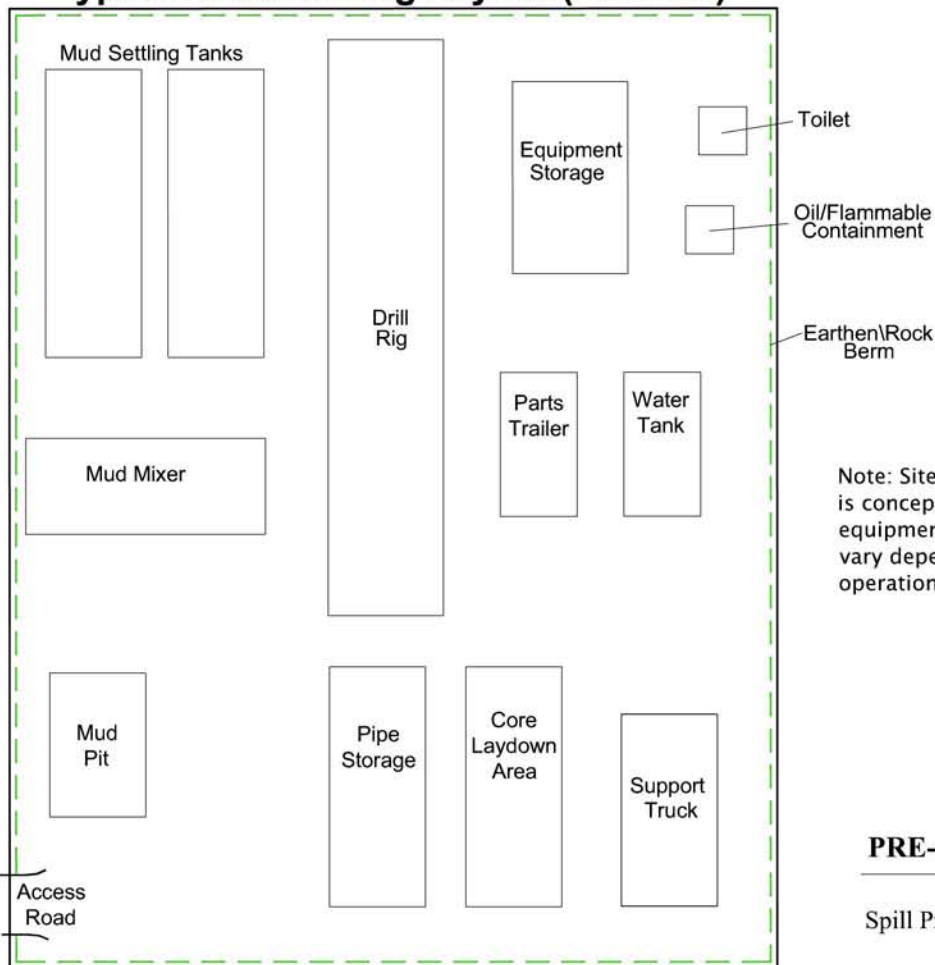


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Typical Rotary Drilling Layout (100'x80')



Typical Core Drilling Layout (80'x100')



Note: Site configuration and equipment layout is conceptual. The actual site configuration and equipment layout used at each drill site will vary depending on site specific constraints and operational considerations.

PRELIMINARY RESOLUTION PRE-FEASIBILITY ACTIVITIES

Conceptual Drill Site Layout
Spill Prevention Control & Countermeasure

Figure 5

APPENDIX A

REGULATORY REQUIREMENT CROSS-REFERENCE TABLE

Appendix A SPCC Regulation Cross-Reference Table
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Requirement	SPCC Reference Section	SPCC Page No.	NA
<p><u>§ 112.3 Requirement to prepare and implement a Spill Prevention, Control, and Countermeasure Plan.</u></p> <p>(a) If your onshore or offshore facility was in operation on or before August 16, 2002, you must maintain your Plan, but must amend it, if necessary to ensure compliance with this part, on or before October 31, 2007, and must implement the amended Plan as soon as possible, but not later than October 31, 2007.</p>			X
<p>(a) If your onshore or offshore facility becomes operational after August 16, 2002, through October 31, 2007, and could reasonably be expected to have a harmful discharge to a navigable water, you must prepare and implement a Plan on or before October 31, 2007.</p>			X
<p>(b) If you are the owner or operator of an onshore or offshore facility that becomes operational after October 31, 2007, and could reasonably be expected to have a harmful discharge to a navigable water, you must prepare and implement a Plan before you begin operations.</p>	Section 1	1	
<p>(c) If you are the owner or operator of an onshore or offshore mobile facility, you must prepare, implement, and maintain a facility Plan as required by this section.</p>			X
<p>(d) A licensed Professional Engineer must review and certify a Plan for it to be effective to satisfy the requirements of this part.</p>	Section 2.3	2	
<p>(e) If you are the owner or operator of a facility for which a Plan is required under this section, you must:</p> <p>(1) Maintain a complete copy of the Plan at the facility if the facility is normally attended at least four hours per day, or at the nearest field office if the facility is not so attended, and</p> <p>(2) Have the Plan available to the Regional Administrator for on-site review during normal working hours.</p>	Section 4.1	5	
<p>(f) Extension of time.</p> <p>(1) The Regional Administrator may authorize an extension of time for the preparation and full implementation of a Plan, or any amendment thereto.</p> <p>(2) If you are an owner or operator seeking an extension of time under paragraph (f)(1) of this section, you may submit a written extension request to the Regional Administrator.</p>			X
<p>(g) Qualified Facilities. The owner or operator of a qualified facility as defined in this subparagraph may self-certify his or her facility's Plan, as provided in §112.6. A qualified facility is one that:</p> <p>(1) Has an aggregate aboveground storage capacity of 10,000 gallons or less; and</p> <p>(2) Has had no single discharge as described in §112.1(b) exceeding 1,000 U.S. gallons or no two discharges as described in §112.1(b) each exceeding 42 U.S. gallons within any twelve month period in the three years prior to the SPCC Plan self-certification date, or since becoming subject to this part if the facility has been in operation for less than three years (other than discharges as described in §112.1(b) that are the result of natural disasters, acts of war, or terrorism).</p>			X

Appendix A SPCC Regulation Cross-Reference Table
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Requirement	SPCC Reference Section	SPCC Page No.	NA
<p><u>§ 112.4 Amendment of Spill Prevention, Control, and Countermeasure Plan by Regional Administrator.</u></p> <p>(a) Notwithstanding compliance with § 112.3, whenever your facility has discharged more than 1,000 U.S. gallons of oil in a single discharge as described in § 112.1(b), or discharged more than 42 U.S. gallons of oil in each of two discharges as described in § 112.1(b), occurring within any twelve month period, submit the following information to the Regional Administrator within 60 days from the time the facility becomes subject to this section:</p> <p>(1) Name of the facility;</p> <p>(2) Your name;</p> <p>(3) Location of the facility;</p> <p>(4) Maximum storage or handling capacity of the facility and normal daily throughput;</p> <p>(5) Corrective action and countermeasures you have taken, including a description of equipment repairs and replacements;</p> <p>(6) An adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary;</p> <p>(7) The cause of such discharge as described in § 112.1(b), including a failure analysis of the system or subsystem in which the failure occurred;</p> <p>(8) Additional preventive measures you have taken or contemplated to minimize the possibility of recurrence; and</p> <p>(9) Such other information as the Regional Administrator may reasonably require.</p>	Section 7.3.2	14	
(c) Send to the appropriate agency or agencies in charge of oil pollution control activities in the State in which the facility is located a complete copy of all information you provided to the Regional Administrator.	Section 7.3.2	14	
(d & e) Regional Administrator requirements for SPCC Plan amendment.			X
(f) Appeal of amendment by facility.			X
<p><u>§ 112.5 Amendment of Spill Prevention, Control, and Countermeasure Plan by owners or operators.</u></p> <p>(a) Amend the SPCC Plan for your facility when there is a change in the facility design, construction, operation, or maintenance that materially affects its potential for a discharge.</p>	Section 4.2.1	5	
(b) Complete a review and evaluation of the SPCC Plan at least once every five years. As a result of this review and evaluation, you must amend your SPCC Plan within six months of the review.	Section 4.2.3	6	
(c) Have a Professional Engineer certify any technical amendment to your Plan.	Sections 4.2.1 and 4.2.3	5 and 6	
<p><u>§ 112.6 Qualified Facility Plan Requirements.</u></p> <p>(a) Preparation and Self-certification of Plan. If you are the owner or operator of a facility that meets the qualified facility qualification criteria in §112.3(g), you may choose to self-certify your Plan.</p>			X

Appendix A SPCC Regulation Cross-Reference Table
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Requirement	SPCC Reference Section	SPCC Page No.	NA
<u>§ 112.7 General requirements for Spill Prevention, Control, and Countermeasure Plans.</u>			
(First Paragraph:)			
- Full approval of management with authority to commit resources.	Section 2.1	2	
- Discuss additional facilities or procedures, methods, or equipment not yet fully operational.	Section 4.3	6	
- Plan follows sequence of '112.7, or is supplemented with a section cross-referencing the location of requirements.	Section 1.0 and Appendix A	1	
(a)			
(1) Include a discussion of your facility's conformance with the requirements listed in this part.	Section 1.0	1	
(2) Comply with all applicable requirements listed, or state the reasons for nonconformance in your Plan and describe in detail alternate methods and how you will achieve equivalent environmental protection.	Section 4.4	6	
(3) Describe in your Plan the physical layout of the facility and include a facility diagram, which must mark the location and contents of each container. You must also address in your Plan:	Section 5.0; Figures 3-5	8	
(i) The type of oil in each container and its storage capacity;	Section 5.2; Appendix C	9	
(ii) Discharge prevention measures including procedures for routine handling of products (loading, unloading, and facility transfers, etc.);	Section 5.3	9 and 10	
(iii) Discharge or drainage controls such as secondary containment around containers and other structures, equipment, and procedures for the control of a discharge;	Appendix C		
(iv) Countermeasures for discharge discovery, response, and cleanup (both the facility's capability and those that might be required of a contractor);	Section 6.0; Appendix E	11	
(v) Methods of disposal of recovered materials in accordance with applicable legal requirements;	Section 6.2	12	
(vi) Contact list and phone numbers for the facility response coordinator, National Response Center, cleanup contractors with whom you have an agreement for response, and all appropriate Federal, State, and local agencies who must be contacted in case of a discharge.	Section 7.0; Appendix D	13	
(4) Unless you have submitted a response plan under § 112.20, provide information and procedures in your Plan to enable a person reporting a discharge to relate the required information.	Section 7.2	13 and 14	
(5) Unless you have submitted a response plan under § 112.20, organize portions of the Plan describing procedures you will use when a discharge occurs in a way that will make them readily usable in an emergency, and include appropriate supporting material as appendices.	Section 6.0; Appendix E	11	
(b) Where experience indicates a reasonable potential for equipment failure, include in your Plan a prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of each type of major equipment failure.	Section 8.1; Section 8.2; Appendix C	16	

Appendix A SPCC Regulation Cross-Reference Table
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Requirement	SPCC Reference Section	SPCC Page No.	NA
(c) Provide appropriate containment and/or diversionary structures or equipment to prevent a discharge. At a minimum, you must use one of the following prevention systems or its equivalent: (1) For onshore facilities: (i) Dikes, berms, or retaining walls sufficiently impervious to contain oil; (ii) Curbing; (iii) Culverting, gutters, or other drainage systems; (iv) Weirs, booms, or other barriers; (v) Spill diversion ponds; (vi) Retention ponds; or (vii) Sorbent materials.	Section 8.5	17	
(2) For offshore facilities: (i) Curbing or drip pans; or (ii) Sumps and collection systems.			X
(d) If you determine that the installation of any of the structures or pieces of equipment to prevent a discharge is not practicable, you must clearly explain in your Plan why such measures are not practicable; for bulk storage containers, conduct both periodic integrity testing of the containers and periodic integrity and leak testing of the valves and piping; and, unless you have submitted a response plan under § 112.20, provide in your Plan the following:	Section 8.5	17	
(1) An oil spill contingency plan following the provisions of part 109 of this chapter.			X
(2) A written commitment of manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful.			X
(e) Conduct inspections and tests required by this part in accordance with written procedures that you or the certifying engineer develop for the facility. You must keep these written procedures and a record of the inspections and tests, signed by the appropriate supervisor or inspector, with the SPCC Plan for a period of three years.	Section 9.0; Appendix C	18	
(f) Personnel, training, and discharge prevention procedures.	Section 10.0	20	
(1) At a minimum, train your oil-handling personnel in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; applicable pollution control laws, rules, and regulations; general facility operations; and, the contents of the facility SPCC Plan	Section 10.0	20	
(2) Designate a person at each applicable facility who is accountable for discharge prevention and who reports to facility management.	Section 10.0	20	
(3) Schedule and conduct discharge prevention briefings for your oil-handling personnel at least once a year to assure adequate understanding of the SPCC Plan for that facility.	Section 10.0	20	
(g) Security (excluding oil production facilities).			
(1) Fully fence each facility handling, processing, or storing oil, and lock and/or guard entrance gates when the facility is not in production or is unattended.	Section 11.1	21	
(2) Ensure that the master flow and drain valves and any other valves permitting direct outward flow of the container's contents to the surface have adequate security measures so that they remain in the closed position when in non-operating or non-standby status.	Section 11.2	21	

Appendix A SPCC Regulation Cross-Reference Table
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Requirement	SPCC Reference Section	SPCC Page No.	NA
(3) Lock the starter control on each oil pump in the "off" position and locate it at a site accessible only to authorized personnel when the pump is in a non-operating or non-standby status.	Section 11.3	21	
(4) Securely cap or blank-flange the loading/unloading connections of oil pipelines or facility piping when not in service or when in standby service for an extended time. This security practice also applies to piping that is emptied of liquid content either by draining or by inert gas pressure.	Section 11.4	21	
(5) Provide facility lighting commensurate with the type and location of the facility that will assist in the: (i) Discovery of discharges occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel (the general public, local police, etc.); and (ii) Prevention of discharges occurring through acts of vandalism.	Section 11.5	21	
(h) Facility tank car and tank truck loading/unloading rack (excluding offshore facilities). (1) Where loading/unloading area drainage does not flow into a catchment basin or treatment facility designed to handle discharges, use a quick drainage system for tank car or tank truck loading and unloading areas. You must design any containment system to hold at least the maximum capacity of any single compartment of a tank car or tank truck loaded or unloaded at the facility.			X
(2) Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks, or vehicle break interlock system in loading/unloading areas to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.	Section 12.0; Appendix I	22	
(3) Prior to filling and departure of any tank car or tank truck, closely inspect for discharges the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.	Section 12.0; Appendix I	22	
(i) If a field-constructed aboveground container undergoes a repair, alteration, reconstruction, or a change in service that might affect the risk of a discharge or failure due to brittle fracture or other catastrophe, or has discharged oil or failed due to brittle fracture failure or other catastrophe, evaluate the container for risk of discharge or failure, and as necessary, take appropriate action.	Section 13.0	23	
(j) In addition to the minimal prevention standards listed under this section, include in your Plan a complete discussion of conformance with the applicable requirements and other effective discharge prevention and containment procedures listed in this part or any applicable more stringent State rules, regulations, and guidelines.	Section 14.0	24	
(k) Qualified Oil-filled Operational Equipment. The owner or operator of a facility with oil-filled operational equipment that meets the qualification criteria in paragraph (k)(1) of this sub-section may choose to implement for this qualified oil-filled operational equipment the alternate requirements as described in paragraph (k)(2) of this sub-section in lieu of general secondary containment required in paragraph (c) of this section.			X

Appendix A SPCC Regulation Cross-Reference Table
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Requirement	SPCC Reference Section	SPCC Page No.	NA
<p><u>§ 112.8 Spill Prevention, Control, and Countermeasure Plan requirements for onshore facilities (excluding production facilities).</u></p> <p>(a) Meet the general requirements for the Plan listed under § 112.7, and the specific discharge prevention and containment procedures listed in this section.</p> <p>(b) Facility drainage requirements.</p>	See individual requirements		
(1) Restrain drainage from diked storage areas by valves to prevent a discharge into the drainage system or facility effluent treatment system, except where facility systems are designed to control such discharge.	Section 15.0	25	
(2) Use valves of manual, open-and-closed design, for the drainage of diked areas.	Section 15.0	25	
(3) Design facility drainage systems from undiked areas with a potential for a discharge to flow into ponds, lagoons, or catchment basins designed to retain oil or return it to the facility.	Section 15.0	25	
(4) If facility drainage is not engineered as in paragraph (b)(3) of this section, equip the final discharge of all ditches inside the facility with a diversion system that would, in the event of an uncontrolled discharge, retain oil in the facility.			X
(5) Where drainage waters are treated in more than one treatment unit and such treatment is continuous, and pump transfer is needed, provide two "lift" pumps and permanently install at least one of the pumps.			X
(c) Bulk storage containers.			
(1) Not use a container for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature.	Section 16.1	26	
(2) Construct all bulk storage container installations so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. You must ensure that diked areas are sufficiently impervious to contain discharged oil. Dikes, containment curbs, and pits are commonly employed for this purpose. You may also use an alternative system consisting of a drainage trench enclosure that must be arranged so that any discharge will terminate and be safely confined in a facility catchment basin or holding pond.	Section 16.2	26	
<p>(3) Not allow drainage of uncontaminated rainwater from the diked area into a storm drain or discharge of an effluent into an open watercourse, lake, or pond, bypassing the facility treatment system unless you:</p> <p>(i) Normally keep the bypass valve sealed closed.</p> <p>(ii) Inspect the retained rainwater to ensure that its presence will not cause a discharge as described in § 112.1(b).</p> <p>(iii) Open the bypass valve and reseal it following drainage under responsible supervision; and</p> <p>(iv) Keep adequate records of such events, for example, any records required under permits issued in accordance with §§ 122.41(j)(2) and 122.41(m)(3) of this chapter.</p>	Section 16.3	26	

Appendix A SPCC Regulation Cross-Reference Table
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Requirement	SPCC Reference Section	SPCC Page No.	NA
(4) Protect any completely buried metallic storage tank installed on or after January 10, 1974 from corrosion by coatings or cathodic protection compatible with local soil conditions. You must regularly leak test such completely buried metallic storage tanks.	Section 16.4	26	
(5) Not use partially buried or bunkered metallic tanks for the storage of oil, unless you protect the buried section of the tank from corrosion. You must protect partially buried and bunkered tanks from corrosion by coatings or cathodic protection compatible with local soil conditions.	Section 16.5	26	
(6) Test each aboveground container for integrity on a regular schedule, and whenever you make material repairs. The frequency of and type of testing must take into account container size and design (such as floating roof, skid-mounted, elevated, or partially buried). You must combine visual inspection with another testing technique such as hydrostatic testing, radiographic testing, ultrasonic testing, acoustic emissions testing, or another system of non-destructive shell testing. You must keep comparison records and you must also inspect the container's supports and foundations. In addition, you must frequently inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas. Records of inspections and tests kept under usual and customary business practices will suffice for purposes of this paragraph.	Section 16.6; Appendix C	26 through 28	
(7) Control leakage through defective internal heating coils by monitoring the steam return and exhaust lines for contamination from internal heating coils that discharge into an open watercourse, or pass the steam return or exhaust lines through a settling tank, skimmer, or other separation or retention system.	Section 16.7	28	
(8) Engineer or update each container installation in accordance with good engineering practice to avoid discharges. You must provide at least one of the following devices: (i) High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. (ii) High liquid level pump cutoff devices set to stop flow at a predetermined container content level. (iii) Direct audible or code signal communication between the container gauger and the pumping station. (iv) A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. (v) You must regularly test liquid level sensing devices to ensure proper operation.	Section 16.8	28	
(9) Observe effluent treatment facilities frequently enough to detect possible system upsets that could cause a discharge as described in § 112.1(b).	Section 16.9	28	
(10) Promptly correct visible discharges which result in a loss of oil from the container, including but not limited to seams, gaskets, piping, pumps, valves, rivets, and bolts. You must promptly remove any accumulations of oil in diked areas.	Section 16.10	28	

Appendix A SPCC Regulation Cross-Reference Table
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Requirement	SPCC Reference Section	SPCC Page No.	NA
(11) Position or locate mobile or portable oil storage containers to prevent a discharge as described in § 112.1(b). You must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation.	Section 17.0	29	
(d) Facility transfer operations, pumping, and facility process. (1) Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage.	Section 18.0; Appendix I	30	
(2) Cap or blank-flange the terminal connection at the transfer point and mark it as to origin when piping is not in service or is in standby service for an extended time.	Section 18.0	30	
(3) Properly design pipe supports to minimize abrasion and corrosion and allow for expansion and contraction.	Section 18.0	30	
(4) Regularly inspect all aboveground valves, piping, and appurtenances. During the inspection you must assess the general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces. You must also conduct integrity and leak testing of buried piping at the time of installation, modification, construction, relocation, or replacement.	Section 18.0; Section 9.0; Appendix C	30 18	
(5) Warn all vehicles entering the facility to be sure that no vehicle will endanger aboveground piping or other oil transfer operations.	Section 18.0	30	

APPENDIX B

SPCC PLAN REVIEW LOG

Appendix B Plan Review Log
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Plan Reviews

Review Date	Reviewed by	Revision Required?	Signature / Date	Comments

By signing this review log, the SPCC Plan reviewer certifies that the following statement is true on the date that it is signed:

“I have completed review and evaluation of the SPCC Plan for the pre-feasibility activities on [INSERT DATE] and will (**will not**) amend the Plan as a result.”

Plan Revisions

Revision Date	Revision Scope	P.E. certification required?	Certifying Engineer	Licensing State and Registration No.

APPENDIX C

PRE-FEASIBILITY ACTIVITIES TANK LIST

Appendix C-1 Photo Log
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

Tank Name	Service vehicle ID LP185
Facility Area	Mobile; Boart Yard and at drill sites during service
Outfall	SW-3
Tank Contents	Various
MOC	Steel
Nominal Tank Capacity (gallons)	240 Diesel; various petroleum product containers less than 55-gallons
Type of Secondary Containment	Double walled
Approximate Secondary Containment Capacity (gallons)	



Appendix C-1 Photo Log
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

Tank Name	LGD7 Accumulator; mud pump
Facility Area	Mobile; Boart Yard and at drill sites during use
Outfall	SW-3
Tank Contents	Diesel
MOC	Steel
Nominal Tank Capacity (gallons)	100
Type of Secondary Containment	
Approximate Secondary Containment Capacity (gallons)	



Appendix C-1 Photo Log
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

Tank Name	No ID; Ingersoll-Rand 1170 portable generator
Facility Area	Mobile; Boart Yard and at drill sites during use
Outfall	SW-3
Tank Contents	Diesel
MOC	Steel
Nominal Tank Capacity (gallons)	260
Type of Secondary Containment	Double walled
Approximate Secondary Containment Capacity (gallons)	286



Appendix C-1 Photo Log
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

Tank Name	No ID; Green Diesel
Facility Area	Boart Yard
Outfall	SW-3
Tank Contents	Diesel
MOC	Steel
Nominal Tank Capacity (gallons)	9,000
Type of Secondary Containment	White containment structure
Approximate Secondary Containment Capacity (gallons)	12,600



Appendix C-1 Photo Log
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

Tank Name	No ID; Green Diesel
Facility Area	Boart Yard
Outfall	SW-3
Tank Contents	Diesel
MOC	Steel
Nominal Tank Capacity (gallons)	2,200
Type of Secondary Containment	White containment structure
Approximate Secondary Containment Capacity (gallons)	3,828



Appendix C-1 Photo Log
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

Tank Name	Service Vehicle ID LP194
Facility Area	Mobile; Boart Yard and at drill sites during service
Outfall	SW-3
Tank Contents	Various
MOC	Steel
Nominal Tank Capacity (gallons)	240 Diesel; various petroleum product containers less than 55-gallons
Type of Secondary Containment	Double walled
Approximate Secondary Containment Capacity (gallons)	



Appendix C-1 Photo Log
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

Tank Name	Tank ID UL142
Facility Area	Major Exploration Yard
Outfall	SW-1
Tank Contents	Used Oil
MOC	Steel
Nominal Tank Capacity (gallons)	240
Type of Secondary Containment	Double walled
Approximate Secondary Containment Capacity (gallons)	



Appendix C-1 Photo Log
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

Tank Name	No ID
Facility Area	Major Exploration Yard; drum storage area
Outfall	SW-1
Tank Contents	Used oil; oil rags; hydraulic oil H-68
MOC	Steel
Nominal Tank Capacity (gallons)	Various numbers of 55-gallon drums
Type of Secondary Containment	Plastic drum storage structure; pallets
Approximate Secondary Containment Capacity (gallons)	66g on the containment structure



APPENDIX D

EMERGENCY CONTACT LIST

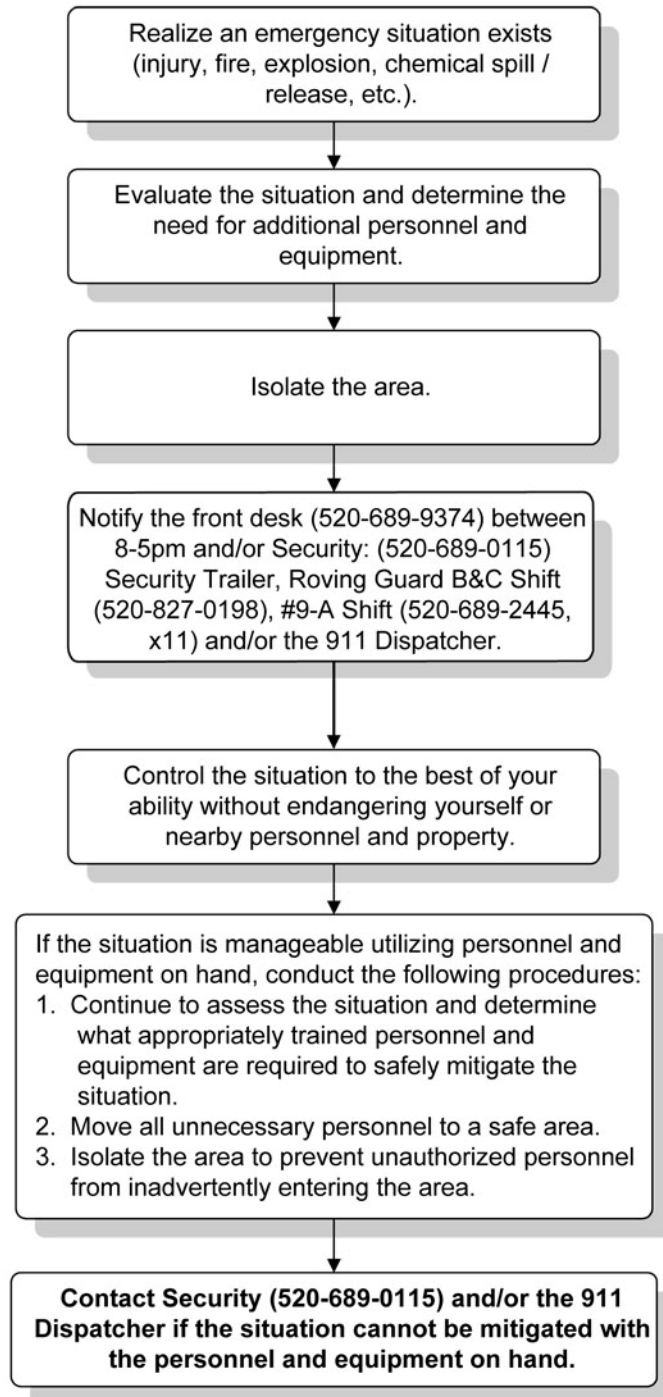
Appendix D Emergency Contact List
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

EMERGENCY CONTACTS	
Contact:	Number:
Resolution Copper Mining Mine Information Office/Security	Office hours: 520- 689-3392 After hours security: 520-689-0115 and/or Roving guard: 520-827-0198
Casey McKeon <i>is the designated person accountable to management for spill prevention.</i>	520- 689-3254
SPCC Plan Coordinator: TBD	
Spill Response Contractor: TBD	
Disposal Contractor: TBD	
OUTSIDE AGENCY NOTIFICATIONS FOR RELEASES	
Pinal County Emergency Management	520-509-3555
National Response Center (NRC)	1-800-424-8802
Fire, Police, Ambulance	911
Arizona Department of Public Safety (DPS): release reporting (emergencies)	602-255-7744 602-223-2212 602-255-8133 (after hours)
Arizona Department of Environment Quality (ADEQ): release reporting (non-emergencies)	800-234-5677

APPENDIX E

QUICK REFERENCE EMERGENCY PROCEDURES FLOWCHART

Appendix E
Quick Reference Emergency Procedures Flowchart
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities



**NOTIFY THE FRONT DESK (520-689-0155) BETWEEN 8-5PM AND/OR
SECURITY: (520-689-0115) SECURITY TRAILER, ROVING GUARD B&C
SHIFT (520-827-0198), #9-A SHIFT (520-689-2445, X11) AND/OR
THE 911 DISPATCHER.**

APPENDIX F

SPILL REPORT FORM

Appendix F Spill Report Form
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Name (print)	
Signature	

Date & Time of Release	
Location of Release	
Substance Released	
Estimated Volume	<div style="display: flex; justify-content: space-between;"> released: recovered: </div>
Release Discharged to:	<div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"><input type="checkbox"/> ground</div> <div style="width: 33%;"><input type="checkbox"/> intermittent stream (dry)</div> <div style="width: 33%;"><input type="checkbox"/> stream or surface water</div> <div style="width: 33%;"><input type="checkbox"/> open pit</div> <div style="width: 33%;"><input type="checkbox"/> storm water ponds (on site)</div> <div style="width: 33%;"><input type="checkbox"/> containment area</div> <div style="width: 33%;"><input type="checkbox"/> sanitary sewer</div> </div> <p>describe:</p>
Weather Conditions	
Suspected Cause	
Corrective Actions Taken	
Any Injuries?	
First Reported by	
Witnesses	

AGENCIES CONTACTED BY TELEPHONE		
Agency:	Name of Contact:	Date & Time of Call:

Comments made by agency contacts:

APPENDIX G

INSPECTION CHECKLISTS

Appendix G - Quarterly Tank Inspection Form
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities

Tank ID: 	
Date: 	
Inspector: 	
New Tank: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Secondary containment ¹ <input type="checkbox"/> Professional engineer notified ² Tank in Service: <input type="checkbox"/> Yes <input type="checkbox"/> No If <i>not</i> in service: <input type="checkbox"/> Blank Flanged <input type="checkbox"/> Marked "Not in Service" Drainage <input type="checkbox"/> No noticeable oil sheen on runoff <input type="checkbox"/> Containment area drainage valves are closed and locked (<i>if applicable</i>) <input type="checkbox"/> No visible oil sheen in containment area <input type="checkbox"/> No standing water in containment area <input type="checkbox"/> No localized dead vegetation Piping <input type="checkbox"/> NA <input type="checkbox"/> No signs of corrosion damage to pipelines supports <input type="checkbox"/> Signs/barriers to protect pipelines from vehicles are in place (<i>if applicable</i>) <input type="checkbox"/> No bowing of pipe between supports <input type="checkbox"/> No discoloration of piping <input type="checkbox"/> No droplets of stored material <input type="checkbox"/> No evidence of stored material seepage from valves or seals <input type="checkbox"/> No localized dead vegetation	Tank <input type="checkbox"/> Tank surfaces checked for signs of leakage <input type="checkbox"/> No drip marks <input type="checkbox"/> No discoloration of tanks <input type="checkbox"/> Tank condition good (no rusting, corrosion, cracks, pitting, dents or leakage) <input type="checkbox"/> Bolts, rivets, or seams are not damaged. <input type="checkbox"/> Tank foundation intact <input type="checkbox"/> Valves, flanges, and gaskets are free from leaks. <input type="checkbox"/> Containment walls are intact <input type="checkbox"/> No localized dead vegetation. Containment <input type="checkbox"/> Surface flow into non-discharging containment basin / area is functional <input type="checkbox"/> No apparent leaks in interstitial space of double-walled tanks (<i>if applicable</i>) <input type="checkbox"/> No cracks in containment <input type="checkbox"/> No discoloration of containment area <input type="checkbox"/> No puddles containing spilled or leaked material <input type="checkbox"/> No apparent settling <input type="checkbox"/> No gaps between tank and foundation <input type="checkbox"/> No apparent damage caused by vegetation roots
<u>COMMENTS:</u> <div style="height: 150px; border: 1px solid black;"></div>	

The tank inspection checklist presented above is based on Appendix F to 40 CFR SPCC Part 112. During inspection, make note of any discrepancies in any of the above-mentioned items. Return the Completed form to the SPCC Coordinator.

¹ Capacity of secondary containment area should be sufficient for 110 percent of the volume of the largest tank.
² Modifications to tanks and/or secondary containment require a technical review by a professional engineer.

APPENDIX H

TRAINING ATTENDANCE FORM

Appendix H Training Attendance Form
Preliminary Spill Prevention, Control, and Countermeasure Plan
Resolution Pre-Feasibility Activities
(check which type of training conducted)

___ **PRELIMINARY TRAINING TOPICS:** Overview of the SPCC Plan contents; Overview of applicable pollution control laws, rules, and regulations; Operation and maintenance of equipment to prevent discharges; General facility operations; Review of oil management activities at the facility; Spill response procedures; Release notification procedures; and Disposal procedures for spilled materials

___ **BRIEFING TOPICS:** Review of known discharges at the facility; Review of any failures, malfunctioning components, or any recently developed precautionary measures; Review of any changes to the SPCC Plan procedures and/or requirements.

REFERENCES: 40 CFR 112.7 (f) & Facility SPCC Plan

DATE: _____

INSTRUCTOR(s) / COMPANY: _____

INSTRUCTOR SIGNATURE: _____

SPCC COORDINATOR SIGNATURE: _____

EMPLOYEE NAME (Please Print)	EMPLOYEE ID #
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	

APPENDIX I

FUEL LOADING
UNLOADING PROCEDURES

Appendix I Fuel Loading / Unloading Procedures
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

PRIOR TO UNLOADING

- If a spill containment apron is present the truck must be inside the containment.
- Visually check all hoses for leaks and wet spots.
- Verify that there is sufficient volume in the storage tank.
- Lock in the closed position any drainage valves for the secondary containment structure.
- Secure the tank vehicle with chocks and interlocks.
- Ensure the vehicle's parking brake is set.
- Verify proper alignment of valves and proper functioning of the pumping system.
- Establish adequate bonding/grounding prior to connecting to the fuel transfer point.
- Turn off cell phone.

DURING UNLOADING

- Driver must stay with the vehicle at all times during unloading activities.
- Periodically inspect all systems, hoses and connections.
- Ensure that no leaks are detected by sight, sound or smell during fuel unloading.
- When loading, keep internal and external valves on the receiving tank open along with the pressure relief valves.
- When making a connection, shut off the engine. When transferring Class 3 materials, shut off the vehicle engine unless it is used to operate a pump.
- Monitor the liquid level in the receiving tank to prevent overflow.
- Monitor flow meters to determine rate of flow.
- When topping off the tank, reduce flow rate to prevent overflow.
- Report and clean up any spills according to the Resolution Pre-Feasibility Activities Preliminary SPCC Plan.
- Call **520-689-9374** to report any spills.

AFTER UNLOADING

- Make sure the transfer is complete.
- Close all tank and loading valves before disconnecting.
- Securely close all vehicle internal, external and dome cover valves before disconnecting.
- Secure all hatches.
- Disconnect grounding/bonding wires.
- Make sure the hoses are drained to remove the remaining fuel before moving them away from the connection. Use a drip pan.
- Cap the end of the hose and other connecting devices before moving them to prevent uncontrolled leakage.
- Remove wheel chocks and interlocks.
- Inspect the lowermost drain and all outlets on the tank truck prior to departure. If necessary tighten, adjust, or replace caps, valves, or other equipment to prevent fuel leakage while in transit.

APPENDIX J

RAINWATER DISCHARGE FORM

Appendix J Rainwater Discharge Form
Preliminary Spill Prevention, Control, and Countermeasures Plan
Resolution Pre-Feasibility Activities

Name (print)	
Signature	
Date & Time of Observation	

Location of Containment Area	
Was Sheen Observed?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Appearance of Water	
Location of Discharge	

Notes:

Contact the SPCC Coordinator prior to **any** discharge of collected rainwater from a diked area.

This form is to be completed before discharging any collected rainwater from a diked area ***to a storm sewer system or an open water course only.***

If the water has a sheen, is discolored, or contains any oil or sludge, ***do not pump out or discharge the contents.*** Contact the SPCC Coordinator for further assistance.

APPENDIX H
MAGMA MINE ROAD
MAINTENANCE AND
CARE PLAN

APPENDIX H
MAGMA MINE ROAD REPAIR, MAINTENANCE AND CARE PLAN

RESOLUTION COPPER MINING
PRE-FEASIBILITY ACTIVITIES
PLAN OF OPERATIONS

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Attachment H-1 Inspection Form

Attachment H-2 Engineering Judgment Report (AZTEC 2011)

1. INTRODUCTION AND BACKGROUND INFORMATION

Magma Mine Road is an existing paved road which tees into US 60 from the south, approximately three miles east of Superior, Pinal County, Arizona. It is located across the highway from a safety pullout at the top of a ridge.

This road provides access through Tonto National Forest (TNF) lands to the RCM East Plant Site / No. 9 Shaft area, the Oak Flat Campground, and other US Forest Service (FS) roads and facilities. An overview of the Road from US 60 to the East Plant Site is included as Figure 1. The road has been used to access the No. 9 mine shaft and the attendant surface facilities on private land since 1969.

The Forest Service document titled *The Guidelines for Maintenance Road Levels (GMRL)*, the United States Department of Agriculture (December 2005), was used in developing this Magma Mine Road Repair, Maintenance and Care Plan. The existing Magma Mine Road aligns with the criteria associated with a designation of Level 4 from the Guidelines for both operational and objective road maintenance. As such, this Repair, Maintenance and Care Plan describes planned activities which will maintain the Magma Mine Road as a Forest Service - Maintenance Level 4 road.

Ongoing commercial activities at the East Plant Site and recreational use in the vicinity result in a mix of passenger vehicles, light-duty trucks and heavy equipment along this road. In accordance with Mitigation Measure EA-23 (*Resolution Copper Mining Pre-feasibility Activities Plan of Operations, October 2010*), RCM is now responsible for the maintenance and care of Magma Mine Road (FR 469). Therefore, the purpose of this appendix is to provide a repair, maintenance and care plan for work required to keep the road, as well as its contiguous turn-outs and intersections, safe for RCM employees and contractors, Forest and state land users, and FS employees.

The existing asphalt concrete (AC) road is approximately 24 feet wide with about 4-foot aggregate base (AB) shoulders in most areas. Along bedrock outcrop areas, the road is equipped with a steel cable guardrail. A typical sectional plan view of the road is shown in Figure 2. In addition to the typical roadway configuration shown in Figure 2, a total of seven existing combination turnouts/intersections and four turnouts will also be maintained. Maintenance of turnouts and turnout/intersections is necessary to keep those areas clear of vegetation, uneven pavement transitions and other obstructions to provide safe traffic flow and visibility on and off Magma Mine Road. The locations of these turnouts and intersections are all labeled on Figure 1, with close-up plan view drawings of each turnout or intersection and the associated area to be maintained shown on Figures 3 through 10.

2. ROAD MAINTENANCE LEVEL 4 GUIDANCE¹

Road maintenance Level 4 is defined in the GMRL as: “Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is ‘encourage.’ However, the ‘prohibit’ strategy may apply to specific classes of vehicles or users at certain times.”

According to the guidance, these roads have the following attributes:

- Subject to the requirements of the Highway Safety Act and Manual on Uniform Traffic Control Devices (MUTCD).
- Roads have moderate traffic volume and speeds.
- May connect to county roads.
- Culverts provide drainage.
- Usually a collector.
- May include some developed recreation.

Maintenance prescription guidelines from the GMRL are listed below. Some of the guidance may not apply to Magma Mine Road. A note regarding applicability is provided as needed for clarification.

- **General.** As needed.
- **Traveled way.** Maintain traveled way to provide for moderate degree of user comfort and convenience and for protection of investment and resource values. Replace surfacing to the depth required for blade maintenance and to prevent wear of the base course. Abate dust when needed.
- **Shoulder.** Maintain existing shoulders commensurate with the traveled way.
- **Drainage.** As necessary to keep drainage facilities functional and prevent unacceptable environmental damage.
- **Roadway.** Maintain existing vegetative cover. Control vegetation to provide sight distance. Repair and/or remove slides and slumps to provide passage by prudent drivers in standard passenger cars. *Note: There is no vegetative cover within the roadway or shoulder to be maintained.*
- **Roadside.** Clean up litter in accordance with road management objectives. Remove hazard trees and perform landscape treatments as required. *Note: No landscape treatments are planned. Roadside areas will be pruned and brushed as needed.*
- **Structure.** Maintain all structures to provide for passage of planned traffic and to preserve structures for future use. Defer noncritical items and combine to provide for a more economical project. For example, repair defective bridge rails, running planks, and bridge guideposts on a current basis. Defer the painting of bridge rails to a logical project cycle.
- **Traffic service.** Install and maintain route markers; warning, regulatory, and guide signs; and other traffic service measures.

¹Guidance for Road Maintenance Levels, USDA Forest Service Technology Program; December 2005

3. ROAD REPAIR

3.1 INITIAL REPAIR AND REPAVING EPISODE

Approximately 11,560 feet of the existing Magma Mine Road pavement will be replaced. The AC material will be ground up using a standard pavement milling machine and reused as road base material. Any excess materials will be hauled off by the Contractor and disposed of offsite in accordance with applicable laws. The recompacted road base consisting of 8 inches of AB will be paved over with a new layer of AC, 4 inches in thickness as seen in the attached Figure 2. Repaving with AC and AB will be in conformance with the Arizona Department of Transportation (ADOT) Standard Specification 409 Asphaltic Concrete (3/4-inch Mix) and the Maricopa Association of Governments (MAG) Aggregate Base Material Specification, respectively. Quality control for AC and AB densities will be per the 2008 ADOT Standard Specifications for Road and Bridge Construction.

The new roadway will be constructed along the existing road grade and will match the existing drainage patterns and roadway slopes. No existing culverts or cattle guards are proposed to be modified or replaced during construction.

In accordance with the Engineering Judgment Report (Attachment H-2) fifteen new guardrails are also proposed with Sequential Kinking Terminals (SKT) in conformance with the Federal Highway Administration (FHWA) Test Level II End Treatment (design speed less than 45 mph). The existing double line will be restriped using Thermo paint per ADOT specification 925-3. Additional striping and signage will be provided as recommended by the engineer in the Engineering Judgment Report.

The following sequence of activities is expected:

- FS approves the Magma Mine Road Repair, Maintenance and Care Plan.
- Work is initiated as soon as the work can be scheduled and weather permits.
- *Day 1 through approximately Day 7.* Contractor mobilizes to the site, places materials and equipment at the staging areas on private lands at the East Plant Site, and implements the traffic safety and control plan (e.g. places temporary construction signage, cones, traffic barriers, etc.) Work will occur on weekdays during daylight hours.
- *Day 7 through approximately Day 30.* Repaving work begins and continues during week days and daylight hours from US 60 to Turnout #4, and on both weekends and weekdays during daylight hours from Turnout #4 to the East Plant Site. Equipment systematically removes and grinds existing pavement, compacts the roadway base and applies new AC. Contractor provides necessary flaggers and traffic control personnel to insure road-user safety and minimize traveler inconvenience. On evenings and weekends, equipment and materials are stored on private lands at the East Plant Site.
- *Approximately Day 30 through Day 40.* Following completion of paving, RCM implements the Engineering Judgment Report and commences with the installation of striping, speed bumps and signage. Work will occur on weekdays during daylight hours.
- *Approximately Day 56 through Day 91.* It is expected to take approximately 35 days to install the guardrails. Work will occur on weekdays during daylight hours.

- Following completion of construction, RCM, the road repair contractor and FS personnel inspect the roadway and develop a contractor punch list.
- Contractor completes punch list items.
- Traffic control is removed.
- Initial Episode complete.

Delays are not expected to occur during replacement of existing cable barrier with installation of new guardrails. As existing cable barrier is removed, new guard rail will be installed.

3.2 SUBSEQUENT REPAIR EPISODES

In general, the terms road ‘maintenance’ and ‘care’ refer to ongoing practices such as brushing or filling potholes. The term ‘repair’ refers to less frequent activities such as repaving and guardrail replacement. Following the initial repair episode described above, it is assumed that the majority of activity related to the Magma Mine Road for the remainder of the permit term would fall into the category of maintenance and care.

However, additional repair activities, such as guardrail replacement or repaving may be necessary. FS personnel would be notified if additional repair is needed or warranted. Repair would be conducted in a similar manner as described above, depending on the extent of the needed repairs.

4. MAINTENANCE AND CARE

Maintenance to the Magma Mine Road will adhere to the USDA guidelines for Level 4 maintenance and will be performed by qualified contractors in accordance with accepted engineering and construction practices. All road maintenance and care activities will be limited to the areas of existing disturbance and vegetation immediately adjacent to the roadway. The turnouts and turnout/intersections will not be paved; activities for these areas will be limited to light grading, AB replacement, and brushing.

Staging areas for maintenance and care projects will be located on private lands. In the unlikely event that a staging area is needed on FS lands, the staging area will be approved in advance by FS personnel and will not be located within the withdrawal area or create any new disturbance. Any road maintenance work with a duration exceeding four hours or requiring more than minimal traffic flow disruption will be coordinated with the FS.

An ongoing maintenance and care schedule is important in order to prolong the life and utility of the repairs. The maintenance and care schedule will include the following:

Table 1. Maintenance Summary

Roadway Component	Inspection Frequency	Trigger Action	Maintenance Activity
Pavement Section and Shoulder AB	Quarterly	<ul style="list-style-type: none"> • Development of potholes • Development of surface cracks/cracking • Development erosion/rutting of shoulder 	<p>Maintain pavement AC and shoulder AB surfaces as required with pavement patching, chip sealing, and shoulder grading and/or AB reapplication.</p> <p>Large repairs will be implemented in a similar fashion as the initial repair described above in this Plan.</p>
Turnout & Turnout Intersection Grading	Quarterly	<ul style="list-style-type: none"> • Development of potholes • Development erosion/rutting • Development of uneven pavement transitions between paved and unpaved areas. 	Fill in potholes, ruts and uneven pavement transitions with compacted AB or new AC as necessary.
Vegetation	Biannually	<ul style="list-style-type: none"> • Vegetation obstructing visibility 	<p>Clear, brush and grade the existing turnouts and turnout/intersections shown on Figures 3 through 8.</p> <p>Clear and brush vegetation on the shoulder and immediately adjacent to the shoulder as required for shoulder maintenance and visibility.</p>
Drainage Culverts	Annually	<ul style="list-style-type: none"> • Accumulation of vegetation, soils, rocks, trash, debris, etc. near culvert inlet/outlets and inside culvert which restrict flow capacity. 	Clear brush and debris near inlet/outlet, jet clean with pressurized nozzle/ equipment to remove debris inside culvert.
Signage	Inspected Annually and Replaced before 10 years or earlier as needed.	<ul style="list-style-type: none"> • Structural damage from vehicles, rocks, bullets, vandalism etc. • Not legible to sun damage, vandalism/spray paint 	<p>Repair/replace traffic control signage as required.</p> <p>Replace in 10 years or earlier as needed.</p>
Pavement Striping	Annually	<ul style="list-style-type: none"> • Not visible due to spills, removal/damage during other maintenance, removal during deicing operations, etc. 	Restripe the existing double yellow centerline as required.
Guardrails	Annually	<ul style="list-style-type: none"> • Structural damage to guardrails from vehicles, falling rocks, etc. • Normal wear and tear 	Maintain guardrails and SKTs as required.

5. SAFETY AND ENVIRONMENTAL PRACTICES

During road repair and maintenance activities, the following practices will be implemented:

- **Traffic Control.** An appropriate and activity-specific traffic control plan will be implemented for each repair or maintenance episode. Depending on the activity, controls may include:
 - Fixed or electronic signage, such as “Road Work Ahead”, “Reduced Speed Ahead”, “Use Caution”, etc.
 - Barricades or traffic cones
 - Radio-assisted flaggers
- **Environmental Protection and Forest User Impacts Mitigation.** Activity-specific environmental protection measures will be implemented for each repair or maintenance episode. Depending on the activity, measures may include:
 - Conducting road and/or shoulder watering for dust abatement
 - Installing BMPs for sediment control
 - Recycling pavement materials
 - Limiting heavy equipment work to daylight hours
 - Keeping fire fighting and spill clean up supplies and equipment at hand
 - Maintaining access to campground areas during road work by implementing traffic control and maintaining at least one lane of traffic during maintenance.
 - Coordinating with TNF when major repairs requiring noteworthy traffic disruption and work exceeding four hours in duration are needed.

6. MAGMA MINE ROAD WIDENING OR OTHER IMPROVEMENTS

This Repair, Maintenance and Care Plan for the Magma Mine Road is to facilitate the repair, maintenance and care of the existing roadway to a Level 4 designation. No improvements, such as road widening, shoulder widening or widening of turnouts or turnout/intersections, are permitted under this Plan. Any new ground-disturbing improvements considered for the Magma Mine Road will require authorization by the Forest Service.

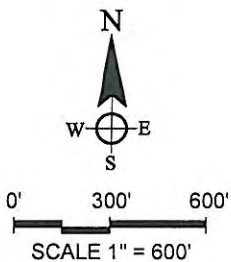
FIGURES

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Legend

100+00 Stationing Every 500 FT



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4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

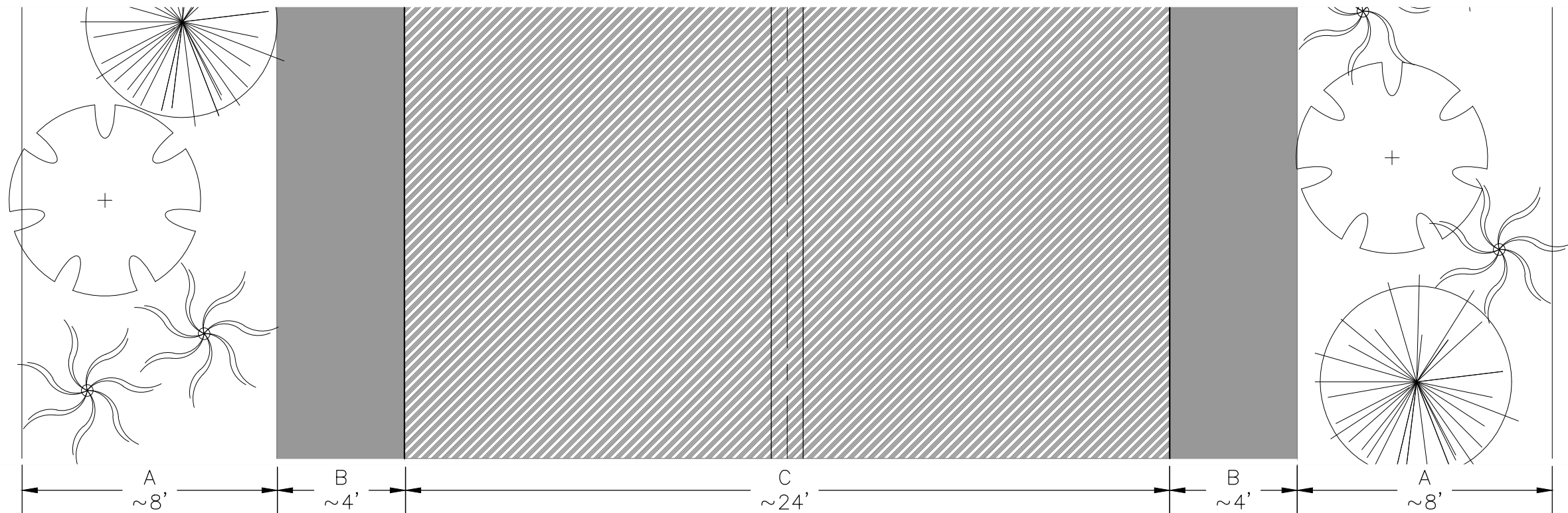
RESOLUTION COPPER MINING, LLC

Plan of Operations – Appendix H

Magma Mine Road Repair, Maintenance &
Care Plan

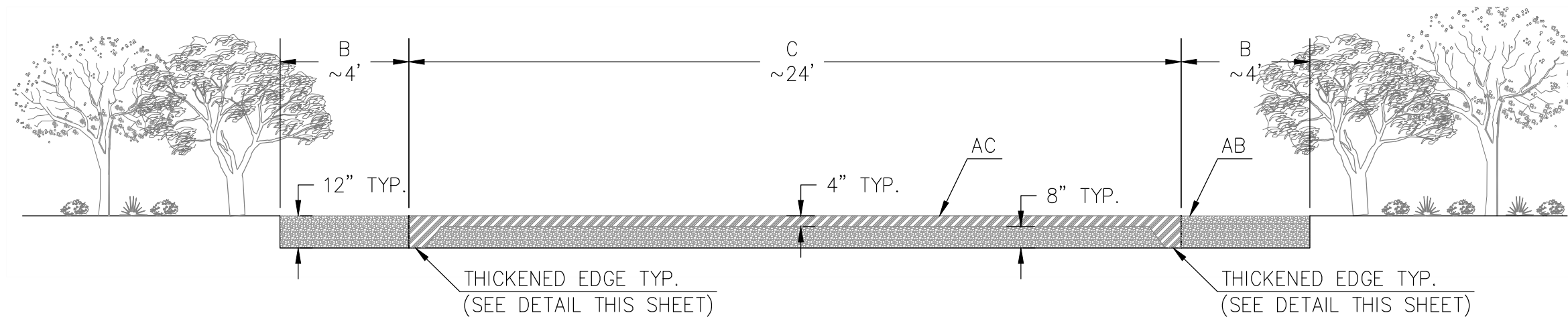
OVERVIEW
Figure 1

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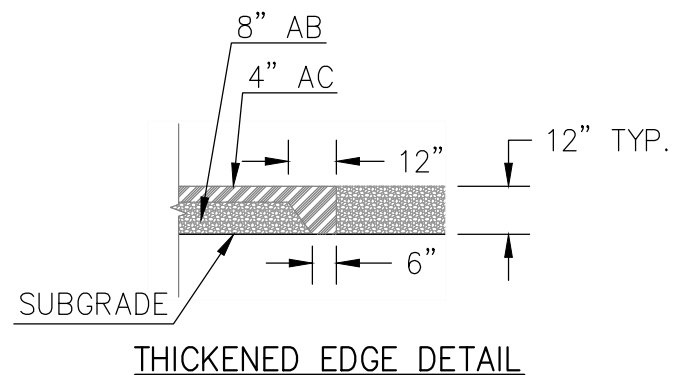


NOTES:

- A—EXISTING VEGETATION ADJACENT TO THE SHOULDER OF THE ROAD. WILL REQUIRE INITIAL AND PERIODIC CLEARING AND BRUSHING AS REQUIRED FOR VISIBILITY AROUND CURVES AND TURNOUTS.
- B—EXISTING AB SHOULDER, APPROXIMATELY 4 FEET WIDE. WILL REQUIRE INITIAL AND PERIODIC CLEARING, GRADING AND AB REAPPLICATION AS REQUIRED.
- C—PAVEMENT AC, APPROXIMATELY 24 FEET WIDE. WILL REQUIRE RE-STRIPING AND INITIAL AND PERIODIC SUB-BASE AND PAVEMENT REPAIR AS REQUIRED.

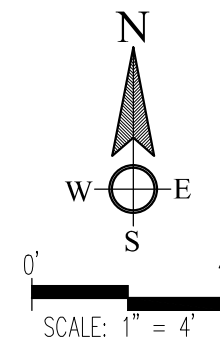


TYPICAL ROAD SECTION



THICKENED EDGE DETAIL

* DETAILS ADAPTED FROM
RESOLUTION MINE ACCESS ROAD
(AZTEC 2008) AS MODIFIED BY
SUNDT CONSTRUCTION.



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Plan of Operations – Appendix H

Magma Mine Road Repair, Maintenance &
Care Plan


PAVEMENT DETAIL

Figure 2


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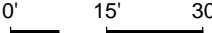
Image Source: Provided by Resolution Copper 2008



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N
W—O—E
S



0' 15' 30'
SCALE 1" = 30'



Approximate Area
of Turnout

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Care Plan
TURNOUT NO.1
Figure 3

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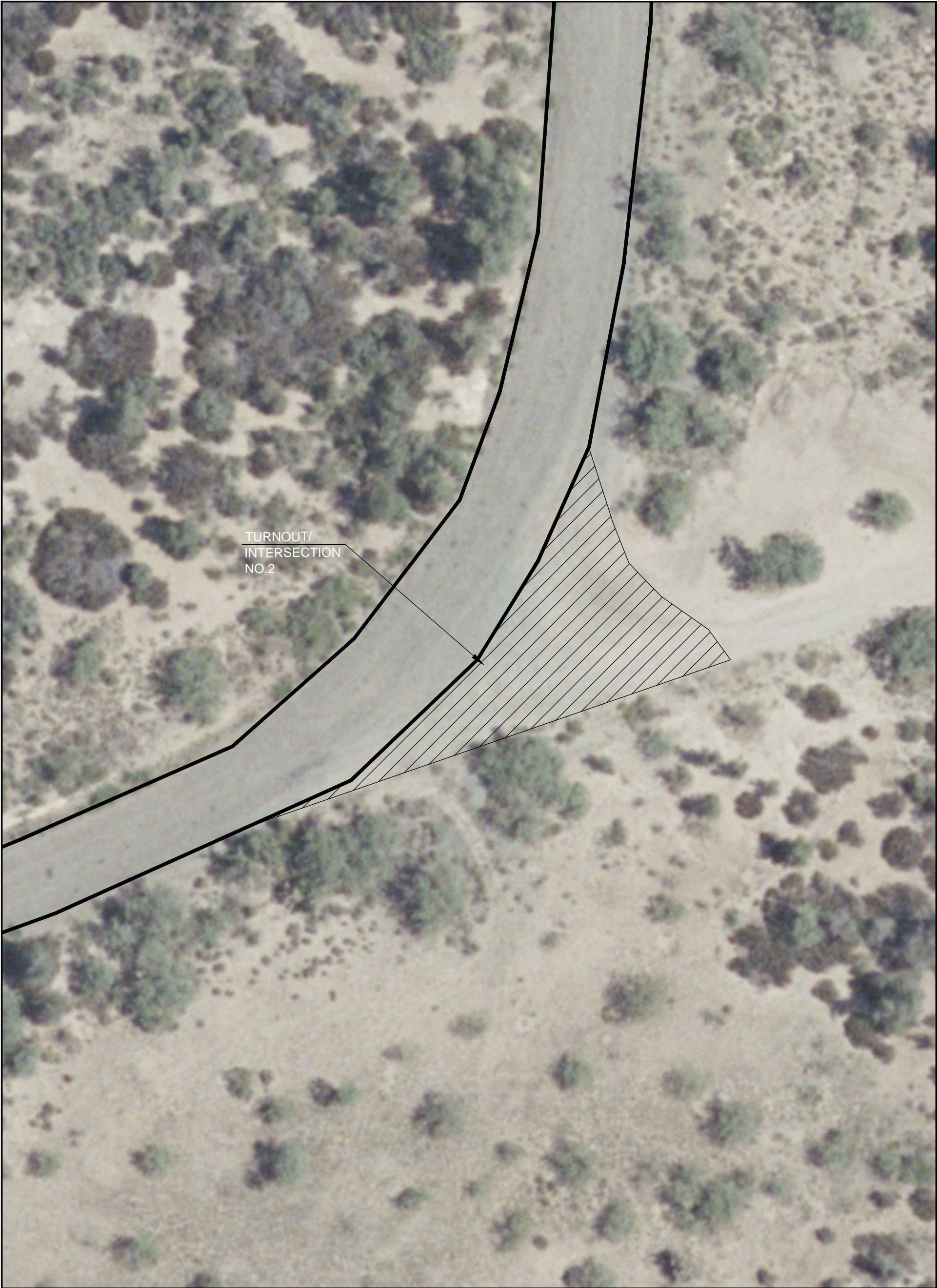



Image Source: Provided by Resolution Copper 2008



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N
W—+—E
S

0' 15' 30'

SCALE 1" = 30'



Approximate Area
of Turnout

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Care Plan
TURNOUT/INTERSECTION NO.2
Figure 4

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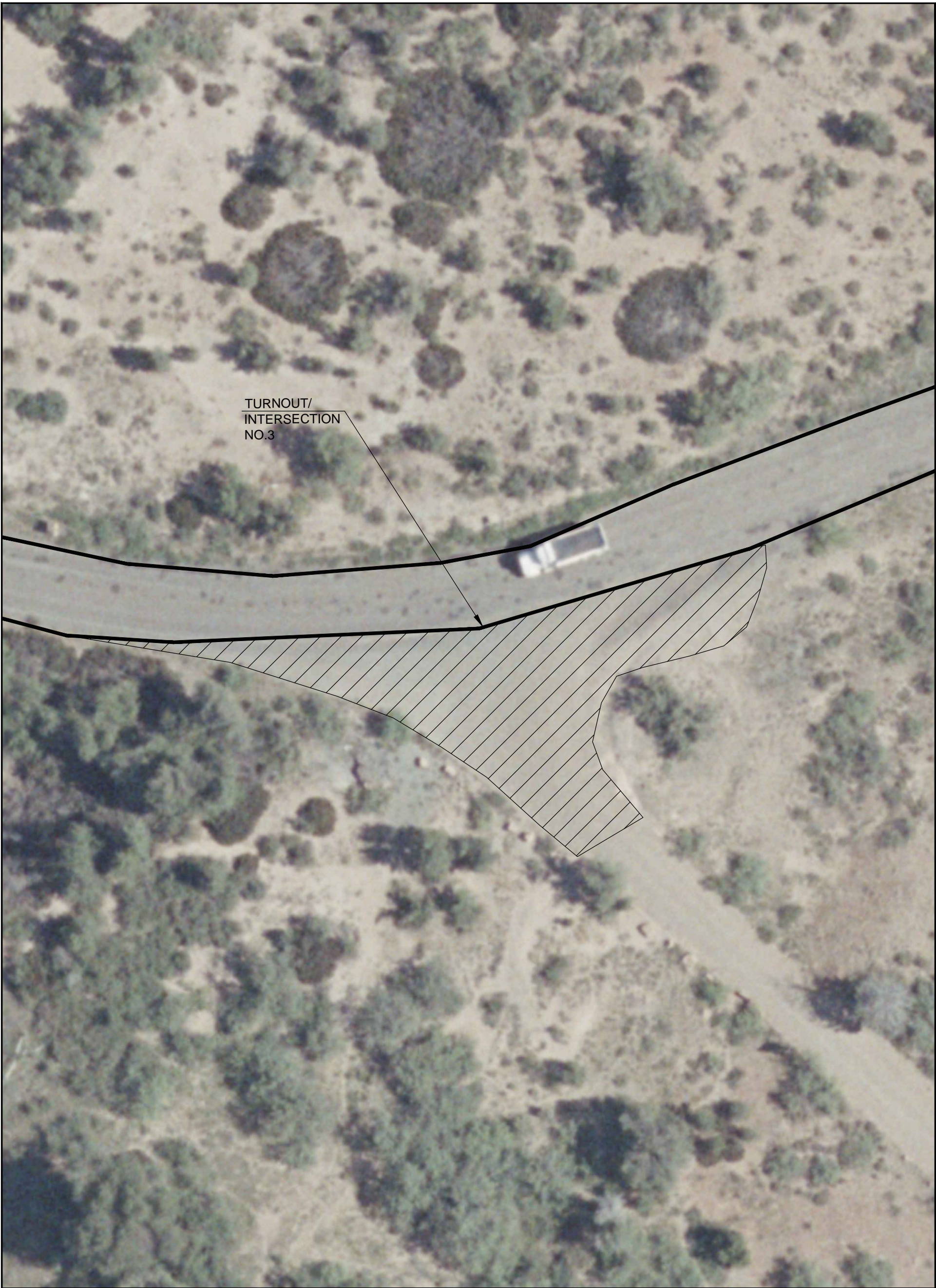

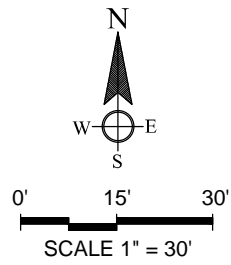


Image Source: Provided by Resolution Copper 2008



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0' 15' 30'
SCALE 1" = 30'

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Plan of Operations – Appendix H
Magma Mine Road Repair, Maintenance & Care Plan
TURNOUT/INTERSECTION NO.3
Figure 5


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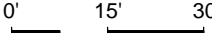
Image Source: Provided by Resolution Copper 2008



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N
W—+—E
S



0' 15' 30'
SCALE 1" = 30'



Approximate Area
of Turnout

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Plan of Operations – Appendix H

Magma Mine Road Repair, Maintenance &
Care Plan

TURNOUT NO.4
Figure 6

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Image Source: Provided by Resolution Copper 2008



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0'25'50'

SCALE 1" = 50'

N

W

E

S



Approximate Area
of Turnout

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Plan of Operations – Appendix H

Magma Mine Road Repair, Maintenance &
Care Plan


TURNOUT/INTERSECTION NO.5 AND 6

Figure 7


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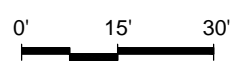
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0' 15' 30'
SCALE 1" = 30'

 Approximate Area of Turnout

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Plan of Operations – Appendix H
Magma Mine Road Repair, Maintenance & Care Plan
TURNOUT/INTERSECTION NO.7, TURNOUT NO.8
Figure 8

ATTACHMENT H-1
INSPECTION FORM

MAGMA MINE ROAD INSPECTION FORM

Date: _____

—

Inspected

By: _____

System Component	Station (begin)	Station (end)	Notes	Scheduled Repair Date	Repair Completion Date
Pavement Roadway and Shoulder AB					
Turnout & Turnout Intersection Grading					

System Component	Station (begin)	Station (end)	Notes	Scheduled Repair Date	Repair Completion Date
Vegetation					
Drainage Culverts					
Signage					

System Component	Station (begin)	Station (end)	Notes	Scheduled Repair Date	Repair Completion Date
Pavement Striping					
Guardrails					

ATTACHMENT H-2
ENGINEERING JUDGEMENT
REPORT



RESOLUTION COPPER MINING MAGMA MINE ROAD FR 469

ENGINEERING JUDGMENT REPORT

OCTOBER 2011



PREPARED FOR:



PREPARED BY:



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Magma Mine Road, FR 469

Engineering Judgment Report

Prepared for:



Prepared by:



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EXPIRES 9/30/2012

October 2011

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EXECUTIVE SUMMARY

Magma Mine Road (MMR) intersects US 60, the Phoenix to Globe Highway, near MP 231 east of Superior, Pinal County, Arizona within the Tonto National Forest (TNF). The roadway begins at the US 60 intersection and traverses a distance of approximately 2.2 miles ending at the gate near the Resolution Copper Mining (RCM) No. 9 & No. 10 mineshaft site. MMR provides public access to the Oak Flat Campground and surrounding TNF lands for recreational use and business access to the RCM No. 9 & No. 10 mineshaft site.

RCM retained AZTEC to prepare an engineering judgment report for MMR. This report describes the existing roadway characteristics, signage, and potential roadside hazards. It also provides recommendations to improve safety by eliminating or mitigating hazards through, installing signing, pavement markings, guardrail and speed bumps. AZTEC understands that RCM will be repaving the road surface.

The recommended improvements include the following:

- Install new double-yellow pavement markings, stop signs, speed limit signs, curve warning signs, intersection warning signs, stop ahead warning signs, truck crossing warning signs, dead end/no outlet warning signs, bump warning signs, cattle guard warning signs, object markers, and route markers.
- Replace existing cable barrier with new W-Beam guardrail and installation of additional W-Beam guardrail.
- Replace existing speed bumps.

1.0 INTRODUCTION

RCM retained AZTEC to prepare an engineering judgment report to review, evaluate, and recommend traffic control devices and roadway feature improvements to MMR between the US 60 intersection and the RCM No. 9 and No. 10 mineshaft site. An engineering judgment is a technical review and evaluation of available pertinent information, based on decisions made by professionals having knowledge of the applicable principles, standards, and practices of traffic control devices and roadway features contained in the 2009 *Manual on Uniform Traffic Control Devices* (MUTCD), American Association of State Highway and Transportation Officials (AASHTO) standards, and EM 7100-15 Sign and Poster Guidelines for the US Forest Service (USFS).

RCM is currently performing mining pre-feasibility activities in the Globe Ranger District of the TNF in Pinal County, Arizona. Access to these activities is via MMR, which is an existing 2.2-mile paved roadway that intersects US 60 near milepost 231 within the TNF. The roadway also provides access to the Oak Flat Campground and other recreational activities within the TNF.

RCM intends to make roadway maintenance and safety improvements to MMR. The recommendations made in this report will be utilized as the basis for these improvements. The location of the project is shown on **Figure 1**.

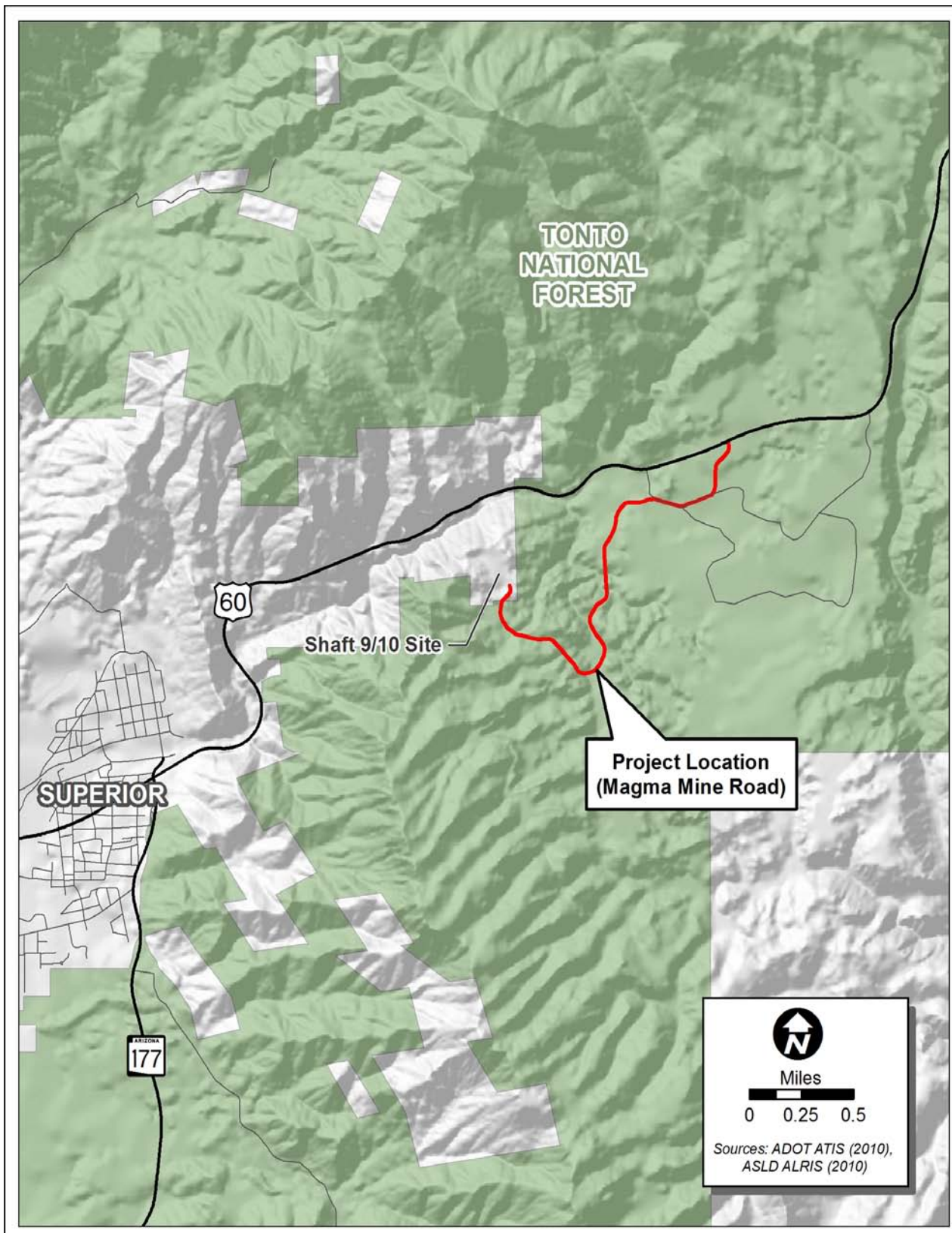


Figure I. Project Location Map

2.0 REPORT METHODOLOGY

In order to review, evaluate, and recommend traffic control devices and roadway features for MMR, the following tasks were undertaken:

- Site Visit – A photographic record and documentation of existing traffic control devices along MMR was made, and roadway features were inventoried.
- Evaluation – Existing traffic control devices and roadway features were evaluated based on applicable standards, practice, and guidelines set in accordance with the USFS, MUTCD, and AASHTO.
- Recommendations – Based on the inventory and evaluation of the above tasks, recommend improvements for traffic control devices and roadway features were developed.

3.0 EXISTING CONDITIONS EVALUATION

The surrounding area consists of mountainous terrain managed by the TNF. The RCM operations are accessed by MMR, which intersects US 60 near milepost 231.

The existing US 60 and Magma Mine Road intersection is controlled by a stop sign with MMR as the minor stop-controlled roadway approaching US 60. The intersection was recently improved with the construction of an eastbound right-turn deceleration lane, new signing, and new pavement marking. These improvements are illustrated on **Figure 2**.

MMR is a paved public roadway covering approximately 2.2 miles between its intersection with US 60 and the entrance gate at the No. 9 and No. 10 mining shafts. MMR is located within the TNF boundary and also allows access to Oak Flat Campground.

Based on the existing conditions and utilizing the MUTCD, MMR can be classified as a low-volume paved rural roadway serving resource development (mining) and public land access.

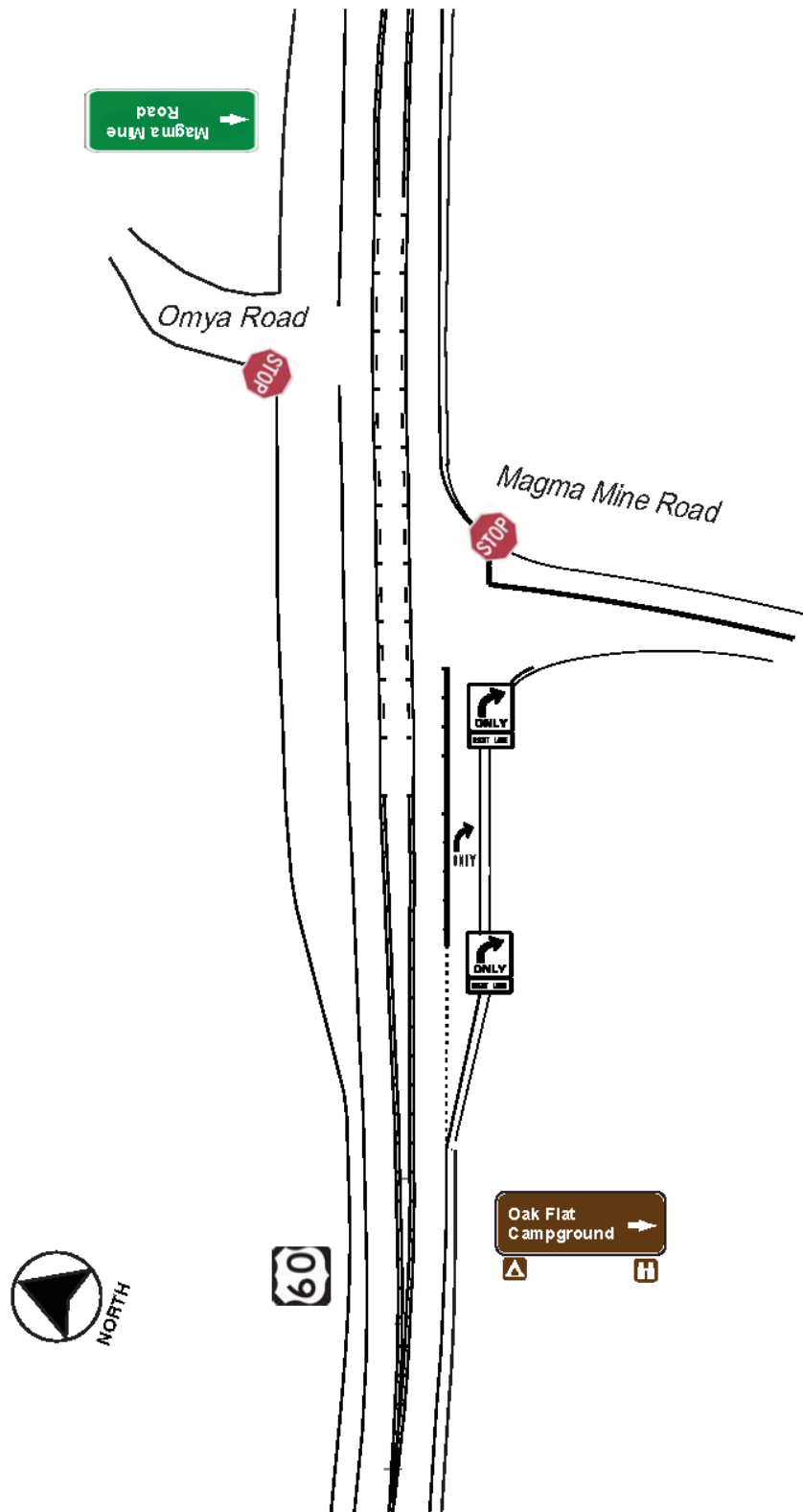


Figure 2. Recent US 60 Intersection Improvements

3.1 Existing Traffic Control Devices Evaluation

On March 2, 2011, AZTEC performed an inventory of traffic control devices on MMR. A photographic record and documentation was collected of existing pavement markings and signs; including location, condition, legend, color, shape, and panel size. The existing sign locations are shown on **Figure 3**.

Based on field observations it was evident that most of the pavement markings and many of the signs are damaged, weathered, missing, or vandalized. These poor conditions affect legibility and motorists' understanding and expectation. Also, there is no evidence of ownership and date of sign installation. As part of this evaluation, unexpected conditions, unfamiliar motorists, recreational and resource development users were considered. Samples of varying pavement marking and signing conditions are shown below.



Existing regulatory signs include, but are not limited to, stop signs, speed limit signs, restrictive use signs, and seat belt usage signs. The posted speed limit of

MMR changes between 25-mph, 14 ½-mph, and 10-mph for varying applications.

Some of the existing speed limit signs do not meet the minimum size requirement, nor is the displayed numerical speed limit per the MUTCD.

Existing warning signs include, but are not limited to, horizontal curve signs, intersection ahead signs, advance traffic control (stop ahead) signs, vehicular (truck) traffic entering signs, dead end/no outlet signs, and sharp (bump) vertical deflection signs. In addition, object markers (shown in the photos below) delineate the edge of the roadway and roadside obstructions, such as cattle guards.



Additionally, several of the existing signs (shown in the photographs below) do not meet the minimum vertical sign-height requirement and sign spacing requirement found in the MUTCD.



Lastly, informational and guide signing for the Oak Flat Campground and vertical route markers for FR 315 and FR 2438 are present (shown in the photographs below), but route marker for FR 469 located at the entrance of MMR was missing.



3.2 Existing Roadway Features Evaluation

On March 2, 2011, AZTEC performed an inventory of existing roadway features on MMR, which included an assessment of the roadway type, number of lanes, lane and shoulder width, documenting locations of existing cable barrier, speed bumps, and intersecting access points, as well as noting the condition of the roadway surface.

MMR is a two-lane undivided road varying in width between 22 and 24 feet. The roadway has one 10-11 foot-wide travel lane in each direction, and 1-foot-wide outside shoulders. There are no existing turn lanes. The existing cross slope is about 1.5 percent. The surrounding area consists of mountainous, rocky terrain, and the average roadway elevation is approximately 4,000 feet above mean sea level. Between U.S 60 and the No. 9 and No. 10 shaft site, MMR has a net increase in elevation of approximately 100 feet.

There are 11 intersecting roads along MMR. These intersecting roads are unpaved and have relatively low traffic volumes.

There are five speed bumps along MMR, and these are indicated on **Figure 3**. They are located in the vicinity of intersecting roads, access points, and nearby work areas. The speed bumps are composed of asphaltic concrete and are buckling under the traffic loads. The painted markings on them have worn off which contribute to the speed bumps' low visibility, as shown in the photographs on the next page.



As-built plans for MMR dated 1969 indicate a pavement structural section of 2½ inches of asphaltic concrete on 4 inches of aggregate base. The as-built plans show no callout for a wearing course when the road was originally paved, and nothing was noticed in the field that suggests one was later added.

Field observation indicates the existing roadway pavement is in generally very poor condition. The pavement has developed considerable cracking and potholes in nearly all areas throughout the 2.2 miles up to the shaft site. Photographs showing several of the areas of deteriorated pavement are shown on the next page.



There is existing cable barrier located within one foot of the roadway shoulder. It consists of either old railroad rail or six-inch galvanized pipe drilled through with heavy gauge cable strung through the holes. A few of the pipes — particularly those used as sign post supports — are filled with concrete. These supports vary in height, but stand approximately 20 to 26 inches above the surrounding ground.

The cables are strung in a state of low tension. As the photographs on the next page indicate, in some places there is so little tension that it can be pressed down to the ground with a foot; on some runs, the low points of the cable already touch the ground. There are also locations where the cables have been attached together, or even where some of the cables and their supports have fallen over and are resting on the ground.



The existing cable barrier cannot be proven to meet any of the standard crash tests described in National Cooperative Highway Research Program Report No. 350, *Recommended Procedures for the Safety Performance Evaluation of Highway Features* (NCHRP Report 350). Further, the supporting posts and/or rails used to support the cables fail to meet the height requirement of 27 inches noted in the *AASHTO Roadside Design Guide, 3rd Edition 2006 with Update Chapter 6*.

4.0 RECOMMENDATIONS

4.1 Recommendations - Traffic Control Devices

It was observed that many of the existing traffic control devices installed along MMR do not meet the minimum standards found in the MUTCD and the Sign and Poster Guidelines for the Forest Service (EM 7100-15).

Signing shall be consistent, uniform, and provide effective timely messages to the motorist. The recommended signing improvements are shown on **Figure 4** and listed below:

- Install new regulatory signs, warning signs, and double-yellow pavement markings with recessed Type D pavement markers.
- Existing FR route markers and guide signs, and signs associated with RCM property, are proposed to remain.
- Install a new FR 469 route marker at the entrance of MMR.
- Install regulatory stop and speed limit signs to meet the minimize size requirements found in the MUTCD of 30"x30" and 18"x24", respectively.
- Install numerical speed limit signs in multiples of 5 mph, per the MUTCD.
- Install new stop signs for intersecting roads.
- Install signs to meet the minimum vertical sign-height to the bottom of a sign of 5 feet, or 4 feet to the bottom of a secondary sign mounted below another sign.
- Install signs separately with sufficient distance between the signs.
- Install new horizontal curve warning signs to inform the motorist of the change in roadway alignments, which include signing for U-turn curves, reverse

curves, winding roads, and “curves mountainous grades”.

- Install new advisory warning speed plaques of 10 mph.
- Install new intersection and truck crossing warning signs.
- Install new stop ahead warning signs.
- Install new dead end/no outlet warning to warn motorists that the road terminates at the RCM site, and placed at locations that will give motorists the opportunity to turn around or select another route.
- Install new speed bump ahead with supplementary 10 mph speed advisory plaques, and bump signs located in the vicinity of intersecting roadways, entrance and exit of RCM site, and adjacent work areas.
- Install new cattle guard warning signs for the two existing cattle guards.
- Install new object markers at each end of each guard rail run and at each cattle guard location, where the road may be constricted or to mark objects that intrude into the roadway.

Attached to this Engineering Judgment Report is the Traffic Engineering Speed Study, dated October 2011, performed along MMR by AZTEC at the request of TNF. This study included the evaluation of curves, sight distance, spot speed data, test car runs, roadway conditions, and roadside environment along MMR in accordance with ADOT speed study guidelines and the MUTCD. The speed study proposes to maintain the posted speed limit of 25 mph for the length of the route between its intersection with US 60 and RCM private entrance gate, for an approximate length of 2 miles.

4.2 Recommendations - Roadway Features

Guardrail

- Install new W-Beam guardrail to replace the existing cable barrier. Utilize wooden posts at least 72 inches in length, and at minimum meet TL-2 requirements as noted in NCHRP Report 350. Install crashworthy terminals at both ends of each run, per the NCHRP Report 350 TL-2 requirements. There is also one location (see **Figure 4**) where guardrail is proposed where no roadside barrier exists.

Speed Bumps

- The three existing speed bumps nearest the No. 9 and No. 10 mine shaft will be replaced with new speed bumps. The remaining two speed bumps (see **Figure 4**) will only remain until December 31, 2014. Install the speed bumps with a height of no more than 3¼ inches.

5.0 CONCLUSION

It is understood that RCM will be repaving the road surface and based upon our analysis, AZTEC makes the following recommendations as illustrated on **Figure 4**:

- Install new double-yellow pavement markings, stop signs, speed limit signs, curve warning signs, intersection warning signs, stop ahead warning signs, truck crossing warning signs, dead end/no outlet warning signs, bump warning signs, cattle guard warning signs, object markers, and route markers.
- Replace cable barrier, as shown in **Figure 4**, with new W-Beam guardrail and additional W-beam guardrail at one location.
- Replace existing speed bumps.

MAGMA MINE ROAD, FR 469

EXISTING CONDITIONS

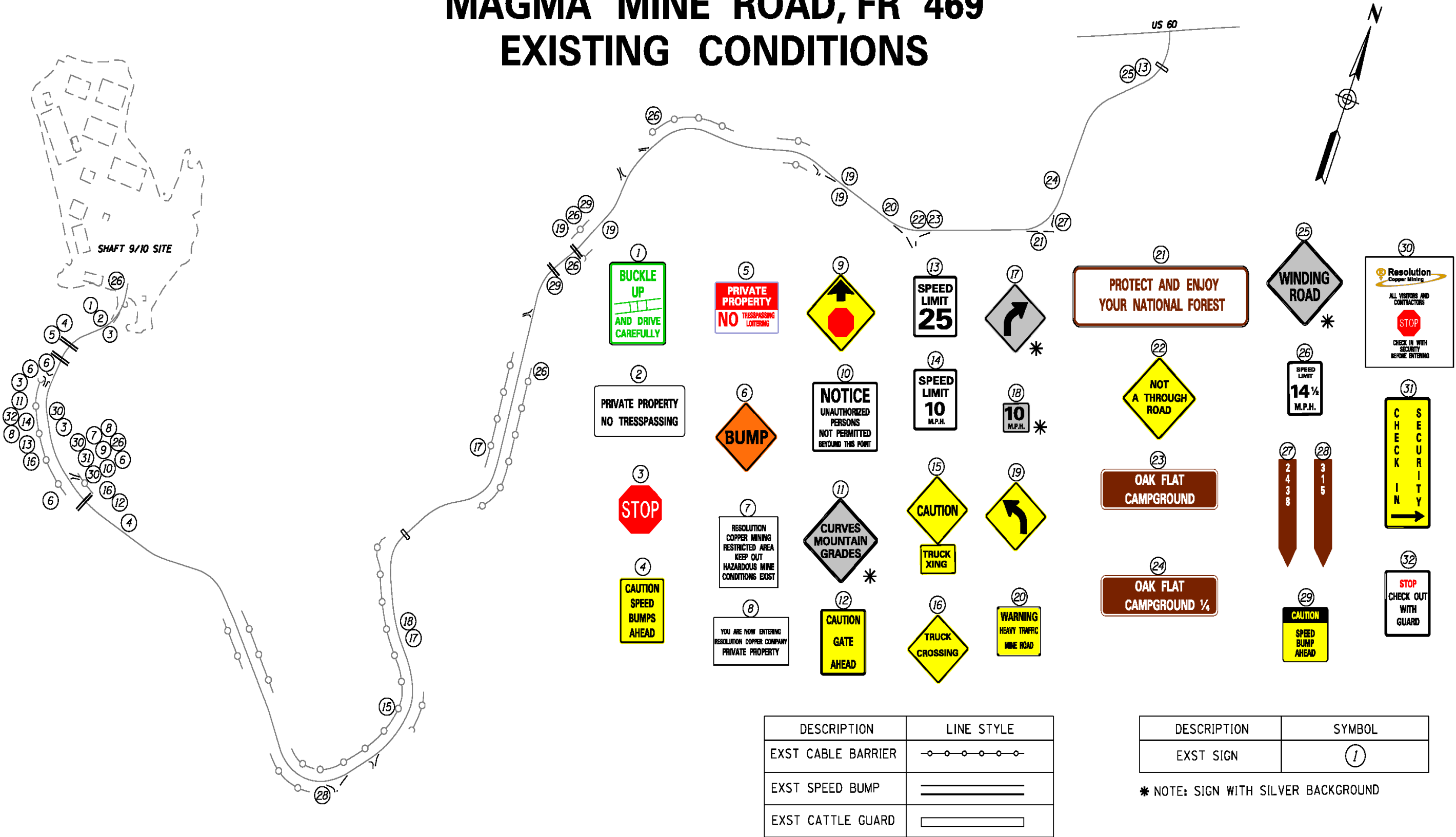


Figure 3. Schematic of Existing Conditions

MAGMA MINE ROAD, FR 469 RECOMMENDED IMPROVEMENTS AND EXISTING FEATURES AND SIGNS TO REMAIN

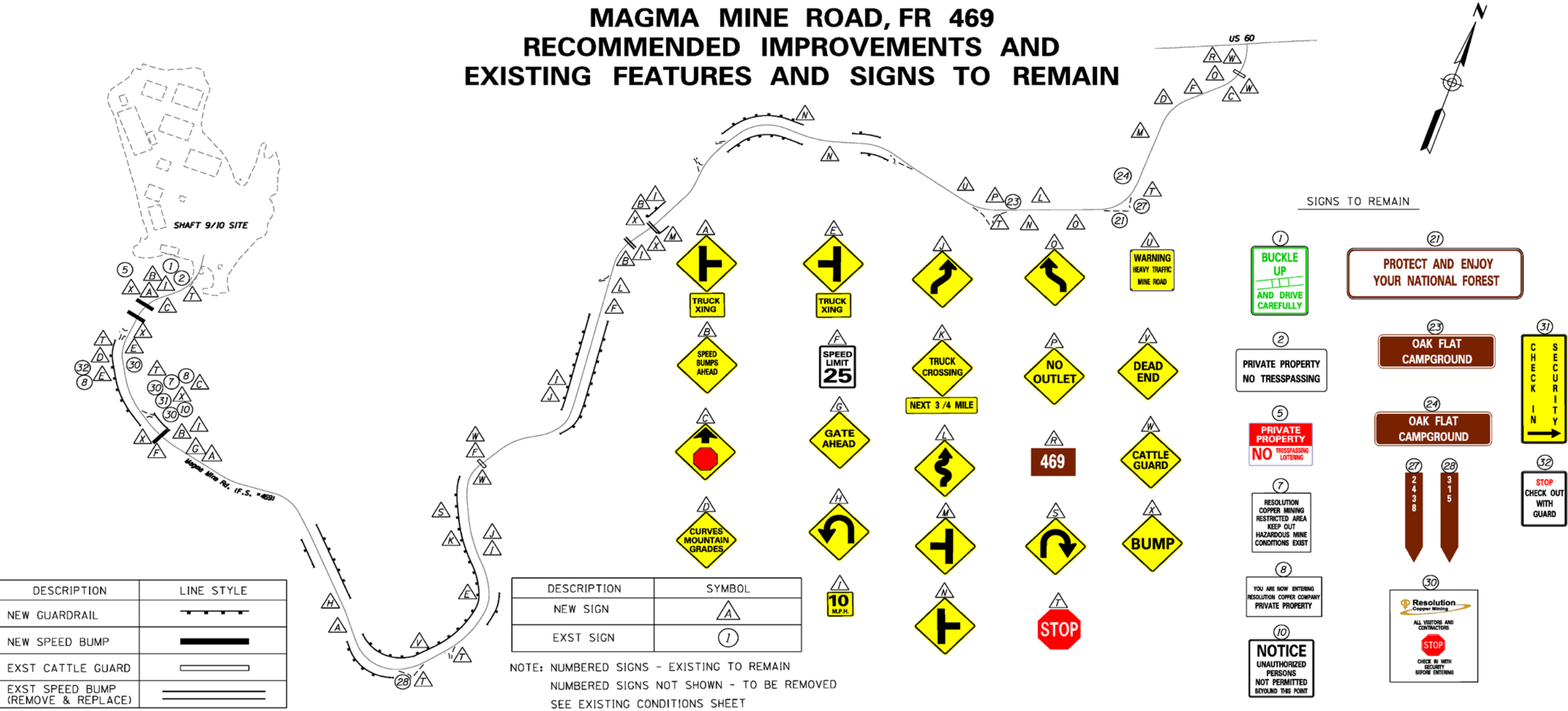
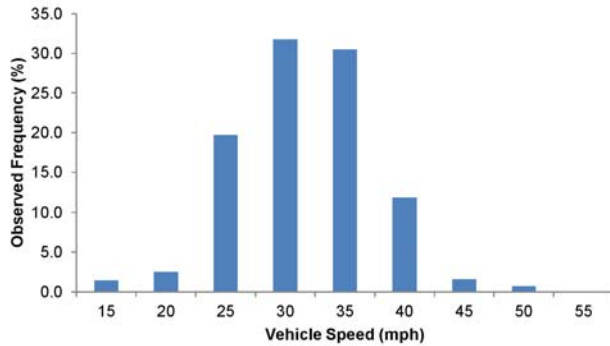


Figure 4. Schematic of Recommended Improvements and Existing Features and Signs to Remain

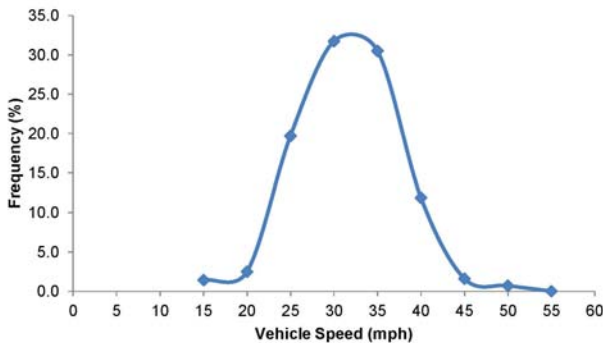
ATTACHMENT 1: TRAFFIC ENGINEERING SPEED STUDY

RESOLUTION COPPER MINING MAGMA MINE ROAD FR 469

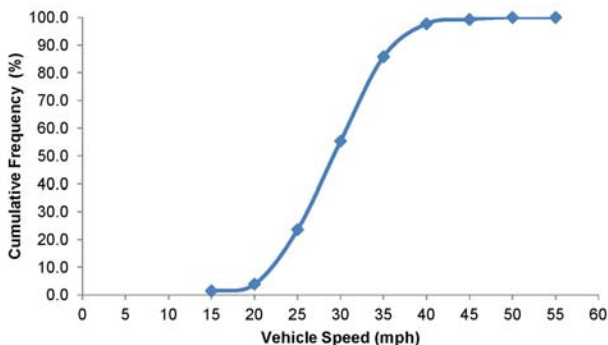


TRAFFIC ENGINEERING SPEED STUDY

OCTOBER 2011



PREPARED FOR:



PREPARED BY:

AZTEC
TYP SA Group
www.typsa.es



EXPIRES 9/30/2012

AZTEC ENGINEERING GROUP, INC.
4561 EAST MCDOWELL ROAD | PHOENIX, AZ 85008
P: 602.454.0402 | F: 602.454.0403

Magma Mine Road, FR 469

Traffic Engineering Speed Study

Prepared for:



Prepared by:



4561 East McDowell Road
Phoenix, Arizona 85008
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EXPIRES 9/30/2012

October 2011

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EXECUTIVE SUMMARY

At the request of Tonto National Forest (TNF) this study analyzed the recent improvements and conditions of Magma Mine Road (MMR) and proposes a posted speed limit of 25 mph for the length of the route between its intersection with US 60 and the private gated entrance, for an approximate length of 2 miles.

The study was analyzed in accordance the Arizona Department of Transportation (ADOT) speed study guidelines and the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD). The analysis included the evaluation of curves, sight distance, spot speed data, test car runs, roadway conditions, and roadside environment along MMR.

1.0 INTRODUCTION

Resolution Copper Mining (RCM) retained AZTEC to perform a traffic engineering speed study on MMR. The study was requested by TNF in a letter to RCM dated June 22, 2011. A copy of the letter can be found in **Appendix A**.

Recent roadway maintenance and safety improvements on MMR were completed September 23, 2011, which included repaving the roadway surface, new and additional guardrail sections, new pavement markings, and new signing. MMR is 2.2 miles long between its intersection with US 60 and the entrance to the RCM private lands (shafts No. 9 and No. 10). MMR is located within the TNF boundary and also provides access to Oak Flat Campground. The location of MMR is shown in **Figure 1**.

This study analyzed the recent improvements and conditions of MMR and proposes a posted speed limit for the length of the route between its intersection with US 60 and the private gated entrance, for an approximate length of 2 miles. Due to the stop conditions at the security gate, the remaining 0.2 miles on RCM private lands were not analyzed.

2.0 SPEED STUDY CONCEPTS

The speed study was performed in accordance ADOT Traffic Engineering, Policies, Guidelines, and Procedures (PGP), Section 222 – Speed Studies. A copy of the ADOT PGP can be found in **Appendix B**.

Motorists tend to drive at speeds considered reasonable and safe, and adjust their speeds in reaction to the roadside environment and road conditions rather than by posted speed limits. Speed limits set unreasonably low (or high) will be ignored by a large percentage of drivers. This tends to lead to disrespect and credibility with motorists and difficulty for law enforcement. Experience has shown that speed limits set at or near the 85th-percentile speed in conjunction with other factors is representative of reasonable and prudent motorists' driving behavior. In other words, roadways with mountainous grades and curvilinear alignments can have a significant factor in determining posted speed limits.

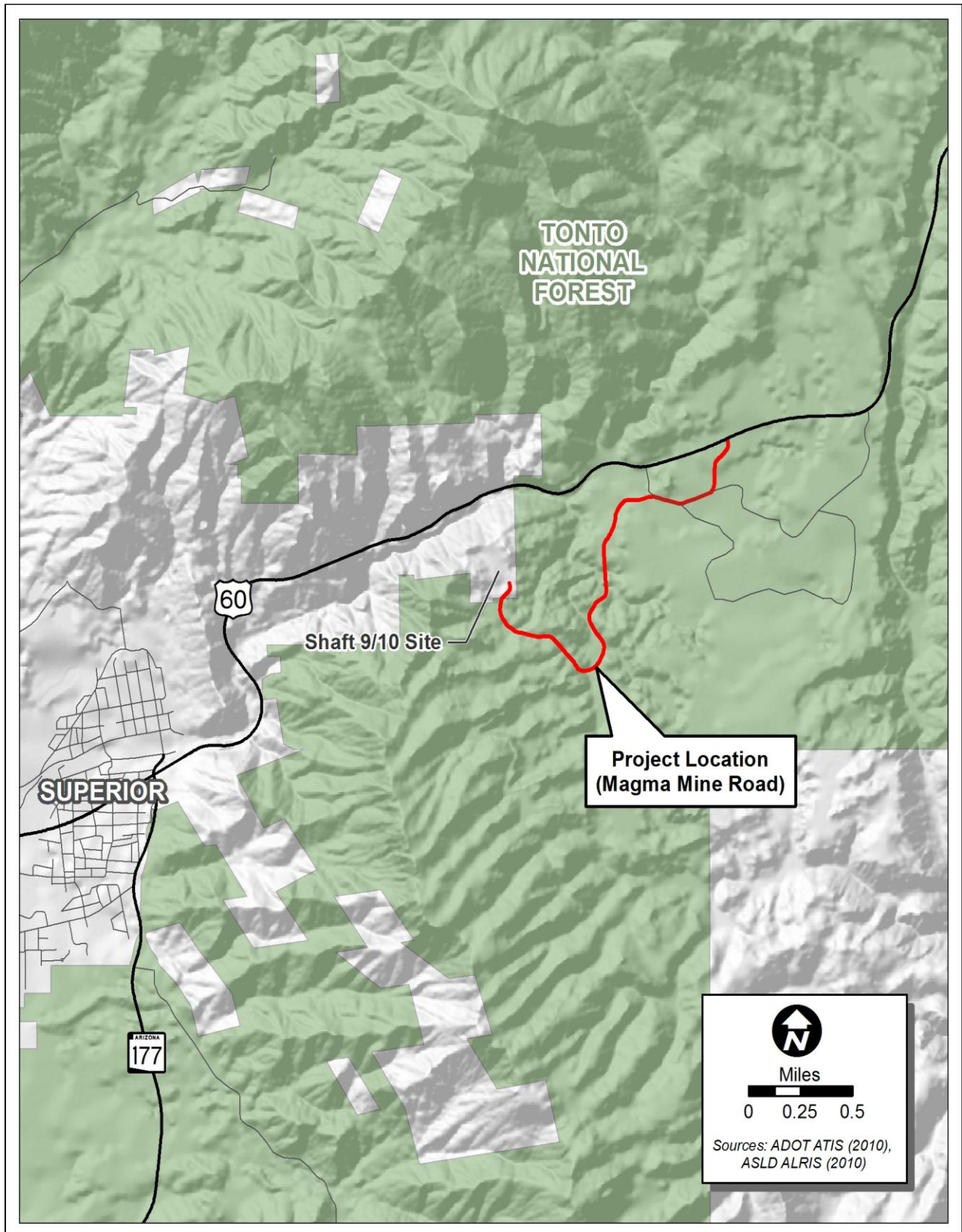


Figure I. Project Location

3.0 STUDY METHODOLOGY

AZTEC performed the following tasks to review and evaluate the existing operations of MMR:

1. Field site visit of MMR was conducted to document the existing roadway conditions and roadside environment. This included the performance of ball bank measurements of curves, sight distance measurements, and test car runs.
2. An evaluation of average, mean, pace, and 85th percentile spot speeds in conjunction with the roadway conditions and roadside environment was performed.
3. Based on the site visit and evaluation above, a proposed posted speed limit for the length of MMR was determined.

4.0 EXISTING CONDITIONS

MMR is a 2.2 mile long paved roadway located within the TNF boundary surrounded by mountainous terrain with a posted speed limit of 25 mph. Based on the traffic data collected on September 27th and September 28th, MMR has an average daily traffic volume of approximately 580 vehicles per day. Crash data for MMR was not available.

MMR roadway surface conditions, pavement marking, and signing are in good conditions as a result of recent roadway maintenance and safety improvements completed on September 23, 2011. This included repaving the roadway surface, new and additional guardrail sections, new pavement markings, and new signing. MMR paved surface width is 23 feet with 11.5 foot wide travels lanes separated by a double-yellow pavement marking.

For the length of MMR there are numerous curves identified with advanced curve warning signs and these curves were evaluated in a detailed ball bank analysis discussed later in this report.

Roadside hazards are delineated with guardrail protection where the remaining sections of MMR are clear of roadside hazards, except for one location with potential roadside obstructions at approximate mile 1.2, near an existing cattle guard. This area

is in a rock cut, immediately adjacent to the pavement edge, within an S-curve, which with the combination of these roadway features has a potential to influence driver behavior.

5.0 BALL BANK ANALYSIS

AZTEC performed a ball bank analysis in accordance with the ADOT PGP, Section 321 – Horizontal Alignment Warning Signs and MUTCD, on September 26, 2011 of all signed curves along MMR. A copy of the ADOT PGP, MUTCD, and ball bank field data can be found in **Appendix C**.

AZTEC conducted trial runs at a total of ten curves using a standard light truck (passenger vehicle equivalent) equipped with a ball bank indicator. The ball bank indicator provides the combined effect of vehicle body roll, centrifugal force, and superelevation. The ball bank indicator is used to determine the maximum comfortable speed for curves. For each curve three free-flowing trial runs in each direction were performed starting at the posted speed of 25 mph. Subsequent runs were made at 5 mph above and below the posted speed. From this information recommended advisory speeds for the curves were determined. Where there was a combination of curves, the lowest recommended speed of any curve was used to determine the comfortable speed for the entire combination curve.

The MUTCD provides the following criteria used to determine the maximum comfortable speed for each curve.

Table 1 – Ball Bank Criteria	
Ball Bank Reading (Degrees)	Speed (mph)
16	≤20
14	25 – 30
12	≥35

Based on the results and analysis of the ball bank trial runs, it is determined that the maximum comfortable speed for all curves is 25 mph.

6.0 SIGHT DISTANCE

AZTEC collected sight distance measurements at four locations along MMR on September 26, 2011 using a vehicle equipped with a Distance Measuring Instrument (DMI). A copy of the ADOT Roadway Design Guidelines, AASHTO, and sight distance field data can be found in **Appendix D**.

The four locations were at mile location 0.25 (Forest Road 2438), 0.41 (Oak Flat Campground), 1.52, and 1.57 (Forest Road 315). These locations were chosen based on the potential for unexpected entries onto MMR and the horizontal curvature in each area.

Based on a posted speed of 25 mph and an assumed design speed of 35 mph, the minimum design stopping sight distance is 250 feet according to AASHTO. The measured sight distances at each location along MMR are greater than the minimum 250 feet.

7.0 SPEED STUDY ANALYSIS

For the purpose of this report, the study limits included the 2 miles between the intersection with US 60 and the private gated entrance. Due to the stop conditions at the security gate, the remaining 0.2 miles on RCM private lands was not analyzed.

AZTEC used an outside source (United Civil Group) to collect spot speed data at seven locations and AZTEC performed test car runs along MMR. The spot speed data and test car runs can be found summarized in **Appendix E**.

Bi-directional spot speed data was collected for a 48-hour period by automatic counters with pneumatic road tubes placed across the entire roadway at seven locations along MMR on September 27, 2011 and September 28, 2011. The locations were at mile locations 0.19, 0.33, 0.49, 0.86, 1.05, 1.36, and 1.74, as identified in **Appendix E**. The locations were chosen based on the relatively tangent and level sections of MMR.

The spot speed data collected at each location was used to calculate the average speed, median speed, 85th percentile speed, pace speed, standard deviation,

and the data was presented in frequency distribution graphs. All of the resultant speed data characteristics can be found in **Appendix E** and are defined below:

Average Speed: The arithmetic mean of all vehicle speeds (the sum of all speeds divided by the number of speeds).

Median Speed: The speed representation of the middle value in a series of spot speed arranged in order (50th percentile). Fifty percent of the speed values will be greater than the median, and fifty percent will be less than the median value.

85th Percentile Speed: Is the speed that 85 percent of the vehicles travel below and 15 percent of the vehicles travel above.

Pace Speed: Is the 10mph range that contains the largest number of observed vehicles.

Standard Deviation: Is the measure of spread about the median speed.

The results of the spot speed data characteristics along MMR are summarized in directional speed profiles shown in **Figure 2**, **Figure 3**, and **Figure 4**.

As a comparative analysis, AZTEC also performed test car runs along MMR between the intersection with US 60 and the private gated entrance. Two drivers drove the 2 mile distance in each direction in free flow conditions representing a typical vehicle for two test runs per driver. The passenger recorded the travel time using a stop watch. The time traveled divided by the distance produced an average speed for all test runs. The average test car run resulted in 33.3 mph with a speed range between 30.7 mph to 35.8 mph.

MAGMA MINE ROAD, FR 469 SB SPEED CHARACTERISTICS

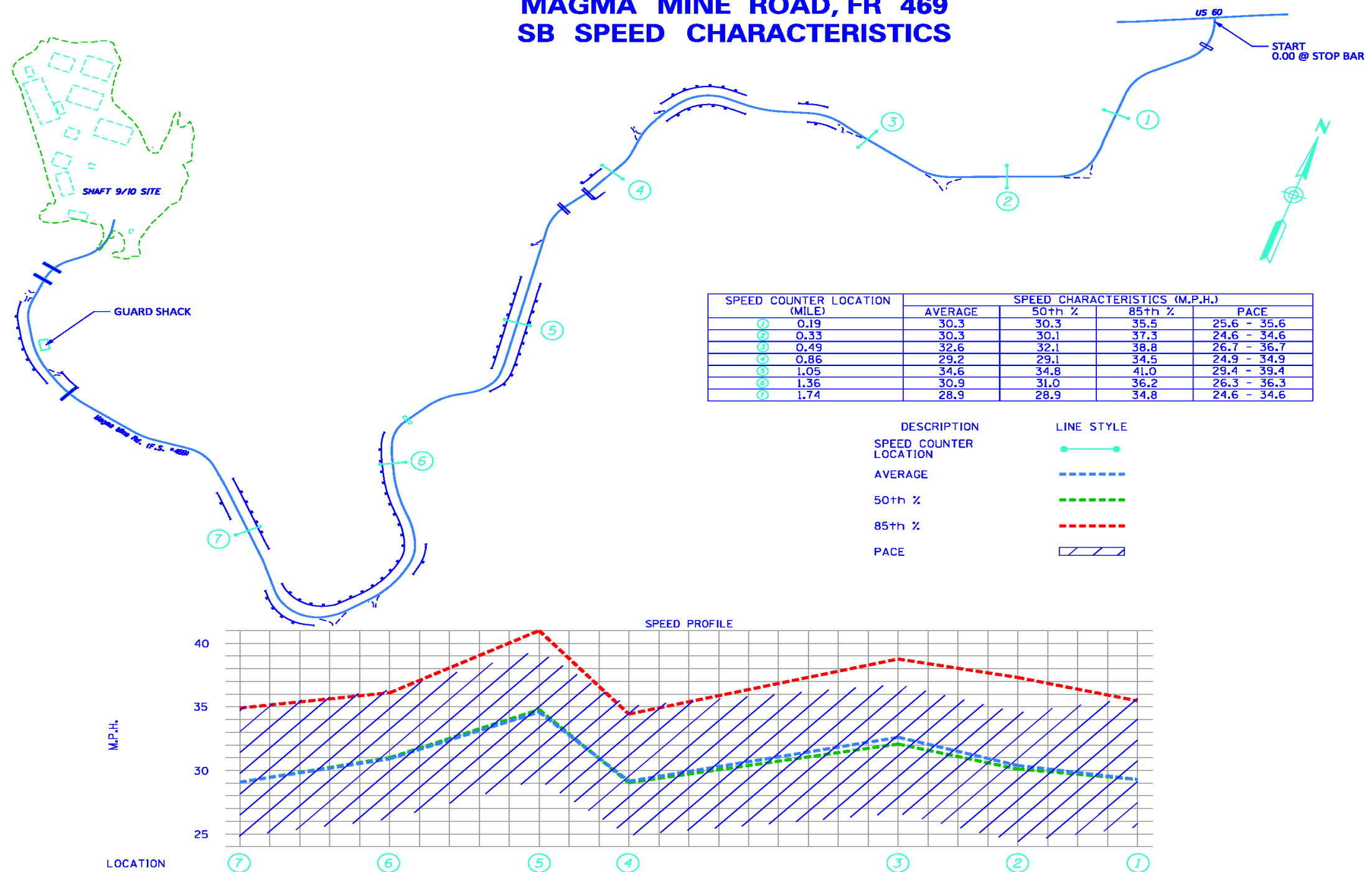


Figure 2. Southbound Speed Profile

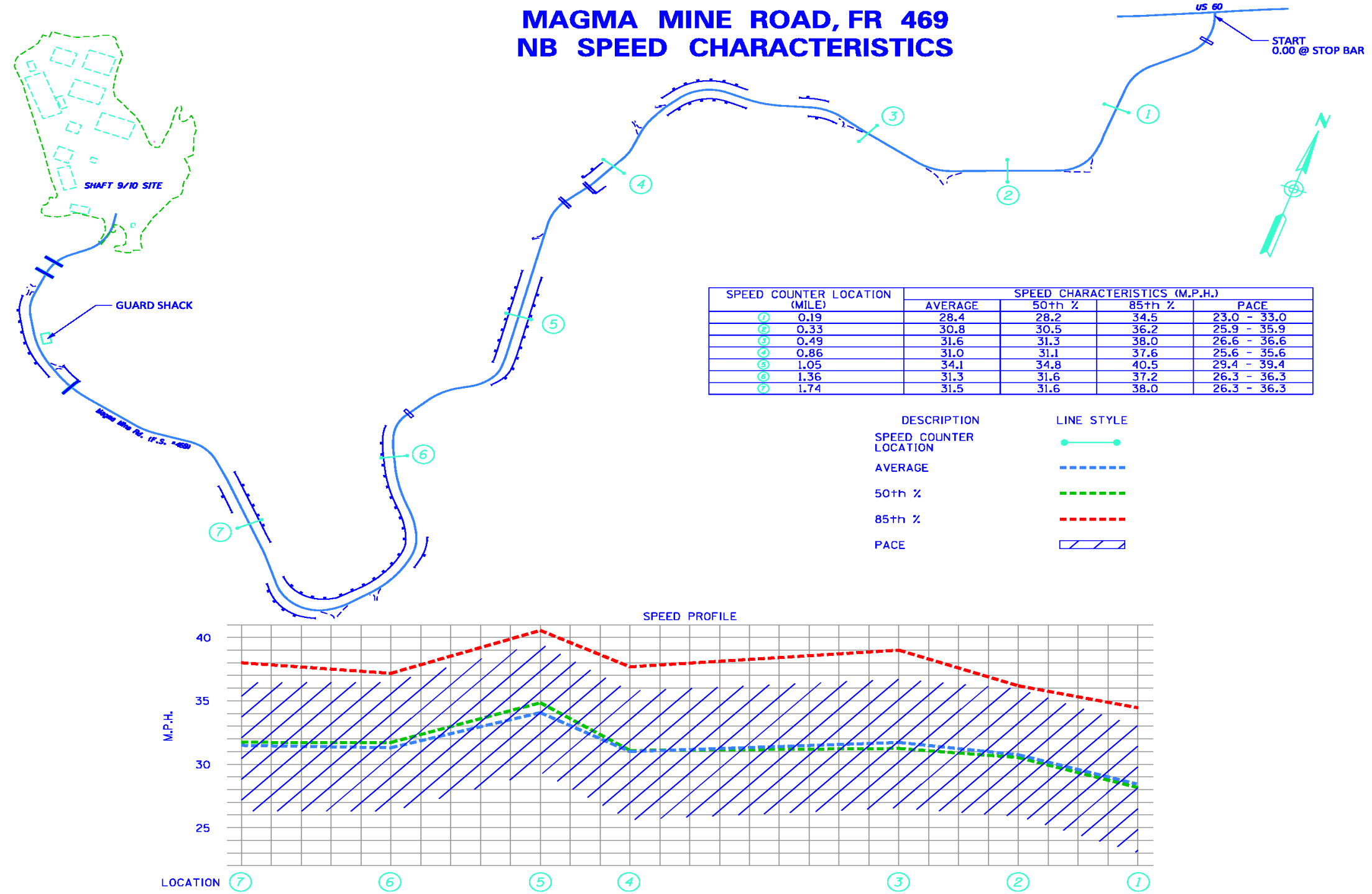


Figure 3. Northbound Speed Profile

MAGMA MINE ROAD, FR 469 COMBINED (NB / SB) SPEED CHARACTERISTICS

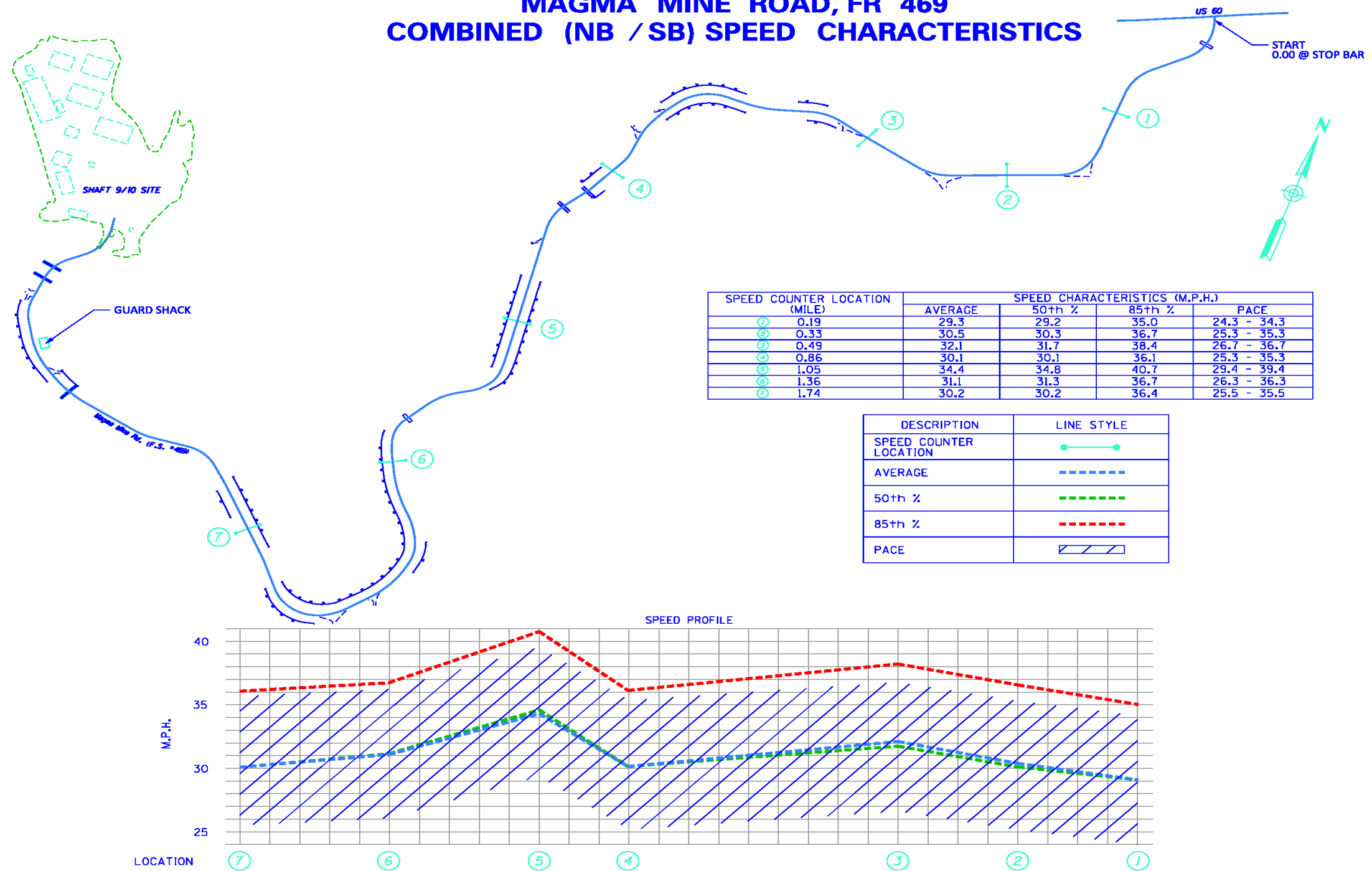


Figure 4. Combined (Southbound/Northbound) Speed Profile

8.0 CONCLUSIONS / RECOMMENDATIONS

Based on the roadway and roadside environment it is proposed that the posted limit of MMR between US 60 and the private gated entrance should be 25 mph. Based on the ball bank and sight distance analysis, this is reflective of the comfortable speed adjustments motorists must make for the entire length of the winding mountainous roadway of MMR.

Even though the majority of motorists exceed the posted limit on small portions of MMR, the remaining roadway conditions and warning signs influence the motorists to travel at reasonable and prudent speeds.

APPENDIX A: TONTO NATIONAL FOREST REQUEST LETTER



United States
Department of
Agriculture

Forest
Service

Tonto National Forest

2324 E. McDowell Rd.
Phoenix, AZ 85006
Phone: 602.225.5200
Fax: 602.225.5295
V/TTY: 602.225.5395

File Code: 2810

Date: June 22, 2011

Vicky Peacey
Manager, Environmental Assessments
Resolution Copper Mining
102 Magma Heights
P.O. Box 1944
Superior, AZ 85273

RE: Resolution Pre-Feasibility Activities
Plan of Operations #03-12-02-006
Magma Mine Road Repair, Maintenance and Care Plan

Dear Ms. Peacey:

We are in receipt of the Magma Mine Road Repair, Maintenance and Care Plan dated June 2011, submitted by WestLand Resources, Inc. on June 8, 2011. Development of this plan complies with *Section 6.1.1 (7)* of the subject *Plan of Operations* (Plan) and, when final, will be incorporated into the Plan as *Appendix H*.

The Magma Mine Road Repair, Maintenance and Care Plan (Appendix H), as submitted, is approved for immediate implementation, subject to the following conditions relative to Attachment H-2 [Engineering Judgment Report (EJR) prepared by Aztec Engineering Group, Inc.]:

1. The EJR shall be amended to include an analysis which supports the determination of speed zones and a summary of how the analysis was applied in developing the speed zones. Planned methods of data collection to be employed in the analysis shall receive Forest Service approval prior to implementation. Within 30 days after completing the repaving stage of the initial repair episode, the required analysis for speed zone determination shall be conducted, and installation of appropriate signing establishing speed zones shall be completed.
2. The EJR cover page shall be amended to include a registered engineer's stamp with the engineer's original signature and date across the stamp.
3. Discussion of speed bumps on Page 15 of the EJR shall be revised to indicate that the two speed bumps located adjacent to drill site *OF-2N* will only remain until December 31, 2014 (corresponding to the authorized length of occupancy at drill site *OF-2N*).



4. An amended EJR complying with conditions 1 through 3 above shall be completed and submitted to our office within 30 days following completion of the repaving stage of the initial repair episode.

If you have questions, please contact Lee Ann Atkinson at our Globe Ranger District.

Sincerely,



THOMAS J. KLABUNDE
Forest Supervisor

cc: Richard D Reitz

APPENDIX B: ADOT PGP – SECTION 222 SPEED STUDIES

222 SPEED STUDIES

ARS 28-702 requires that all posted speed zones be based on an engineering and traffic investigation, herein referred to as a traffic engineering study.

Speed zoning revisions may be necessary because of highway improvements, roadside development, traffic operational changes, route and milepost changes, or requests. It is important that speed regulations be updated promptly to reflect any revisions to the existing speed zoning.

On new highway alignments or major highway reconstruction projects, the speed study should be conducted as soon as possible after the work has been completed.

Several factors may affect the 85th percentile speed. Analysis of these factors in conjunction with the 85th percentile speed provides an accurate representation of traffic operating conditions along any given section of highway and provides a scientific basis for the selection of speed limits:

- A. Length of section
- B. Alignment
- C. Roadway width and shoulders
- D. Surface condition
- E. Sight distance
- F. Traffic volume
- G. Accident experience
- H. Maximum comfortable speed on curves
- I. Side friction (roadside development)
- J. Parking practices and pedestrian activity
- K. Signal progression.

To achieve a comfortable operating speed, a specific location may justify a speed that is lower than the lawful posted speed for a given section of highway, such as an isolated horizontal curve on an otherwise straight section. Such locations may be treated by the application of special warning signs such as Curve and Turn signs with advisory speed signs.

To promote efficiency and still provide an adequate representative sample for speed zone studies, the sample size should be based on the following criteria:

- a. If hoses or other electrical and/or mechanical devices are selected to collect speed data, procure a sample of vehicles during a 24-hour period for each travel direction.
- b. If radar is selected to collect speed data, and

- i. If the average daily traffic (ADT) is under 2000, procure a minimum sample size of 50 vehicles per direction within a maximum time limit of two hours.
- ii. If the ADT is 2000 and over, procure a minimum sample size of 100 vehicles per direction within a maximum time limit of two hours.

Every effort should be made to disguise or conceal the fact that speeds are being recorded, otherwise distorted data may be collected, the analysis of which may lead to unrealistically low speed limits. A speed survey should be made at times of the day when it is possible to measure free-flowing traffic. Free-flowing traffic is defined as a condition when drivers have relative freedom to choose a speed without interference from other traffic. Usually, these conditions do not occur during peak traffic hours. An exception would be low-volume facilities. The first vehicle in a platoon should be monitored unless all are free-flowing.

New speed zones and adjustments to existing speed zones shall be established only when a traffic engineering study shows roadway conditions to be satisfactory for that speed. Traffic engineering studies recommending new speed zones and adjustments to existing speed zones shall be stamped by a registered professional engineer and submitted to the State Traffic Engineer prior to initiating a speed regulation change.

The Speed Limit sign changes recommended in a traffic engineering study shall not be posted in the field until the new speed regulation has been adopted.

APPENDIX C: BALL BANK ANALYSIS

321 HORIZONTAL ALIGNMENT WARNING SIGNS

Horizontal alignment warning signs are intended to be placed only when an engineering evaluation of roadway, geometric, and operating conditions shows that a reduction of speed by the vehicle operator may be required to comfortably maneuver through the change in the horizontal alignment of the roadway.

Trial speed runs are made using a passenger car equipped with a ball bank indicator to show the combined effect of the vehicle body roll, the centrifugal force, and the superelevation.

The first trial run should be made at the posted speed limit or at a lower speed somewhat below the anticipated maximum comfortable speed. Subsequent trial runs, if needed, should be conducted at increasing five mile per hour speed increments until the ball bank indicator exceeds the maximum ball bank reading (as listed in the Ball Bank Table) or the posted speed limit is reached.

The need for horizontal alignment warning signs is based on ball bank indicator readings. The correlation between comfortable curve and turn speeds and ball bank readings is as follows:

BALL BANK TABLE
(Ball Bank Indicator Criteria for Comfortable Speeds for Curve Signs)

Trial Run Speed (mph)	Maximum Ball Bank Reading
10 - 20	14 degrees
25 - 30	12 degrees
35 or greater	10 degrees

Existing horizontal alignment warning signs may remain in place until maintenance is required.

321.1 SIGNING APPLICATIONS

Horizontal alignment warning signs should be installed where the comfortable speed of a curve, turn, or combination thereof is less than the speed limit. For multilane divided highways, horizontal alignment warning signs should be installed on both sides of the roadway.

Horizontal alignment warning signs may be installed where it is determined by a traffic engineering evaluation that the 85th percentile speed approaching the curve

or turn is greater than the speed limit, and the comfortable speed of the curve or turn is less than the 85th percentile speed. Accident data, maintenance records, and traffic conflicts observed in the field may be included in the engineering evaluation.

A. Curve and Turn Signs

i. Turn Sign (W1-1)

The Turn sign (W1-1R or W1-1L) should be installed where the maximum comfortable speed on a turn is 30 miles per hour or less.

ii. Curve Sign (W1-2)

The Curve sign (W1-2R or W1-2L) should be installed where the maximum comfortable speed on a curve is greater than 30 miles per hour with ball bank readings as indicated by the Ball Bank Table.

B. Combination Curve Signs

A combination curve consists of two or more successive curves or turns in any combination in the same or opposite directions, either contiguous or connected by tangent sections less than 600 feet long. The recommended comfortable speed for a combination curve should be the lowest recommended speed on any of the curves making up the combination curve and, if that curve justifies a sign, the entire combination curve should be signed.

If the first curve or turn is to the left, a 'left' sign shall be used. If the first curve or turn is to the right, a 'right' sign shall be used.

i. Reverse Turn Sign (W1-3)

The Reverse Turn sign (W1-3R or W1-3L) should be installed where the combination curve consists of two turns or a curve and a turn in opposite directions.

ii. Reverse Curve Sign (W1-4)

The Reverse Curve sign (W1-4R or W1-4L) should be installed where the combination curve consists of two curves in opposite directions.

iii. Winding Road Sign (W1-5)

The Winding Road sign (W1-5R or W1-5L) should be installed where the combination curve consists of a series of three or more curves or turns.

iv. Horseshoe Curve Turn Sign

The Horseshoe Curve turn sign (W2-8R or W2-8L) may be installed where a turn or a combination curve consisting of two turns or a curve and a turn in the same direction results in a change in the horizontal alignment greater than 90 degrees. Engineering judgment should be used to ensure that a roadway tangent segment connecting two turns or a curve and a turn is insufficient in length to allow independent signing.

The Horseshoe Curve turn sign is not intended for use where the comfortable speed on the curve or combination curve is greater than 30 miles per hour; instead, appropriate curve signing should be used.

C. Supplemental Horizontal Alignment Warning Signs

Supplemental horizontal alignment warning signs may be used to give notice of a sharp change in horizontal alignment. When used, they should be erected on the outside of the turn or on the far side of an intersection, in line with and at right angles to, approaching traffic.

i. Large Arrow Sign (W1-6)

The Large Arrow sign (W1-6R or W1-6L) may be used where a Turn sign is justified.

ii. Chevron Alignment Sign (W1-8)

Chevron Alignment signs (W1-8) may be used to supplement standard delineation or as an alternate or supplement to the Large Arrow sign.

Spacing of signs shall be such that the motorist always has two or more signs in view until the change in alignment eliminates the need for the signs. Typically, the signs may be mounted at a height of as low as four feet in rural areas where used as a supplement to standard delineation; any deviation in mounting height shall be justified by a field review.

iii. Curves/Mountain/Grades Sign (W7-10)

Roadway conditions in mountainous areas containing frequent curves and/or turns and gradients may require a signing supplement to describe approaching roadway conditions for a general section of roadway rather than a specific location. The Curves/Mountain/Grades sign (W7-10) may be used as a supplement

to standard horizontal alignment warning signs under the following conditions:

- a. The Winding Road sign is being used to warn of a series of turns and/or curves, or
- b. The Use Lower Gears sign (W7-2c) is being used to warn of steep grades, or
- c. The roadway section containing frequent curves and/or turns and gradients has a minimum length of 5 miles.

Where the Curves/Mountain/Grades sign is used, it shall be supplemented with the Next ____ Miles plate (W15-2d). The W7-10 and W15-2d signing combination shall be installed for both directions in advance of the roadway section and may be repeated as deemed necessary within each section.

The Curve sign, Turn sign, or Large Arrow sign may be used to provide supplemental warning of a change in horizontal alignment when the alignment is not visible to the driver, such as a horizontal curve at or just beyond a vertical curve.

D. Advisory Speed Signs

Advisory speed values shall be in increments of five miles per hour. The minimum Advisory Speed sign shall be ten miles per hour. The Advisory Speed sign shall not exceed the speed limit.

i. Advisory Speed Plates (W13-1)

Advisory Speed plates (W13-1) should supplement Turn signs (W1-1R or W1-1L) and Curve signs (W1-2R or W1-2L). The advisory speed shall be determined by trial speed runs using a passenger car equipped with a ball bank indicator.

ii. Advisory Exit Speed Signs (W13-2)

The Advisory Exit Speed sign (W13-2) should be used on expressway and freeway off-ramps leading to a lower-type facility. The sign shall indicate the comfortable speed for that portion of the ramp from the painted gore to a point 1000 feet beyond the painted gore. Horizontal alignment warning signs for the first 1000 feet may be omitted. For curves and turns beyond the first 1000 feet of the ramp, horizontal alignment warning signs should be installed where justified.

iii. Advisory Ramp Speed Signs (W13-3)

The Advisory Ramp Speed sign (W13-3) should be used on direct ramp connections at the junction of two expressways or freeways where a normal exit ramp is not involved or at an entrance to an expressway or freeway from another high-type facility where an advisory speed sign is justified. The sign shall indicate the comfortable speed for that portion of the ramp from the painted gore to a point 1000 feet beyond the painted gore. Horizontal alignment warning signs for the first 1000 feet may be omitted. For curves and turns beyond the first 1000 feet of the ramp, horizontal alignment warning signs should be installed where justified.

321.2 UNPAVED ROADWAYS

Unpaved roads normally should not be speed zoned, due to the high potential for varying roadway conditions, nor should Advisory Speed plates (W13-1) be installed with Curve or Turn signs. However, a field investigation shall be conducted to determine an approximate “reasonable and prudent” speed for a section of highway. Using this as a guideline, sections of roadway shall be run at that particular speed. Using a combination of engineering judgment and present curve sign criteria, Curve (W1-2), Reverse Curve (W1-4), or Winding Road (W1-5) signs should be installed at those locations requiring a speed reduction of at least 5 mph below the estimated “speed limit”. The Turn (W1-1) or Reverse Turn (W1-3) sign should be installed at locations where the safe speed is 30 mph or less. The Large Arrow (W1-6) or Chevron Alignment (W1-8) signs may be installed in conjunction with turn signs, if deemed necessary during the field review.

04 *Minimum spacing between warning signs with different messages should be based on the estimated PRT for driver comprehension of and reaction to the second sign.*

05 *The effectiveness of the placement of warning signs should be periodically evaluated under both day and night conditions.*

Option:

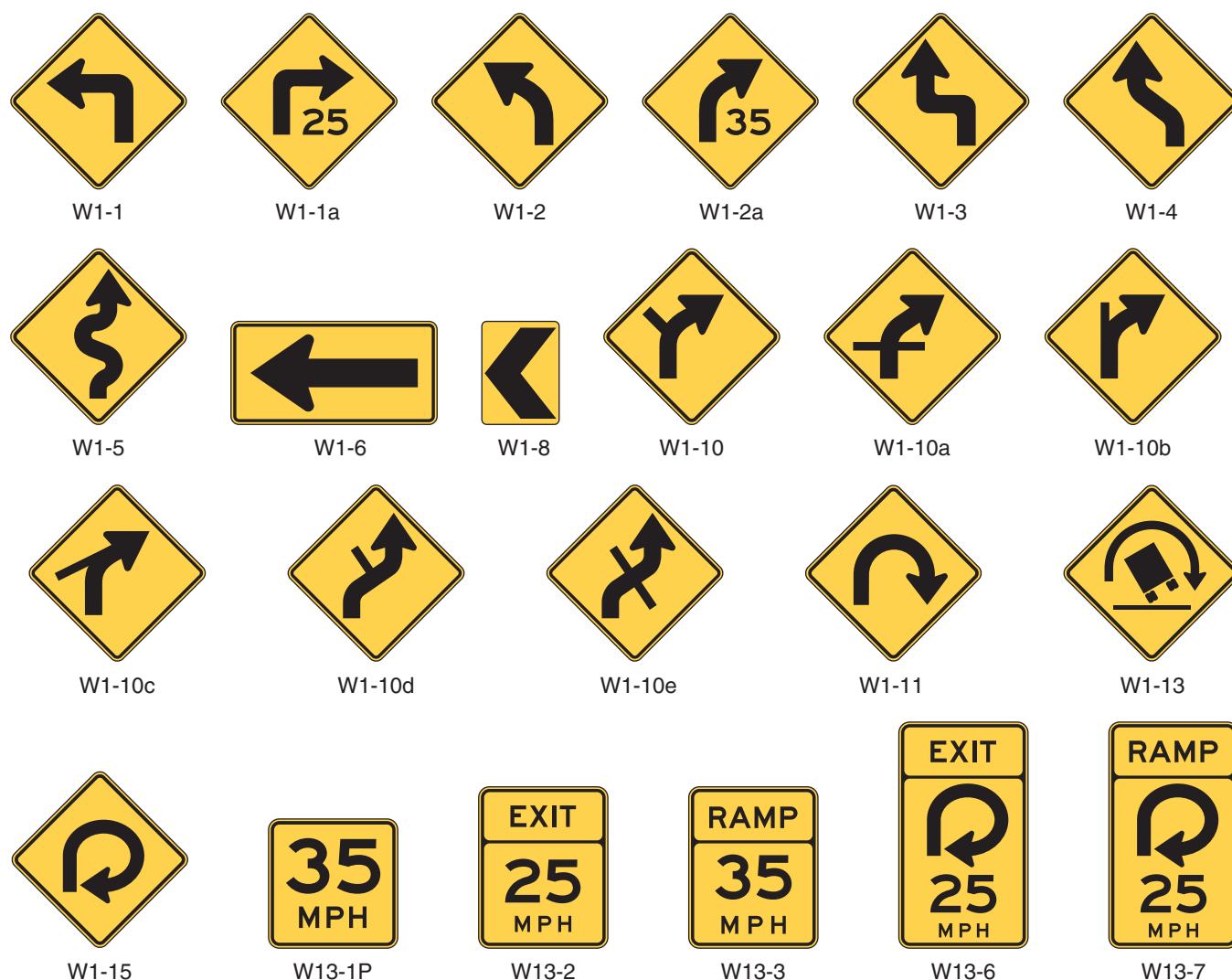
06 Warning signs that advise road users about conditions that are not related to a specific location, such as Deer Crossing or SOFT SHOULDER, may be installed in an appropriate location, based on engineering judgment, since they are not covered in Table 2C-4.

Section 2C.06 Horizontal Alignment Warning Signs

Support:

01 A variety of horizontal alignment warning signs (see Figure 2C-1), pavement markings (see Chapter 3B), and delineation (see Chapter 3F) can be used to advise motorists of a change in the roadway alignment. Uniform application of these traffic control devices with respect to the amount of change in the roadway alignment conveys a consistent message establishing driver expectancy and promoting effective roadway operations. The design and application of horizontal alignment warning signs to meet those requirements are addressed in Sections 2C.06 through 2C.15.

Figure 2C-1. Horizontal Alignment Signs and Plaques



Note: Turn arrows and reverse turn arrows may be substituted for the curve arrows and reverse curve arrows on the W1-10 series signs where appropriate.

Standard:

- 02 **In advance of horizontal curves on freeways, on expressways, and on roadways with more than 1,000 AADT that are functionally classified as arterials or collectors, horizontal alignment warning signs shall be used in accordance with Table 2C-5 based on the speed differential between the roadway's posted or statutory speed limit or 85th-percentile speed, whichever is higher, or the prevailing speed on the approach to the curve, and the horizontal curve's advisory speed.**

Option:

- 03 Horizontal Alignment Warning signs may also be used on other roadways or on arterial and collector roadways with less than 1,000 AADT based on engineering judgment.

Section 2C.07 Horizontal Alignment Signs (W1-1 through W1-5, W1-11, W1-15)**Standard:**

- 01 **If Table 2C-5 indicates that a horizontal alignment sign (see Figure 2C-1) is required, recommended, or allowed, the sign installed in advance of the curve shall be a Curve (W1-2) sign unless a different sign is recommended or allowed by the provisions of this Section.**
- 02 **A Turn (W1-1) sign shall be used instead of a Curve sign in advance of curves that have advisory speeds of 30 mph or less (see Figure 2C-2).**

Guidance:

- 03 *Where there are two changes in roadway alignment in opposite directions that are separated by a tangent distance of less than 600 feet, the Reverse Turn (W1-3) sign should be used instead of multiple Turn (W1-1) signs and the Reverse Curve (W1-4) sign should be used instead of multiple Curve (W1-2) signs.*

Option:

- 04 A Winding Road (W1-5) sign may be used instead of multiple Turn (W1-1) or Curve (W1-2) signs where there are three or more changes in roadway alignment each separated by a tangent distance of less than 600 feet.
- 05 A NEXT XX MILES (W7-3aP) supplemental distance plaque (see Section 2C.55) may be installed below the Winding Road sign where continuous roadway curves exist for a specific distance.
- 06 If the curve has a change in horizontal alignment of 135 degrees or more, the Hairpin Curve (W1-11) sign may be used instead of a Curve or Turn sign.
- 07 If the curve has a change of direction of approximately 270 degrees, such as on a cloverleaf interchange ramp, the 270-degree Loop (W1-15) sign may be used instead of a Curve or Turn sign.

Guidance:

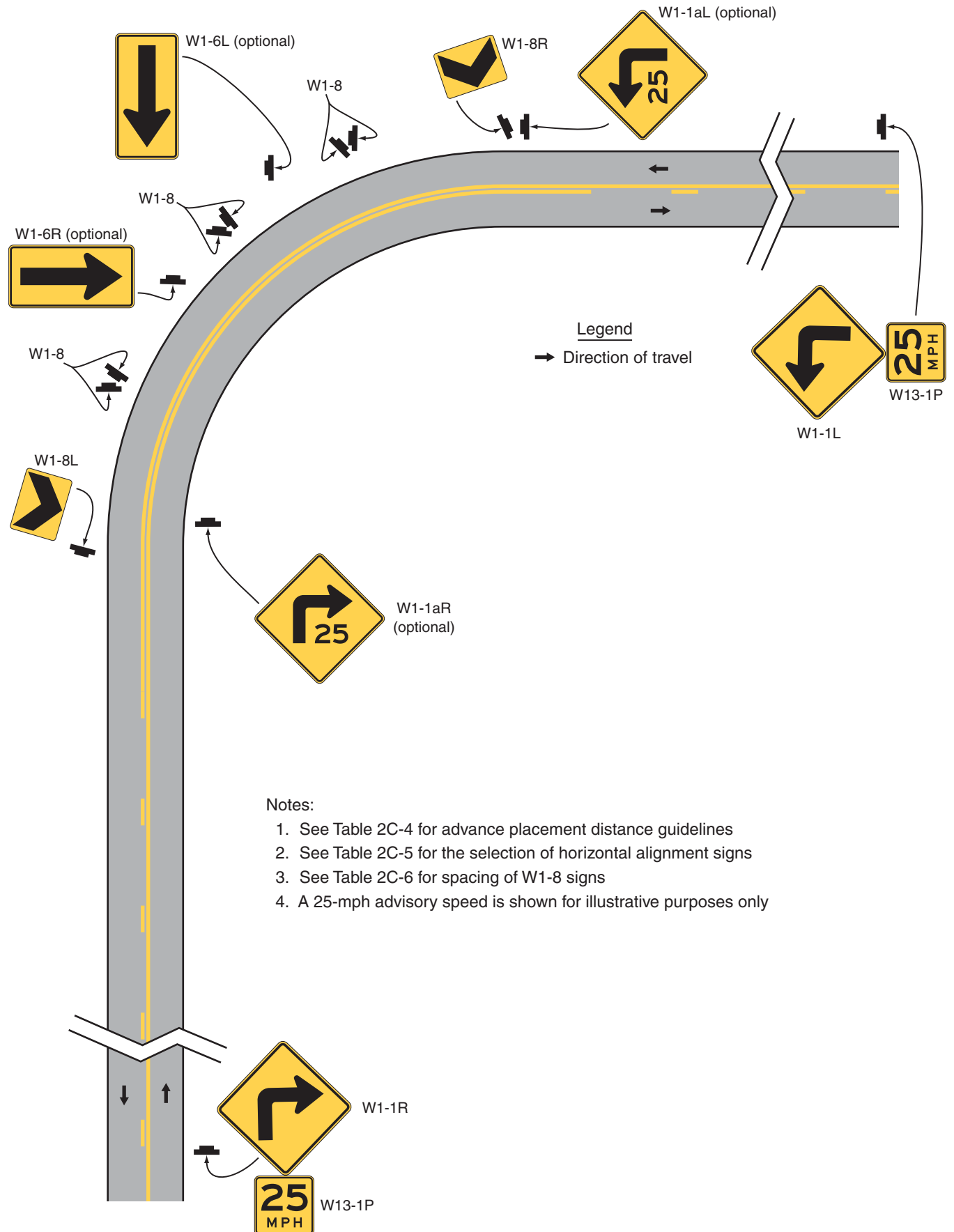
- 08 *When the Hairpin Curve sign or the 270-degree Loop sign is installed, either a One-Direction Large Arrow (W1-6) sign or Chevron Alignment (W1-8) signs should be installed on the outside of the turn or curve.*

Table 2C-5. Horizontal Alignment Sign Selection

Type of Horizontal Alignment Sign	Difference Between Speed Limit and Advisory Speed				
	5 mph	10 mph	15 mph	20 mph	25 mph or more
Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W10-1) (see Section 2C.07 to determine which sign to use)	Recommended	Required	Required	Required	Required
Advisory Speed Plaque (W13-1P)	Recommended	Required	Required	Required	Required
Chevrons (W1-8) and/or One Direction Large Arrow (W1-6)	Optional	Recommended	Required	Required	Required
Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp	Optional	Optional	Recommended	Required	Required

Note: Required means that the sign and/or plaque shall be used, recommended means that the sign and/or plaque should be used, and optional means that the sign and/or plaque may be used.

See Section 2C.06 for roadways with less than 1,000 ADT.

Figure 2C-2. Example of Warning Signs for a Turn

Section 2C.08 Advisory Speed Plaque (W13-1P)**Option:**

- 01 The Advisory Speed (W13-1P) plaque (see Figure 2C-1) may be used to supplement any warning sign to indicate the advisory speed for a condition.

Standard:

- 02 **The use of the Advisory Speed plaque for horizontal curves shall be in accordance with the information shown in Table 2C-5. The Advisory Speed plaque shall also be used where an engineering study indicates a need to advise road users of the advisory speed for other roadway conditions.**
- 03 **If used, the Advisory Speed plaque shall carry the message XX MPH. The speed displayed shall be a multiple of 5 mph.**
- 04 **Except in emergencies or when the condition is temporary, an Advisory Speed plaque shall not be installed until the advisory speed has been determined by an engineering study.**
- 05 **The Advisory Speed plaque shall only be used to supplement a warning sign and shall not be installed as a separate sign installation.**
- 06 **The advisory speed shall be determined by an engineering study that follows established engineering practices.**

Support:

- 07 Among the established engineering practices that are appropriate for the determination of the recommended advisory speed for a horizontal curve are the following:
- A. An accelerometer that provides a direct determination of side friction factors
 - B. A design speed equation
 - C. A traditional ball-bank indicator using the following criteria:
 - 1. 16 degrees of ball-bank for speeds of 20 mph or less
 - 2. 14 degrees of ball-bank for speeds of 25 to 30 mph
 - 3. 12 degrees of ball-bank for speeds of 35 mph and higher

- 08 The 16, 14, and 12 degrees of ball-bank criteria are comparable to the current AASHTO horizontal curve design guidance. Research has shown that drivers often exceed existing posted advisory curve speeds by 7 to 10 mph.

Guidance:

- 09 *The advisory speed should be determined based on free-flowing traffic conditions.*
- 10 *Because changes in conditions, such as roadway geometrics, surface characteristics, or sight distance, might affect the advisory speed, each location should be evaluated periodically or when conditions change.*

Section 2C.09 Chevron Alignment Sign (W1-8)**Standard:**

- 01 **The use of the Chevron Alignment (W1-8) sign (see Figures 2C-1 and 2C-2) to provide additional emphasis and guidance for a change in horizontal alignment shall be in accordance with the information shown in Table 2C-5.**

Option:

- 02 When used, Chevron Alignment signs may be used instead of or in addition to standard delineators.

Standard:

- 03 **The Chevron Alignment sign shall be a vertical rectangle. No border shall be used on the Chevron Alignment sign.**
- 04 **If used, Chevron Alignment signs shall be installed on the outside of a turn or curve, in line with and at approximately a right angle to approaching traffic. Chevron Alignment signs shall be installed at a minimum height of 4 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way.**

Guidance:

- 05 *The approximate spacing of Chevron Alignment signs on the turn or curve measured from the point of curvature (PC) should be as shown in Table 2C-6.*
- 06 *If used, Chevron Alignment signs should be visible for a sufficient distance to provide the road user with adequate time to react to the change in alignment.*

TRAFFIC STUDIES BRANCH

BALL BANKING

ROUTE: MAGMA MINE RD DATE: 9/26/11 RUN BY: MDA/DOK

①

RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	8	13	15		END M.P.	0.124		14	8	6	READINGS
COMMENTS: SB LT CURVE						COMMENTS: NB RT CURVE					
DOWNHILL						UPHILL					
EXIST W1-4L											
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

SIGN (YES, NO) _____

②

RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	6	13	16		END M.P.	0.258		14	11	6	READINGS
COMMENTS: SB RT CURVE						COMMENTS: NB LT CURVE					
Bottom of GRADE - FLATTENS OUT						LEVEL TERRAIN.					
EXIST W1-4L											
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

SIGN (YES, NO) _____

③

RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	2	3	10		END M.P.	0.430		10	8	4	READINGS
COMMENTS: SB RT CURVE						COMMENTS: NB LT CURVE					
EXIST W1-5R											
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

SIGN (YES, NO) _____

④

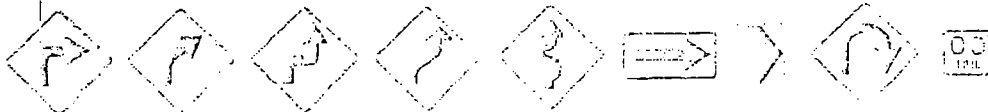
RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	6	10	13		END M.P.	0.692		14	9	6	READINGS
COMMENTS: SB LT CURVE						COMMENTS: NB RT CURVE					
EXIST W1-2L (WORN OUT)											
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

SIGN (YES, NO) _____

⑤

RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	8	13	15		END M.P.	0.936		13	10	7	READINGS
COMMENTS: SB LT CURVE						COMMENTS: NB RT CURVE					
EXIST W1-2L (Bullet Holes)						EXIST W1-5R					
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

SIGN (YES, NO) _____



TRAFFIC STUDIES BRANCH

BALL BANKING

ROUTE: MAGMA MINE RD DATE: 9/26/11 RUN BY: MDH/DDK

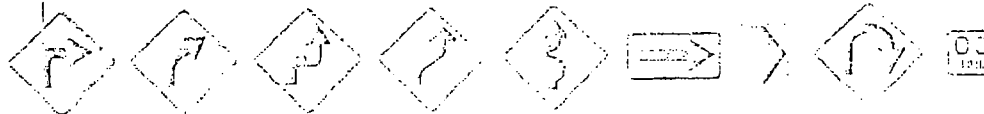
RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	4	10	13		END M.P.	1.172		16	10	7	READINGS
COMMENTS: SB RT CURVE EXST W1-4RT W/S.L. 10 mph						COMMENTS: NB LT CURVE					
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	8	10	16		END M.P.	1.292		15	13	8	READINGS
COMMENTS: SB LT CURVE						COMMENTS: NB RT CURVE EXST W1-2R W/S.L. 10 mph.					
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	2	6	9		END M.P.	1.457		10	9	4	READINGS
COMMENTS: SB RT CURVE EXST W2-8R						COMMENTS: NB LT CURVE					
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

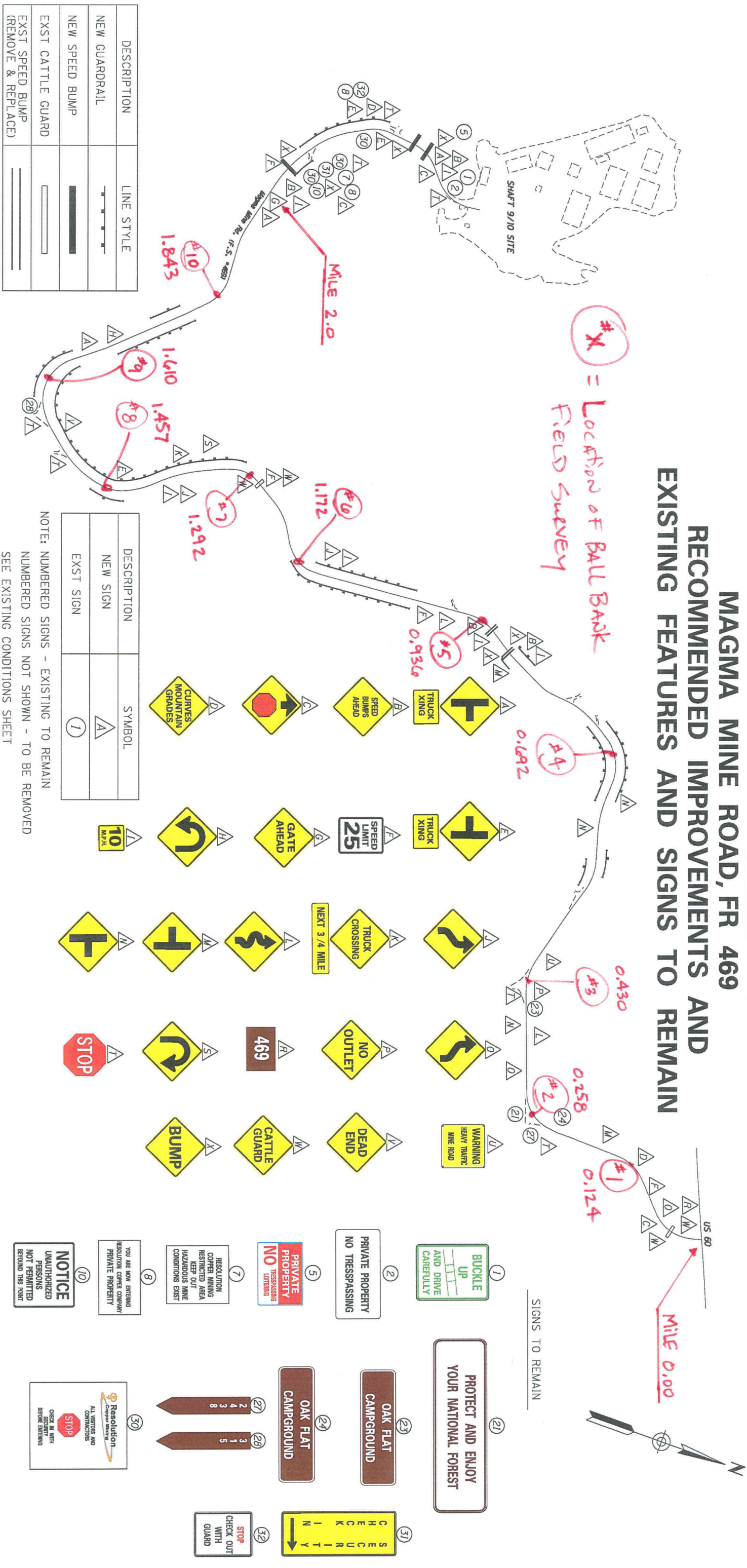
RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	5	10	14		END M.P.	1.610		13	10	6	READINGS
COMMENTS: SB RT CURVE						COMMENTS: NB LT CURVE EXST W2-8L					
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

RUNS	4	3	2	1	SPEED LIMIT	TYPE OF CURVE	1	2	3	4	RUNS
M.P.H.	20	25	30	55	25	L, R	55	30	25	20	M.P.H.
READINGS	7	9	14		END M.P.	1.843		14	9	7	READINGS
COMMENTS: SB LT CURVE						COMMENTS: NB RT CURVE					
DEGREE OF CURVE = _____ RADIUS = _____ SUPERELEVATION = _____											

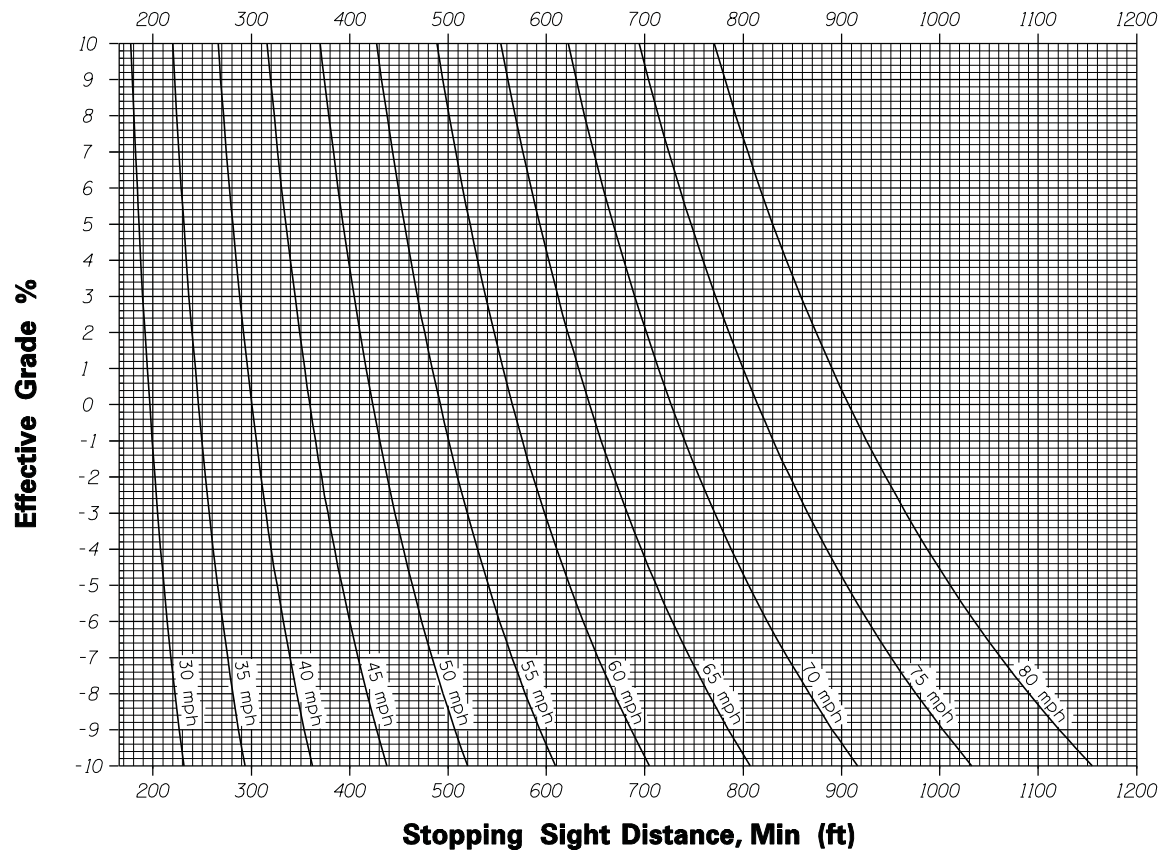


BALL BANKING -
FIELD Survey

MAGMA MINE ROAD, FR 469
RECOMMENDED IMPROVEMENTS AND
EXISTING FEATURES AND SIGNS TO REMAIN



APPENDIX D: SIGHT DISTANCE



$$SD_S = 1.47 \times V_D \times t + \frac{V_D^2}{30 \left(\frac{a}{32.2} \pm G \right)}$$

Where:

SD_S = Stopping Sight Distance, Min (ft)

V_D = Design Speed, mph

a = Assumed Deceleration, 11.2 ft/sec²

G = Effective percent of Grade Divided By 100

t = Assumed Brake Reaction Time, 2.5 Sec.

Modified AASHTO EQ 3-2 + AASHTO EQ 3-3

SD_S = Distance traversed during the brake reaction time plus distance to bring the vehicle to a stop on a grade.

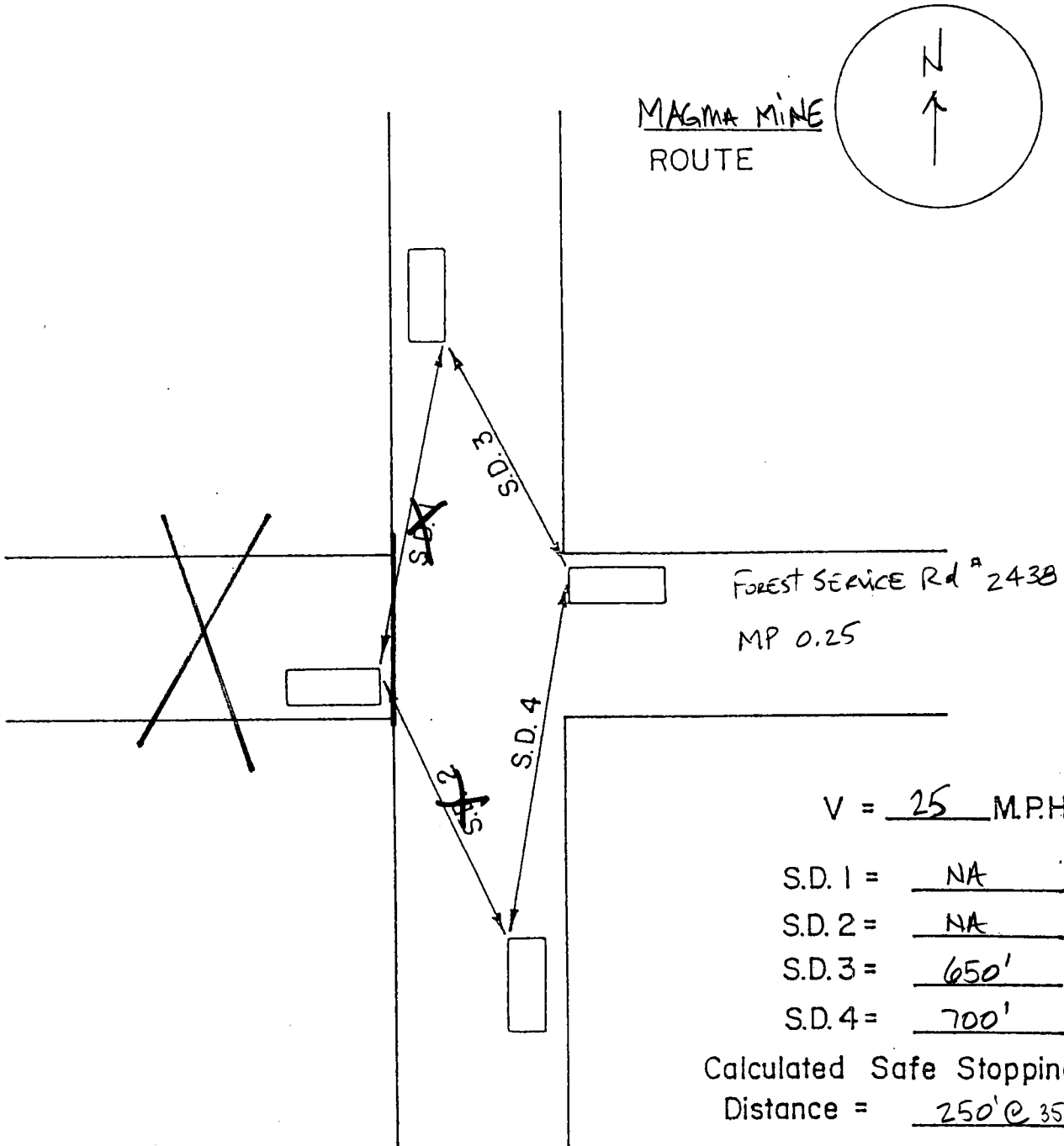
80 mph shown for information purposes only.

**RELATION OF STOPPING SIGHT DISTANCE
TO DESIGN SPEED AND EFFECTIVE GRADE
FIGURE 201.2**

Metric					US Customary				
Design speed (km/h)	Brake reaction distance (m)	Braking distance on level (m)	Stopping sight distance		Design speed (mph)	Brake reaction distance (ft)	Braking distance on level (ft)	Stopping sight distance	
			Calculated (m)	Design (m)				Calculated (ft)	Design (ft)
20	13.9	4.6	18.5	20	15	55.1	21.6	76.7	80
30	20.9	10.3	31.2	35	20	73.5	38.4	111.9	115
40	27.8	18.4	46.2	50	25	91.9	60.0	151.9	155
50	34.8	28.7	63.5	65	30	110.3	86.4	196.7	200
60	41.7	41.3	83.0	85	35	128.6	117.6	246.2	250
70	48.7	56.2	104.9	105	40	147.0	153.6	300.6	305
80	55.6	73.4	129.0	130	45	165.4	194.4	359.8	360
90	62.6	92.9	155.5	160	50	183.8	240.0	423.8	425
100	69.5	114.7	184.2	185	55	202.1	290.3	492.4	495
110	76.5	138.8	215.3	220	60	220.5	345.5	566.0	570
120	83.4	165.2	248.6	250	65	238.9	405.5	644.4	645
130	90.4	193.8	284.2	285	70	257.3	470.3	727.6	730
					75	275.6	539.9	815.5	820
					80	294.0	614.3	908.3	910

Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 3.4 m/s^2 [11.2 ft/s^2] used to determine calculated sight distance.

Exhibit 3-1. Stopping Sight Distance



V = 25 M.P.H.

S.D. 1 = NA

S.D. 2 = NA

S.D. 3 = 650'

S.D. 4 = 700'

Calculated Safe Stopping
Distance = 250' @ 35mph

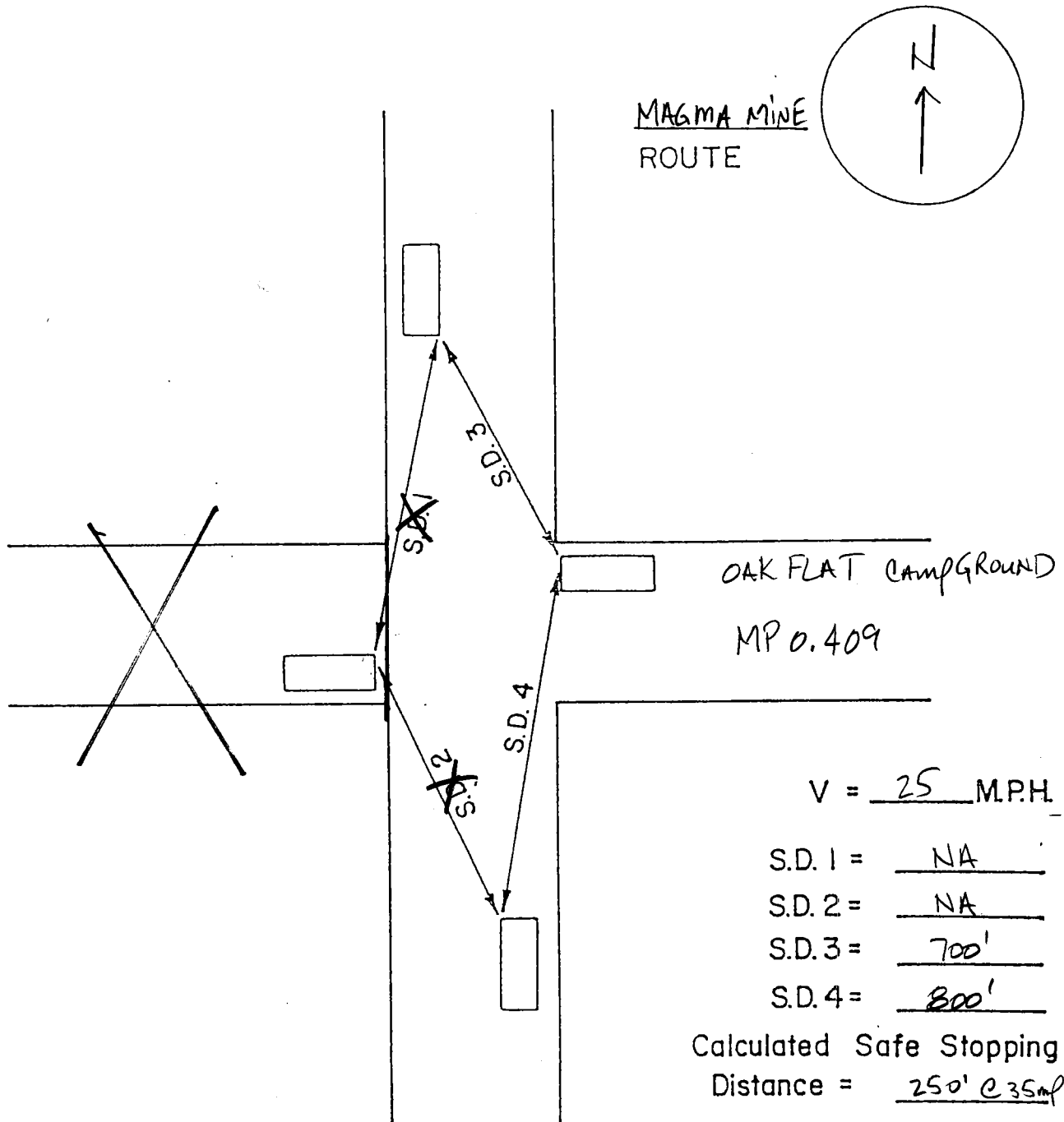
Advance Side Signs

☐ Warranted

☐ Not Warranted

Investigated: 9/26/11
DATE:

By: DDK/MDH



V = 25 M.P.H.

S.D. 1 = NA

S.D. 2 = NA

S.D. 3 = 700'

S.D. 4 = 800'

Calculated Safe Stopping
Distance = 250' @ 35mph

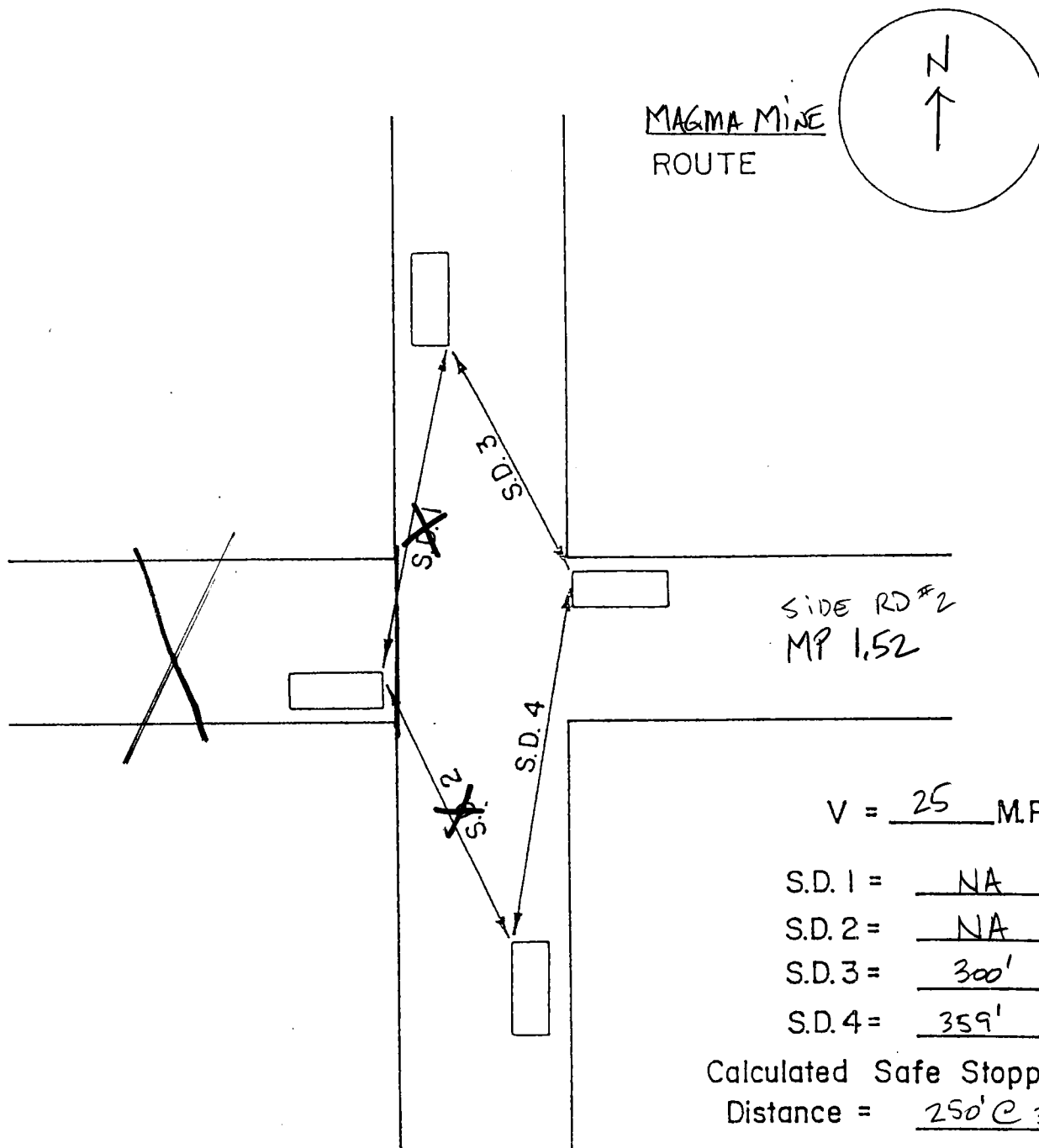
Advance Side Signs

☐ Warranted

☐ Not Warranted

Investigated: 9/26/11
DATE:

By: DDK/MDH



V = 25 M.P.H.

S.D. 1 = NA

S.D. 2 = NA

S.D. 3 = 300'

S.D. 4 = 359'

Calculated Safe Stopping
Distance = 250' @ 35mph

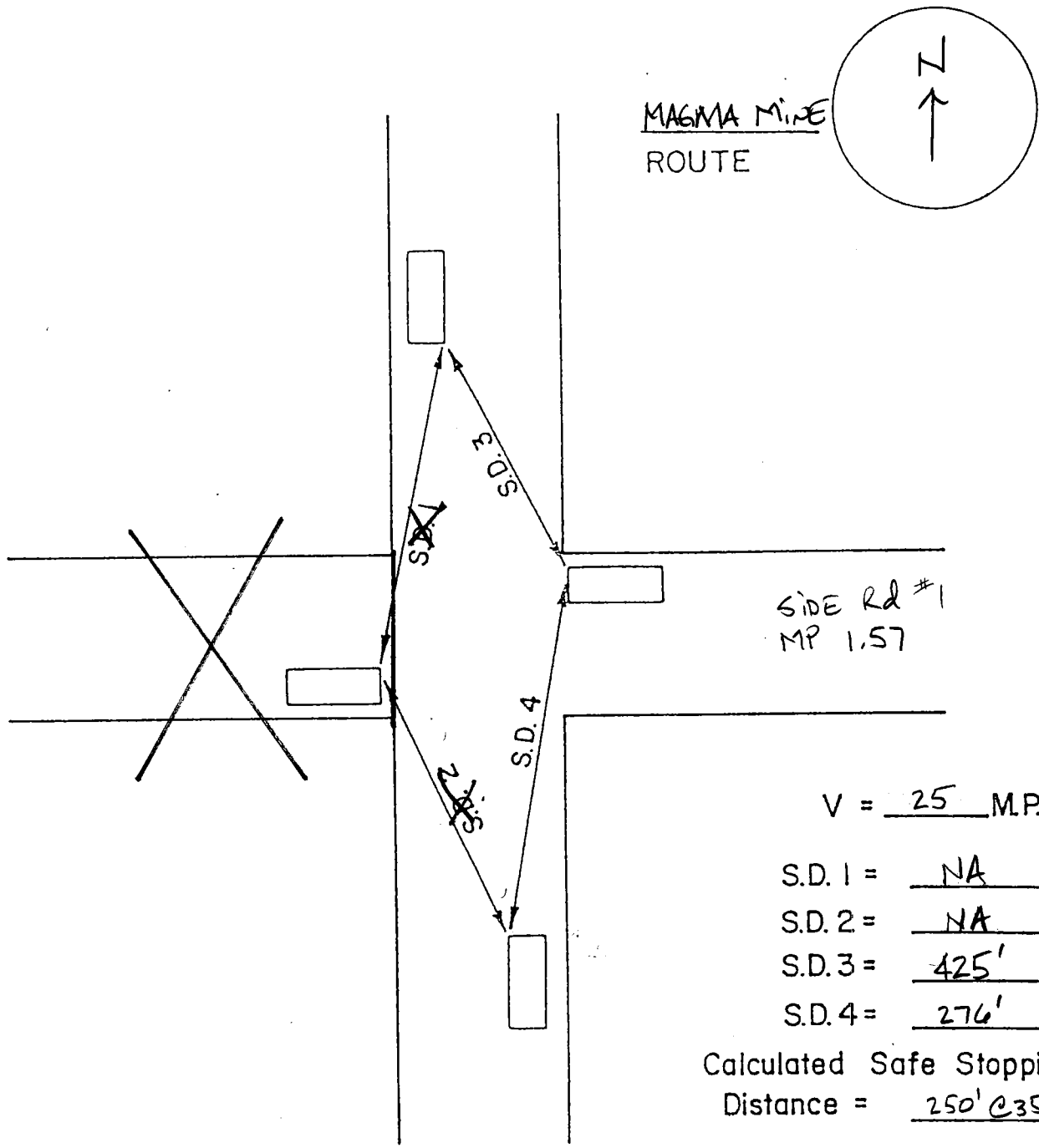
Advance Side Signs

☐ Warranted

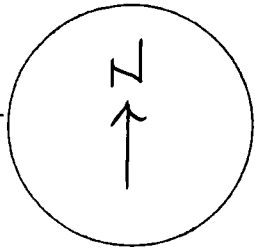
☐ Not Warranted

Investigated: 9/26/11
DATE:

By: DDK/MDH



MAGMA MINE
ROUTE



SIDE Rd #1
MP 1.57

V = 25 M.P.H.

S.D. 1 = NA

S.D. 2 = NA

S.D. 3 = 425'

S.D. 4 = 276'

Calculated Safe Stopping
Distance = 250' @ 35 mph

Advance Side Signs

- ☒ Warranted
☐ Not Warranted

Investigated: 9/26/11
DATE:

By: DDK/MDH

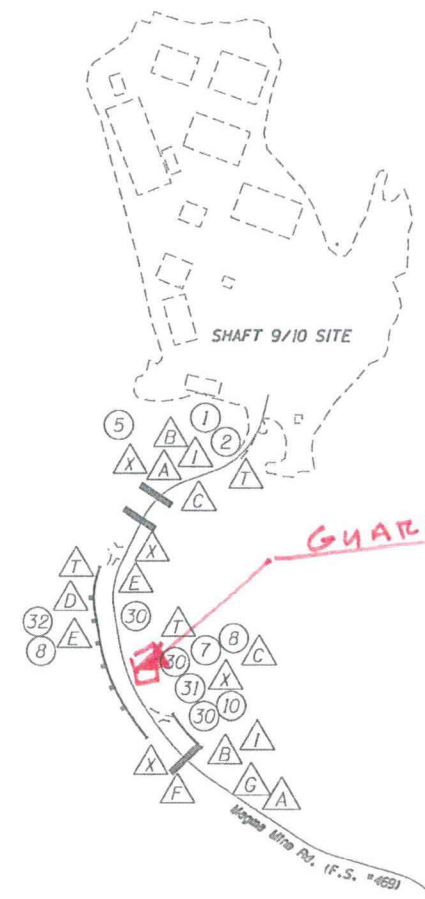
APPENDIX E: SPEED DATA

MAGMA MINE ROAD, FR 469 RECOMMENDED IMPROVEMENTS AND EXISTING FEATURES AND SIGNS TO REMAIN

START
0.00 @ STOP BAR



SIGNS TO REMAIN



GUARD SHACK

1.74

1.36

1.05

0.86

0.49

0.33

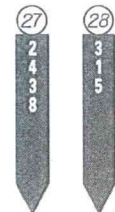
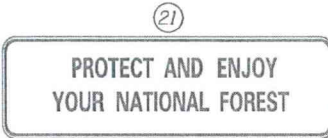
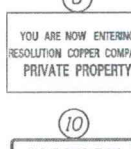
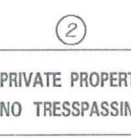
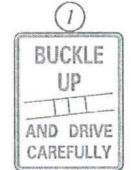
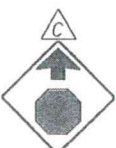
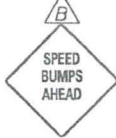
0.19

0.19

DESCRIPTION	LINE STYLE
NEW GUARDRAIL	— — — — —
NEW SPEED BUMP	— — — — —
EXST CATTLE GUARD	— — — — —
EXST SPEED BUMP (REMOVE & REPLACE)	— — — — —

DESCRIPTION	SYMBOL
NEW SIGN	A
EXST SIGN	I

NOTE: NUMBERED SIGNS - EXISTING TO REMAIN
NUMBERED SIGNS NOT SHOWN - TO BE REMOVED
SEE EXISTING CONDITIONS SHEET



SPEED COUNTER LOCATIONS ——— X.XX (MILES) #

<u>Activity</u>	<u>Runs</u>	<u>NB</u>	<u>SB</u>
Driver #1	#1	3:56	3:52
Driver #1	#2	3:50	3:49
Driver #2	#1	3:23	3:21
Driver #2	#2	<u>3:38</u>	<u>3:43</u>
Total Time (Min)		14:47	14:45
Average Time (Min.)		3:41	3:41
Avg. Speed (mph)		35.19	35.19

	<u>NB</u>	<u>SB</u>	<u>NB</u>	<u>SB</u>
Fastest Time	3:23	3:21	35.5 mph	35.8 mph
Slowest Time	3:56	3:52	30.7 mph	31.2 mph

Notes:

1. Travel distance = 2.0 miles (stop bar at Jct. US 60 to top of vertical curve near "Gate Ahead" sign.
2. Driver # 1 = DDK, Driver #2 = MDH
3. Vehcile used = light pick-up truck/passenger car equivalant.
4. Travel time studies conducted during daytime, weather condition clear, pavement surface dry.



4561 East McDowell Road
Phoenix, AZ 85008-4505
Phone (602) 454-0402
Fax (602) 454-0403

Project: Magma Mine Road Speed Study Project No: AZE0820-10
Computed by: DDK Date: 10/4/2011
Checked by: MH Date: 10/6/2011
Sheet Name: MP 0.19 - Spot Speed Characteristics Sheet: 1 of 7

<u>Southbound</u>	<u>SB(1)</u>	<u>SB(2)</u>	<u>SB(Avg)</u>
Average Speed	30.1	30.4	30.3
Median Speed (50th percentile)	30.5	30.0	30.3
85th Percentile Speed	35.1	35.8	35.5
10-mph Pace Speed	25.2 - 35.2	25.9 - 35.9	25.6 - 35.6

<u>Northbound</u>	<u>NB(1)</u>	<u>NB(2)</u>	<u>NB(Avg)</u>
Average Speed	27.9	28.8	28.4
Median Speed (50th percentile)	27.8	28.6	28.2
85th Percentile Speed	34.5	34.5	34.5
10-mph Pace Speed	22.7 - 32.7	23.3 - 33.3	23.0 - 33.0

Combined SB and NB

<u>(mph)</u>	<u>SB(Avg)</u>	<u>NB(Avg)</u>	<u>Comb(Avg)</u>
Average Speed	30.3	28.4	29.3
Median Speed (50th percentile)	30.3	28.2	29.2
85th Percentile Speed	35.5	34.5	35.0
10-mph Pace Speed	25.6 - 35.6	23.0 - 33.0	24.3 - 34.3

Notes:

1. Data collected by United Civil Group, 24-hour Automatic Road Tube Counters on 9/27/11 and 9/28/11
2. Posted Speed = 25mph

<u>Southbound</u>	<u>SB(1)</u>	<u>SB(2)</u>	<u>SB(Avg)</u>
Average Speed	29.3	31.2	30.3
Median Speed (50th percentile)	29.1	31.0	30.1
85th Percentile Speed	36.5	38.0	37.3
10-mph Pace Speed	23.9 - 33.9	25.2 - 35.2	24.6 - 34.6

<u>Northbound</u>	<u>NB(1)</u>	<u>NB(2)</u>	<u>NB(Avg)</u>
Average Speed	30.7	30.9	30.8
Median Speed (50th percentile)	30.0	31.0	30.5
85th Percentile Speed	35.8	36.5	36.2
10-mph Pace Speed	25.2 - 35.2	26.6 - 36.6	25.9 - 35.9

Combined SB and NB

<u>(mph)</u>	<u>SB(Avg)</u>	<u>NB(Avg)</u>	<u>Comb(Avg)</u>
Average Speed	30.3	30.8	30.5
Median Speed (50th percentile)	30.1	30.5	30.3
85th Percentile Speed	37.3	36.2	36.7
10-mph Pace Speed	24.6 - 34.6	25.9 - 35.9	25.3 - 35.3

Notes:

1. Data collected by United Civil Group, 24-hour Automatic Road Tube Counters on 9/27/11 and 9/28/11
2. Posted Speed = 25mph



4561 East McDowell Road
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Project: Magma Mine Road Speed Study Project No: AZE0820-10
Computed by: DDK Date: 10/4/2011
Checked by: MH Date: 10/6/2011
Sheet Name: MP 0.49 - Spot Speed Characteristics Sheet: 3 of 7

<u>Southbound</u>	<u>SB(1)</u>	<u>SB(2)</u>	<u>SB(Avg)</u>
Average Speed	32.3	32.9	32.6
Median Speed (50th percentile)	32.1	32.1	32.1
85th Percentile Speed	38.8	38.8	38.8
10-mph Pace Speed	25.9 - 35.9	27.4 - 37.4	26.7 - 36.7

<u>Northbound</u>	<u>NB(1)</u>	<u>NB(2)</u>	<u>NB(Avg)</u>
Average Speed	30.9	32.2	31.6
Median Speed (50th percentile)	30.5	32.1	31.3
85th Percentile Speed	38.0	38.0	38.0
10-mph Pace Speed	26.6 - 36.6	26.6 - 36.6	26.6 - 36.6

Combined SB and NB

<u>(mph)</u>	<u>SB(Avg)</u>	<u>NB(Avg)</u>	<u>Comb(Avg)</u>
Average Speed	32.6	31.6	32.1
Median Speed (50th percentile)	32.1	31.3	31.7
85th Percentile Speed	38.8	38.0	38.4
10-mph Pace Speed	26.7 - 36.7	26.6 - 36.6	26.7 - 36.7

Notes:

1. Data collected by United Civil Group, 24-hour Automatic Road Tube Counters on 9/27/11 and 9/28/11
2. Posted Speed = 25mph

<u>Southbound</u>	<u>SB(1)</u>	<u>SB(2)</u>	<u>SB(Avg)</u>
Average Speed	29.0	29.3	29.2
Median Speed (50th percentile)	29.1	29.1	29.1
85th Percentile Speed	34.5	34.5	34.5
10-mph Pace Speed	25.2 - 35.2	24.5 - 34.5	24.9 - 34.9

<u>Northbound</u>	<u>NB(1)</u>	<u>NB(2)</u>	<u>NB(Avg)</u>
Average Speed	30.5	31.4	31.0
Median Speed (50th percentile)	30.5	31.6	31.1
85th Percentile Speed	37.2	38.0	37.6
10-mph Pace Speed	24.5 - 34.5	26.6 - 36.6	25.6 - 35.6

Combined SB and NB

<u>(mph)</u>	<u>SB(Avg)</u>	<u>NB(Avg)</u>	<u>Comb(Avg)</u>
Average Speed	29.2	31.0	30.1
Median Speed (50th percentile)	29.1	31.1	30.1
85th Percentile Speed	34.5	37.6	36.1
10-mph Pace Speed	24.9 - 34.9	25.6 - 35.6	25.3 - 35.3

Notes:

1. Data collected by United Civil Group, 24-hour Automatic Road Tube Counters on 9/27/11 and 9/28/11
2. Posted Speed = 25mph



4561 East McDowell Road
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Project: Magma Mine Road Speed Study Project No: AZE0820-10
Computed by: DDK Date: 10/4/2011
Checked by: MH Date: 10/6/2011
Sheet Name: MP 1.05 - Spot Speed Characteristics Sheet: 5 of 7

<u>Southbound</u>	<u>SB(1)</u>	<u>SB(2)</u>	<u>SB(Avg)</u>
Average Speed	33.9	35.3	34.6
Median Speed (50th percentile)	34.5	35.1	34.8
85th Percentile Speed	40.5	41.4	41.0
10-mph Pace Speed	28.2 - 38.2	30.5 - 40.5	29.4 - 39.4

<u>Northbound</u>	<u>NB(1)</u>	<u>NB(2)</u>	<u>NB(Avg)</u>
Average Speed	34.0	34.2	34.1
Median Speed (50th percentile)	34.5	35.1	34.8
85th Percentile Speed	40.5	40.5	40.5
10-mph Pace Speed	28.2 - 38.2	30.5 - 40.5	29.4 - 39.4

Combined SB and NB

<u>(mph)</u>	<u>SB(Avg)</u>	<u>NB(Avg)</u>	<u>Comb(Avg)</u>
Average Speed	34.6	34.1	34.4
Median Speed (50th percentile)	34.8	34.8	34.8
85th Percentile Speed	41.0	40.5	40.7
10-mph Pace Speed	29.4 - 39.4	29.4 - 39.4	29.4 - 39.4

Notes:

1. Data collected by United Civil Group, 24-hour Automatic Road Tube Counters on 9/27/11 and 9/28/11
2. Posted Speed = 25mph

<u>Southbound</u>	<u>SB(1)</u>	<u>SB(2)</u>	<u>SB(Avg)</u>
Average Speed	30.7	31.1	30.9
Median Speed (50th percentile)	31.0	31.0	31.0
85th Percentile Speed	36.5	35.8	36.2
10-mph Pace Speed	26.6 - 36.6	25.9 - 35.9	26.3 - 36.3

<u>Northbound</u>	<u>NB(1)</u>	<u>NB(2)</u>	<u>NB(Avg)</u>
Average Speed	31.0	31.5	31.3
Median Speed (50th percentile)	31.6	31.6	31.6
85th Percentile Speed	37.2	37.2	37.2
10-mph Pace Speed	25.9 - 35.9	26.6 - 36.6	26.3 - 36.3

Combined SB and NB

<u>(mph)</u>	<u>SB(Avg)</u>	<u>NB(Avg)</u>	<u>Comb(Avg)</u>
Average Speed	30.9	31.3	31.1
Median Speed (50th percentile)	31.0	31.6	31.3
85th Percentile Speed	36.2	37.2	36.7
10-mph Pace Speed	26.3 - 36.3	26.3 - 36.3	26.3 - 36.3

Notes:

1. Data collected by United Civil Group, 24-hour Automatic Road Tube Counters on 9/27/11 and 9/28/11
2. Posted Speed = 25mph



4561 East McDowell Road
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Project: Magma Mine Road Speed Study Project No: AZE0820-10
Computed by: DDK Date: 10/4/2011
Checked by: MH Date: 10/6/2011
Sheet Name: MP 1.74 - Spot Speed Characteristics Sheet: 7 of 7

<u>Southbound</u>	<u>SB(1)</u>	<u>SB(2)</u>	<u>SB(Avg)</u>
Average Speed	28.8	28.9	28.9
Median Speed (50th percentile)	28.6	29.1	28.9
85th Percentile Speed	34.5	35.1	34.8
10-mph Pace Speed	23.9 - 33.9	25.2 - 35.2	24.6 - 34.6

<u>Northbound</u>	<u>NB(1)</u>	<u>NB(2)</u>	<u>NB(Avg)</u>
Average Speed	31.4	31.5	31.5
Median Speed (50th percentile)	31.6	31.6	31.6
85th Percentile Speed	38.0	38.0	38.0
10-mph Pace Speed	26.6 - 36.6	25.9 - 35.9	26.3 - 36.3

Combined SB and NB

<u>(mph)</u>	<u>SB(Avg)</u>	<u>NB(Avg)</u>	<u>Comb(Avg)</u>
Average Speed	28.9	31.5	30.2
Median Speed (50th percentile)	28.9	31.6	30.2
85th Percentile Speed	34.8	38.0	36.4
10-mph Pace Speed	24.6 - 34.6	26.3 - 36.3	25.5 - 35.5

Notes:

1. Data collected by United Civil Group, 24-hour Automatic Road Tube Counters on 9/27/11 and 9/28/11
2. Posted Speed = 25mph

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.19

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: SB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	14	0	0	1	5	6	2	0	0	0	0	0	0	0
13:00	19	0	0	1	10	5	2	0	0	0	0	0	1	0
14:00	18	0	0	1	2	9	2	4	0	0	0	0	0	0
15:00	10	1	0	3	1	3	2	0	0	0	0	0	0	0
16:00	8	0	1	1	2	4	0	0	0	0	0	0	0	0
17:00	9	0	0	1	2	6	0	0	0	0	0	0	0	0
18:00	2	0	0	0	2	0	0	0	0	0	0	0	0	0
19:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
20:00	3	0	0	0	0	3	0	0	0	0	0	0	0	0
21:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
22:00	12	0	0	1	1	6	4	0	0	0	0	0	0	0
23:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
09/28/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	1	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	0	2	0	0	0	0	0	0	0	0	0
04:00	3	0	0	0	0	3	0	0	0	0	0	0	0	0
05:00	43	0	0	2	11	20	7	3	0	0	0	0	0	0
06:00	85	4	3	7	25	28	17	0	1	0	0	0	0	0
07:00	22	1	0	4	4	9	2	2	0	0	0	0	0	0
08:00	9	0	0	1	3	3	1	1	0	0	0	0	0	0
09:00	12	0	0	3	5	2	2	0	0	0	0	0	0	0
10:00	16	0	0	4	6	5	1	0	0	0	0	0	0	0
11:00	18	1	2	5	6	3	1	0	0	0	0	0	0	0
Total	310	8	6	35	88	116	45	10	1	0	0	0	1	0
%		2.6	1.9	11.3	28.4	37.4	14.5	3.2	0.3	0.0	0.0	0.0	0.3	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.3	24.8	30.5	35.1	37.2

10 mph Pace Speed
Number in Pace

25.2 - 35.2	Average	30.1 mph
214 (69.0 %)	Minimum	8.0 mph
	Maximum	66.5 mph

Speeds Exceeded

45 mph	55 mph	65 mph
0.6 %	0.3 %	0.3 %
2	1	1

Count

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.19

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: SB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	10	1	2	1	6	0	0	0	0	0	0	0	0	0
13:00	21	0	0	2	14	4	1	0	0	0	0	0	0	0
14:00	18	0	1	5	1	6	4	0	1	0	0	0	0	0
15:00	14	0	0	3	4	1	5	1	0	0	0	0	0	0
16:00	3	0	0	0	1	2	0	0	0	0	0	0	0	0
17:00	9	0	0	1	2	1	5	0	0	0	0	0	0	0
18:00	6	0	0	0	4	2	0	0	0	0	0	0	0	0
19:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
20:00	3	0	0	0	1	0	2	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	9	0	0	4	2	1	2	0	0	0	0	0	0	0
23:00	4	0	0	0	1	0	1	2	0	0	0	0	0	0
09/29/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	1	1	0	0	0	0	0	0	0	0	0
04:00	5	0	0	0	1	3	1	0	0	0	0	0	0	0
05:00	40	0	0	4	9	20	5	2	0	0	0	0	0	0
06:00	74	0	0	11	24	28	7	4	0	0	0	0	0	0
07:00	18	0	0	0	5	6	6	1	0	0	0	0	0	0
08:00	16	0	0	0	7	6	3	0	0	0	0	0	0	0
09:00	16	1	0	1	7	4	1	1	1	0	0	0	0	0
10:00	3	0	0	0	1	1	1	0	0	0	0	0	0	0
11:00	21	0	1	0	10	10	0	0	0	0	0	0	0	0
Total	293	2	4	33	101	95	45	11	2	0	0	0	0	0
%		0.7	1.4	11.3	34.5	32.4	15.4	3.8	0.7	0.0	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.9	25.9	30.0	35.8	37.2

10 mph Pace Speed
Number in Pace

25.9 - 35.9	Average	30.4 mph
211 (72.0 %)	Minimum	6.3 mph
	Maximum	49.0 mph

Speeds Exceeded

45 mph	55 mph	65 mph
0.7 %	0.0 %	0.0 %
Count	2	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.19

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: NB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	23	3	1	5	5	8	1	0	0	0	0	0	0	0
13:00	15	0	0	4	4	6	1	0	0	0	0	0	0	0
14:00	11	0	1	3	3	3	1	0	0	0	0	0	0	0
15:00	45	2	0	6	16	15	5	1	0	0	0	0	0	0
16:00	56	0	2	9	19	20	5	1	0	0	0	0	0	0
17:00	11	0	1	5	2	1	2	0	0	0	0	0	0	0
18:00	13	0	0	1	2	5	4	1	0	0	0	0	0	0
19:00	7	0	0	2	3	1	1	0	0	0	0	0	0	0
20:00	2	0	0	1	1	0	0	0	0	0	0	0	0	0
21:00	3	0	1	0	0	2	0	0	0	0	0	0	0	0
22:00	3	0	0	1	0	2	0	0	0	0	0	0	0	0
23:00	13	1	1	1	2	2	4	1	1	0	0	0	0	0
09/28/2011														
00:00	7	0	0	0	2	3	2	0	0	0	0	0	0	0
01:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
02:00	3	0	0	1	2	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	0	0	1	0	0	0	0	0	0	0	0	0	0
05:00	2	0	0	1	1	0	0	0	0	0	0	0	0	0
06:00	11	0	2	1	2	4	2	0	0	0	0	0	0	0
07:00	7	0	0	3	2	1	1	0	0	0	0	0	0	0
08:00	13	0	0	5	7	0	0	1	0	0	0	0	0	0
09:00	22	2	2	5	10	3	0	0	0	0	0	0	0	0
10:00	17	1	3	3	9	0	1	0	0	0	0	0	0	0
11:00	13	2	0	4	3	2	2	0	0	0	0	0	0	0
Total	299	11	14	62	96	78	32	5	1	0	0	0	0	0
%		3.7	4.7	20.7	32.1	26.1	10.7	1.7	0.3	0.0	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
20.7	21.6	27.8	34.5	35.8

10 mph Pace Speed
Number in Pace

22.7 - 32.7	Average	27.9 mph
188 (62.9 %)	Minimum	7.1 mph
	Maximum	49.0 mph

Speeds Exceeded

45 mph	55 mph	65 mph
0.3 %	0.0 %	0.0 %
Count	1	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.19

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: NB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	11	1	0	4	3	2	1	0	0	0	0	0	0	0
13:00	10	0	0	6	2	2	0	0	0	0	0	0	0	0
14:00	14	1	1	2	6	2	2	0	0	0	0	0	0	0
15:00	58	0	2	9	24	15	8	0	0	0	0	0	0	0
16:00	69	0	3	8	28	23	6	1	0	0	0	0	0	0
17:00	10	0	0	0	2	6	1	0	1	0	0	0	0	0
18:00	11	0	0	4	2	3	1	1	0	0	0	0	0	0
19:00	4	0	0	1	3	0	0	0	0	0	0	0	0	0
20:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
21:00	2	0	0	0	1	0	0	1	0	0	0	0	0	0
22:00	5	0	0	1	0	3	1	0	0	0	0	0	0	0
23:00	10	0	0	1	1	4	2	0	2	0	0	0	0	0
09/29/2011														
00:00	12	0	0	0	3	2	7	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	2	0	0	1	0	1	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
05:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
06:00	6	0	0	0	3	3	0	0	0	0	0	0	0	0
07:00	16	0	0	1	7	7	1	0	0	0	0	0	0	0
08:00	20	1	5	2	5	5	0	2	0	0	0	0	0	0
09:00	9	1	0	2	4	1	1	0	0	0	0	0	0	0
10:00	16	0	1	8	1	2	4	0	0	0	0	0	0	0
11:00	19	1	0	5	5	6	2	0	0	0	0	0	0	0
Total	309	5	12	55	102	90	37	5	3	0	0	0	0	0
%		1.6	3.9	17.8	33.0	29.1	12.0	1.6	1.0	0.0	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
21.4	22.7	28.6	34.5	35.8

10 mph Pace Speed
Number in Pace

23.3 - 33.3	Average	28.8 mph
200 (64.7 %)	Minimum	7.3 mph
	Maximum	49.0 mph

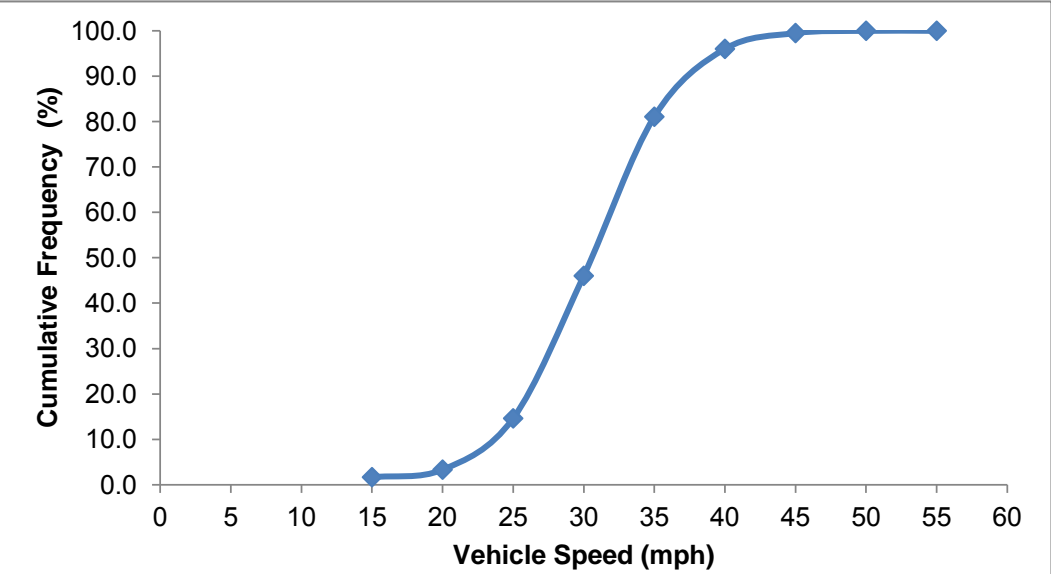
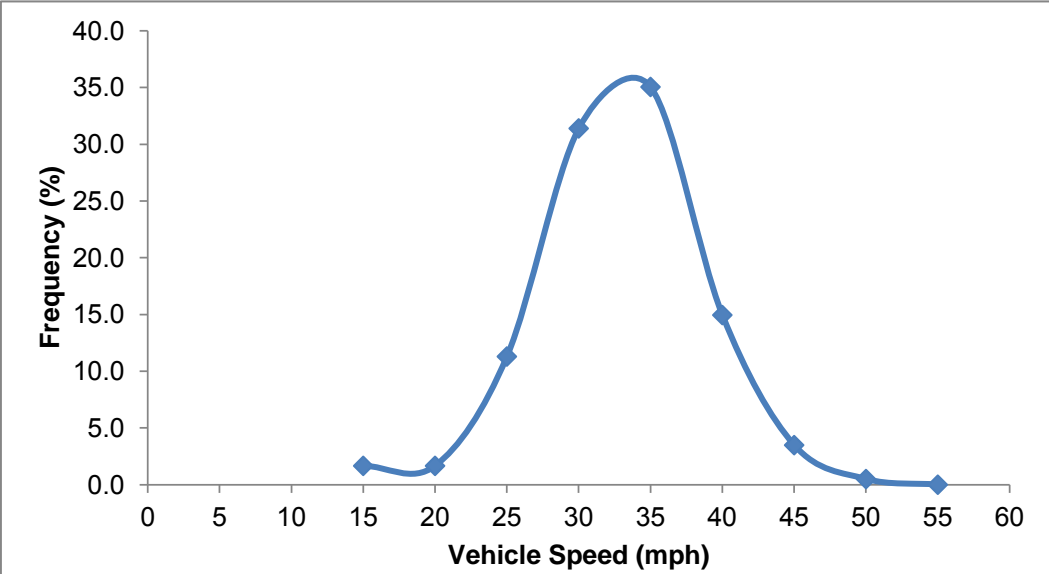
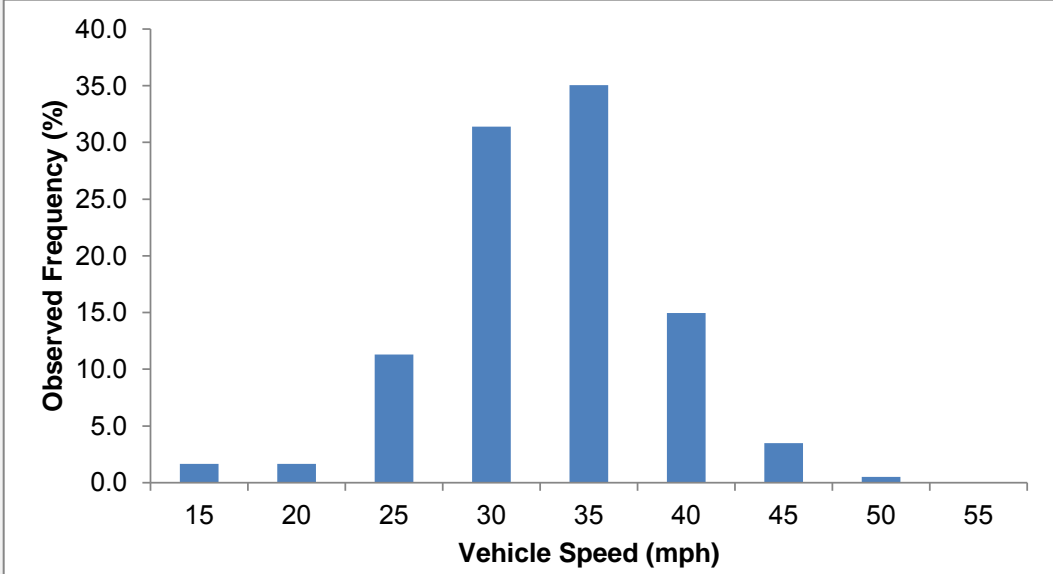
Speeds Exceeded

45 mph	55 mph	65 mph
1.0 %	0.0 %	0.0 %
Count	3	0

Street: Magma Mine Road
Location: At Mile Post 0.19 SB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	10	10	68	189	211	90	21	3	0	0	0	0	0
Frquency (%)	1.7	1.7	11.3	31.4	35.0	15.0	3.5	0.5	0.0	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.7	3.3	14.6	46.0	81.1	96.0	99.5	100.0	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	10	10	68	189	211	90	21	3	0	0	0	0	
$f_i u_i^2$	562.5	1000	10625	42525	64618.75	36000	10631.25	1875	0	0	0	0	
$(f_i u_i)^2$	5625	10000	722500	8037225	13634556	3240000	223256.3	5625	0	0	0	0	

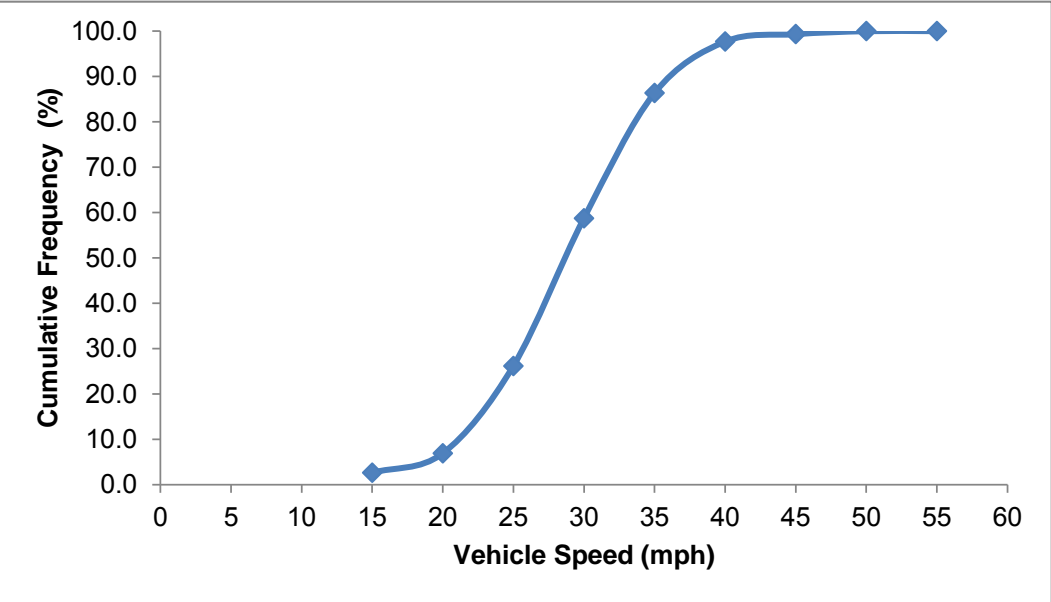
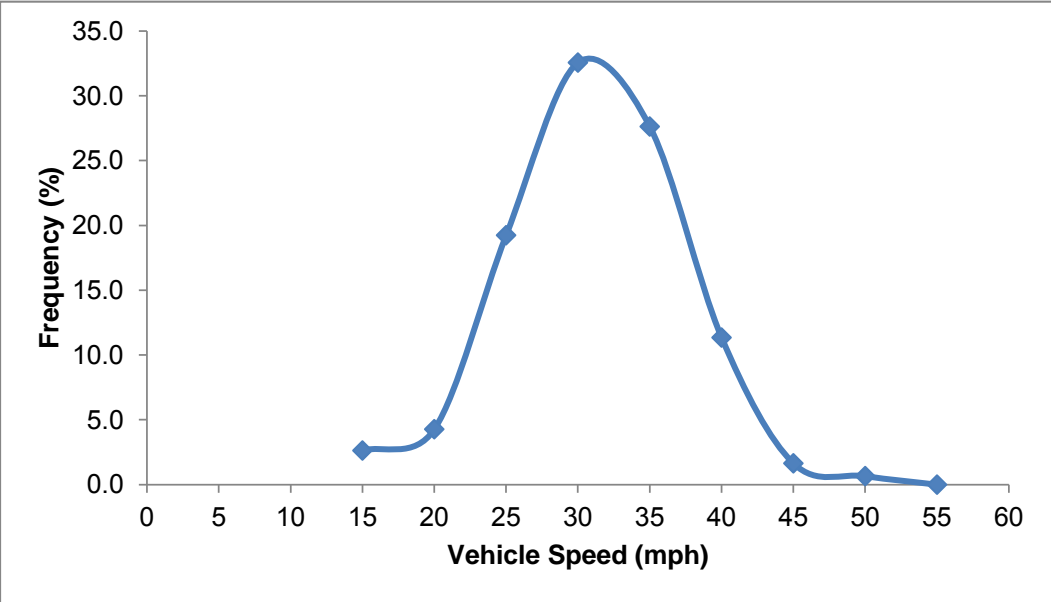
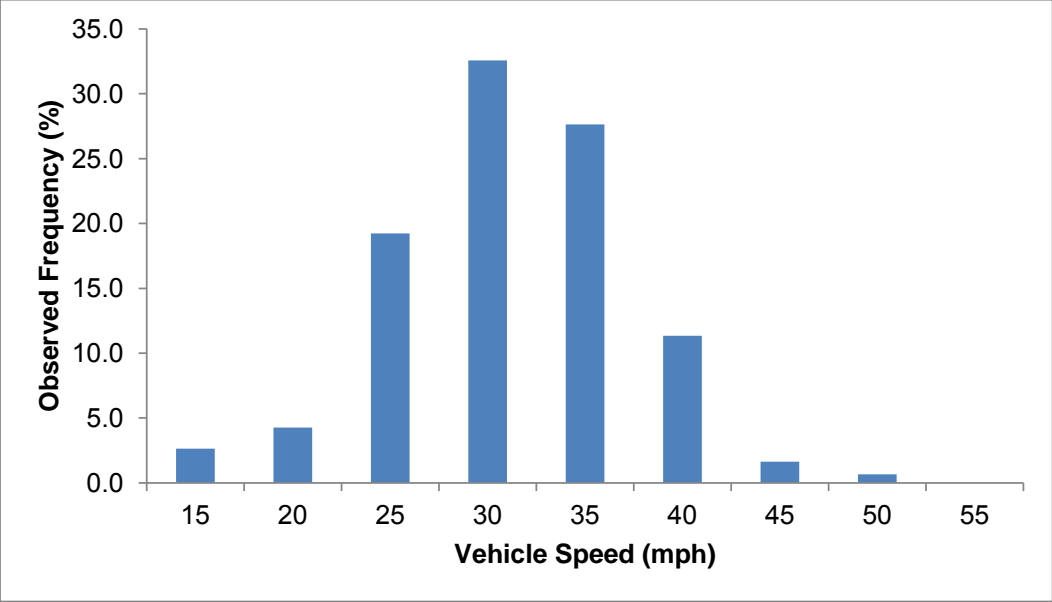
Total Counts
602
Standard Deviation
14.4



Street: Magma Mine Road
Location: At Mile Post 0.19 NB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	16	26	117	198	168	69	10	4	0	0	0	0	0
Frquency (%)	2.6	4.3	19.2	32.6	27.6	11.3	1.6	0.7	0.0	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	2.6	6.9	26.2	58.7	86.3	97.7	99.3	100.0	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u _i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f _i)	16	26	117	198	168	69	10	4	0	0	0	0	
f _i u _i ²	900	2600	18281.25	44550	51450	27600	5062.5	2500	0	0	0	0	
(f _i u _i) ²	14400	67600	2138906	8820900	8643600	1904400	50625	10000	0	0	0	0	

Total Counts
608
Standard Deviation
13.9



Street: Magma Mine Road
Location: At Mile Post 0.19 NB & SB Combined

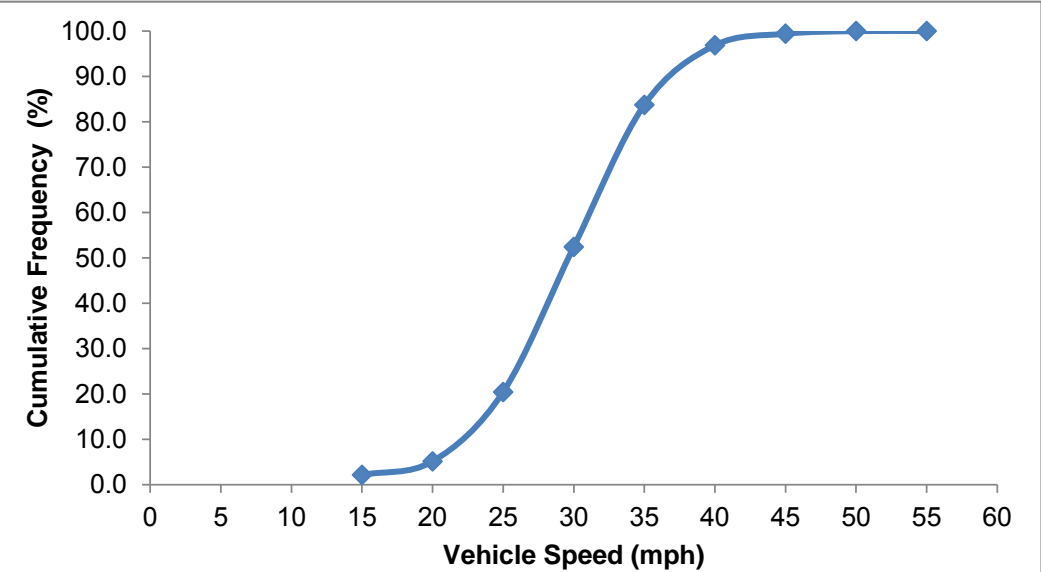
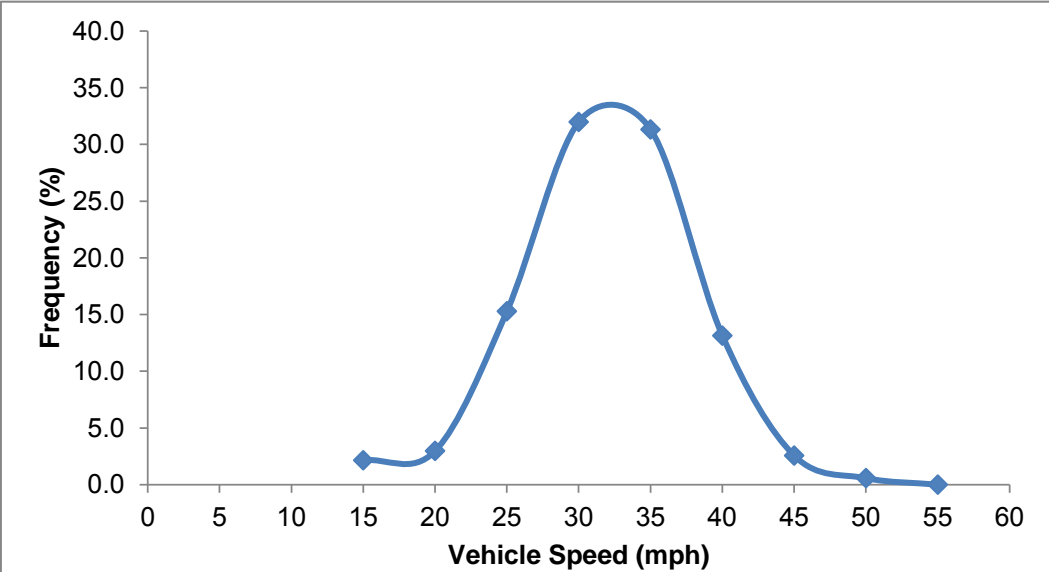
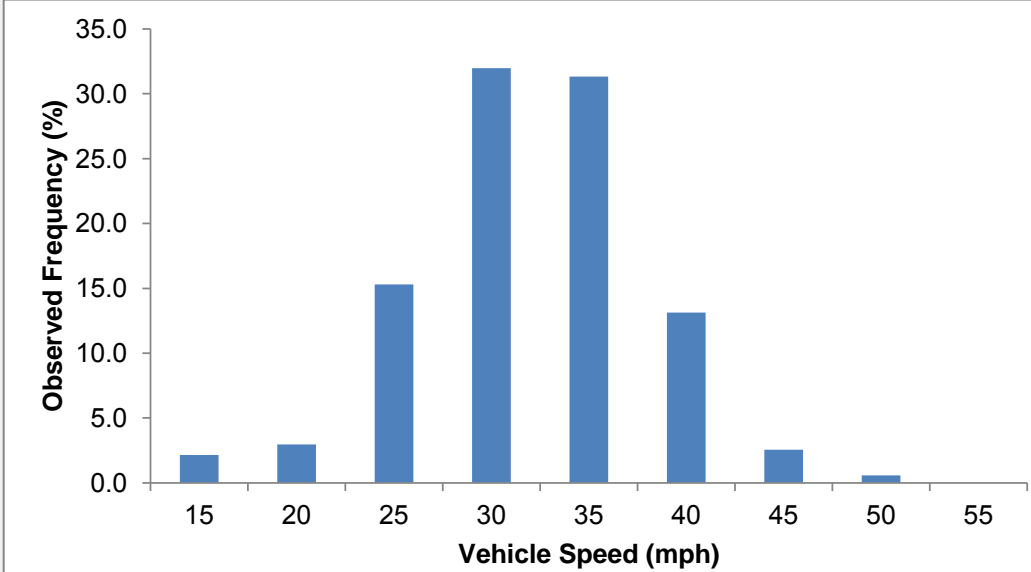
mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	26	36	185	387	379	159	31	7	0	0	0	0	0
Frquency (%)	2.1	3.0	15.3	32.0	31.3	13.1	2.6	0.6	0.0	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	2.1	5.1	20.4	52.4	83.7	96.9	99.4	100.0	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency of speed class (f_i)	26	36	185	387	379	159	31	7	0	0	0	0	
$f_i u_i^2$	1462.5	3600	28906.25	87075	116068.8	63600	15693.75	4375	0	0	0	0	
$(f_i u_i)^2$	38025	129600	5347656	33698025	43990056	10112400	486506.3	30625	0	0	0	0	

Total Counts

1210

Standard Deviation

14.2



United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.33

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: WB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	24	2	1	5	7	4	4	1	0	0	0	0	0	0
13:00	13	1	0	1	7	3	1	0	0	0	0	0	0	0
14:00	12	0	1	4	1	4	1	0	1	0	0	0	0	0
15:00	44	3	1	4	11	13	10	2	0	0	0	0	0	0
16:00	57	0	0	14	12	23	4	4	0	0	0	0	0	0
17:00	11	0	2	2	2	2	2	0	1	0	0	0	0	0
18:00	12	0	1	1	2	2	4	2	0	0	0	0	0	0
19:00	6	0	0	0	2	3	0	1	0	0	0	0	0	0
20:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
21:00	3	0	0	0	0	2	1	0	0	0	0	0	0	0
22:00	3	0	0	0	1	0	1	1	0	0	0	0	0	0
23:00	13	1	0	1	3	1	2	2	1	2	0	0	0	0
09/28/2011														
00:00	7	0	0	0	1	1	3	1	1	0	0	0	0	0
01:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
02:00	3	0	0	0	2	1	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
05:00	2	0	0	0	2	0	0	0	0	0	0	0	0	0
06:00	12	0	0	4	2	4	2	0	0	0	0	0	0	0
07:00	6	0	0	2	1	1	2	0	0	0	0	0	0	0
08:00	13	0	0	5	5	2	0	1	0	0	0	0	0	0
09:00	22	1	1	7	10	3	0	0	0	0	0	0	0	0
10:00	19	2	1	3	8	3	2	0	0	0	0	0	0	0
11:00	13	2	0	2	6	1	1	1	0	0	0	0	0	0
Total	299	12	8	55	88	74	40	16	4	2	0	0	0	0
%		4.0	2.7	18.4	29.4	24.7	13.4	5.4	1.3	0.7	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
20.9	22.7	29.1	36.5	38.8

10 mph Pace Speed
Number in Pace

23.9 - 33.9	Average	29.3 mph
173 (57.9 %)	Minimum	5.8 mph
	Maximum	53.2 mph

Speeds Exceeded

45 mph	55 mph	65 mph
2.0 %	0.0 %	0.0 %
Count	6	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.33

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: WB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	11	1	0	2	5	2	0	1	0	0	0	0	0	0
13:00	10	0	0	6	1	2	1	0	0	0	0	0	0	0
14:00	13	1	1	1	4	1	4	1	0	0	0	0	0	0
15:00	62	0	0	7	13	22	17	3	0	0	0	0	0	0
16:00	65	0	0	5	24	21	13	1	1	0	0	0	0	0
17:00	9	0	0	0	1	2	4	1	0	0	1	0	0	0
18:00	11	0	1	2	3	1	2	2	0	0	0	0	0	0
19:00	4	0	0	0	3	1	0	0	0	0	0	0	0	0
20:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
21:00	2	0	0	0	0	1	0	1	0	0	0	0	0	0
22:00	5	0	0	0	1	1	3	0	0	0	0	0	0	0
23:00	10	0	0	1	1	1	3	2	0	0	2	0	0	0
09/29/2011														
00:00	12	0	1	0	2	2	4	3	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
05:00	2	0	0	0	0	1	1	0	0	0	0	0	0	0
06:00	5	0	0	1	0	2	2	0	0	0	0	0	0	0
07:00	14	0	0	1	3	6	4	0	0	0	0	0	0	0
08:00	18	2	3	4	4	1	3	0	1	0	0	0	0	0
09:00	10	0	0	3	2	4	1	0	0	0	0	0	0	0
10:00	14	0	2	3	1	5	3	0	0	0	0	0	0	0
11:00	19	1	0	1	6	8	3	0	0	0	0	0	0	0
Total	301	5	8	37	75	88	68	15	2	0	3	0	0	0
%		1.7	2.7	12.3	24.9	29.2	22.6	5.0	0.7	0.0	1.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
22.2	24.5	31.0	38.0	38.8

10 mph Pace Speed
Number in Pace

25.2 - 35.2	Average	31.2 mph
181 (60.1 %)	Minimum	9.5 mph
	Maximum	58.2 mph

Speeds Exceeded

45 mph	55 mph	65 mph
1.7 %	1.0 %	0.0 %
Count	5	3
		0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.33

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: EB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	14	0	0	2	6	5	0	1	0	0	0	0	0	0
13:00	17	1	0	2	10	2	1	0	0	0	0	0	0	1
14:00	19	0	0	1	3	6	4	4	0	0	0	1	0	0
15:00	8	0	0	3	3	1	1	0	0	0	0	0	0	0
16:00	9	0	0	3	2	3	1	0	0	0	0	0	0	0
17:00	9	0	0	0	1	8	0	0	0	0	0	0	0	0
18:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
19:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
20:00	3	0	0	0	0	1	2	0	0	0	0	0	0	0
21:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
22:00	12	0	0	1	1	6	2	2	0	0	0	0	0	0
23:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
09/28/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	0	2	0	0	0	0	0	0	0	0	0
04:00	3	0	0	0	0	2	1	0	0	0	0	0	0	0
05:00	44	0	0	1	15	17	9	1	1	0	0	0	0	0
06:00	84	0	0	17	24	25	14	3	0	1	0	0	0	0
07:00	20	0	0	1	6	9	3	1	0	0	0	0	0	0
08:00	9	0	0	2	4	1	1	1	0	0	0	0	0	0
09:00	13	0	1	2	4	3	3	0	0	0	0	0	0	0
10:00	15	0	0	2	6	4	2	1	0	0	0	0	0	0
11:00	17	1	3	2	8	3	0	0	0	0	0	0	0	0
Total	305	2	4	39	96	100	46	14	1	1	0	1	0	1
%		0.7	1.3	12.8	31.5	32.8	15.1	4.6	0.3	0.3	0.0	0.3	0.0	0.3

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.9	24.8	30.0	35.8	38.0

10 mph Pace Speed
Number in Pace

25.2 - 35.2	Average	30.7 mph
207 (67.9 %)	Minimum	10.8 mph
	Maximum	77.6 mph

Speeds Exceeded

45 mph	55 mph	65 mph
1.3 %	0.7 %	0.3 %
Count	4	2
		1

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.33

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: EB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	11	0	0	4	5	2	0	0	0	0	0	0	0	0
13:00	20	0	0	2	10	6	2	0	0	0	0	0	0	0
14:00	19	0	1	5	3	4	5	1	0	0	0	0	0	0
15:00	11	0	0	2	2	3	1	3	0	0	0	0	0	0
16:00	3	0	0	0	1	2	0	0	0	0	0	0	0	0
17:00	10	0	0	0	1	5	4	0	0	0	0	0	0	0
18:00	5	0	0	2	1	2	0	0	0	0	0	0	0	0
19:00	2	0	0	0	1	0	0	1	0	0	0	0	0	0
20:00	2	0	0	0	0	0	1	1	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	9	0	1	2	1	3	2	0	0	0	0	0	0	0
23:00	4	0	0	0	1	0	2	1	0	0	0	0	0	0
09/29/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	0	2	0	0	0	0	0	0	0	0	0
04:00	5	0	0	0	0	4	1	0	0	0	0	0	0	0
05:00	40	0	0	4	9	20	7	0	0	0	0	0	0	0
06:00	75	1	2	6	28	22	12	3	1	0	0	0	0	0
07:00	18	0	0	0	3	7	5	3	0	0	0	0	0	0
08:00	10	0	0	1	1	5	3	0	0	0	0	0	0	0
09:00	17	1	0	4	6	3	1	0	1	1	0	0	0	0
10:00	3	0	0	1	0	1	1	0	0	0	0	0	0	0
11:00	22	0	0	1	7	12	2	0	0	0	0	0	0	0
Total	288	2	4	34	82	101	49	13	2	1	0	0	0	0
%		0.7	1.4	11.8	28.5	35.1	17.0	4.5	0.7	0.3	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.6	25.5	31.0	36.5	37.2

10 mph Pace Speed
Number in Pace

26.6 - 36.6	Average	30.9 mph
200 (69.4 %)	Minimum	10.9 mph
	Maximum	53.2 mph

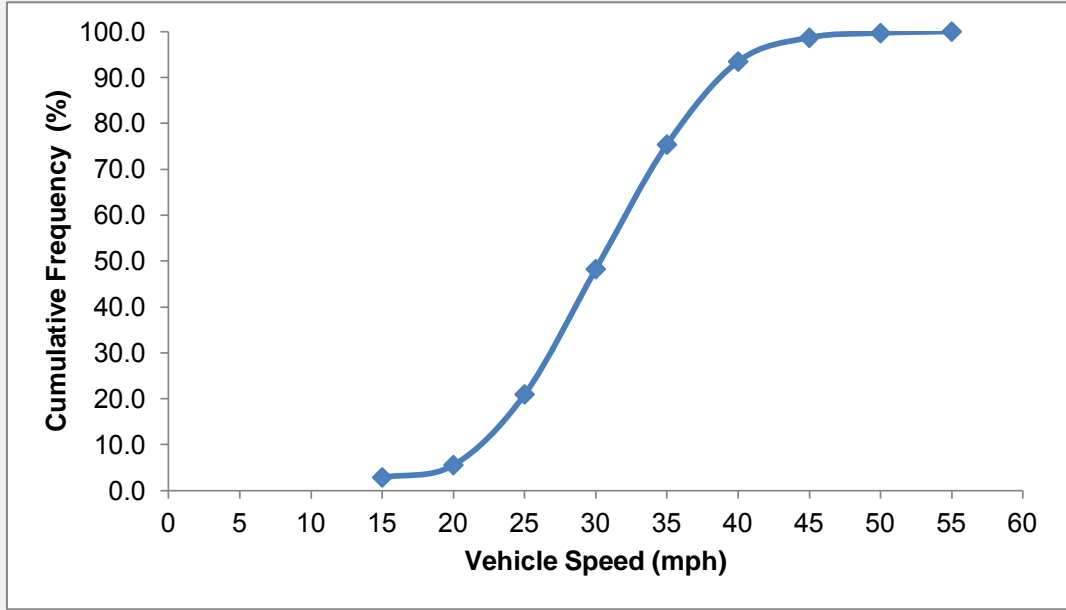
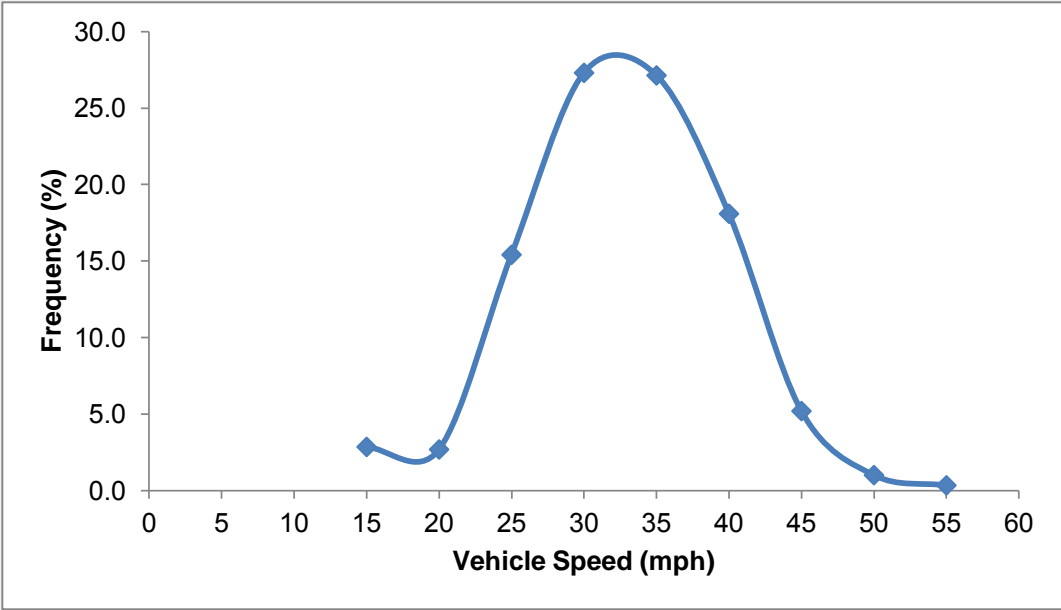
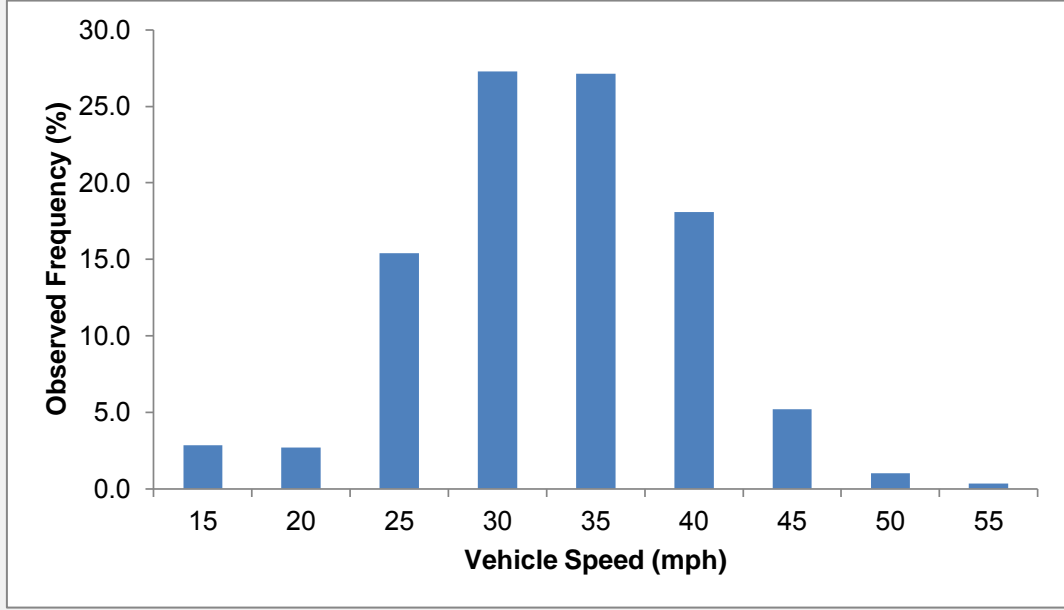
Speeds Exceeded

45 mph	55 mph	65 mph
1.0 %	0.0 %	0.0 %
Count	3	0

Street: Magma Mine Road
Location: At Mile Post 0.33 SB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	17	16	92	163	162	108	31	6	2	0	0	0	0
Frquency (%)	2.8	2.7	15.4	27.3	27.1	18.1	5.2	1.0	0.3	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	2.8	5.5	20.9	48.2	75.4	93.5	98.7	99.7	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u _i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f _i)	17	16	92	163	162	108	31	6	2	0	0	0	
f _i u _i ²	956.25	1600	14375	36675	49612.5	43200	15693.75	3750	1512.5	0	0	0	
(f _i u _i) ²	16256.25	25600	1322500	5978025	8037225	4665600	486506.3	22500	3025	0	0	0	

Total Counts
597
Standard Deviation
14.9

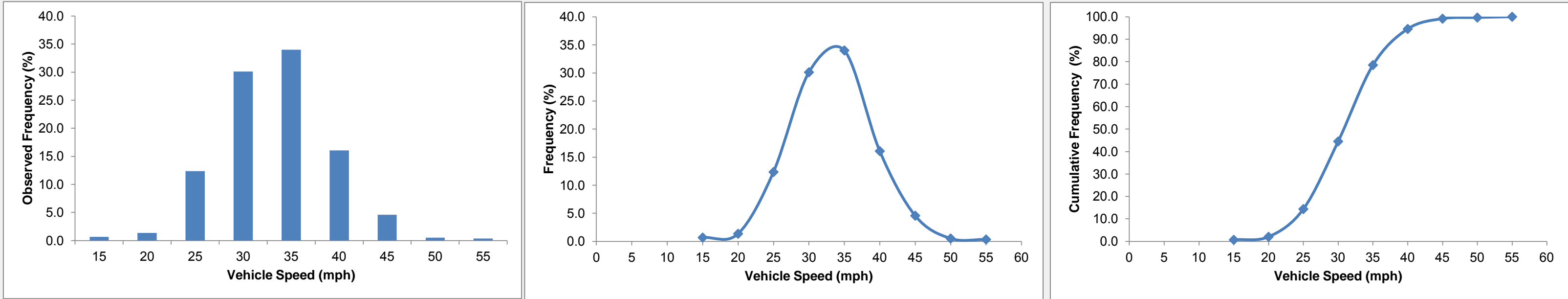


Street: Magma Mine Road
Location: At Mile Post 0.33 NB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	4	8	73	178	201	95	27	3	2	0	0	0	0
Frquency (%)	0.7	1.4	12.4	30.1	34.0	16.1	4.6	0.5	0.3	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	0.7	2.0	14.4	44.5	78.5	94.6	99.2	99.7	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	4	8	73	178	201	95	27	3	2	0	0	0	
$f_i u_i^2$	225	800	11406.25	40050	61556.25	38000	13668.75	1875	1512.5	0	0	0	
$(f_i u_i)^2$	900	6400	832656.3	7128900	12372806	3610000	369056.3	5625	3025	0	0	0	

Total Counts591

Standard Deviation14.7



Street: Magma Mine Road
Location: At Mile Post 0.33 SB&NB Combined

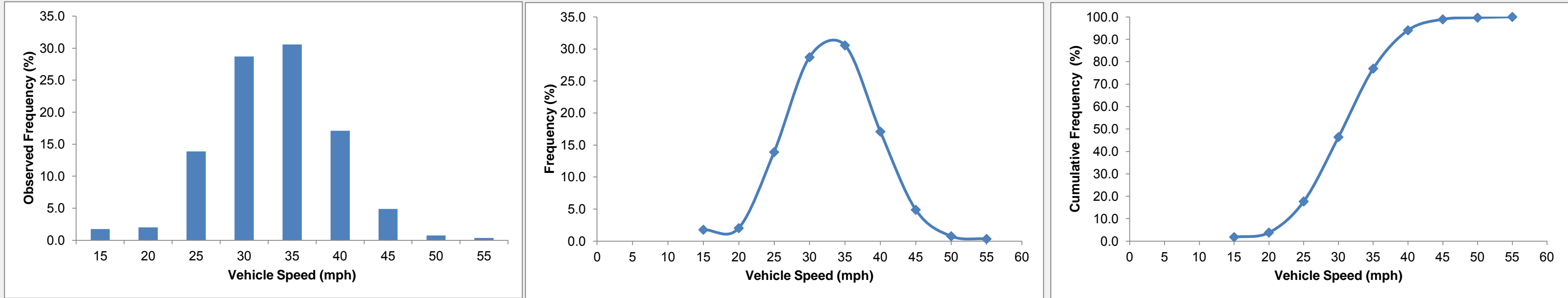
mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	21	24	165	341	363	203	58	9	4	0	0	0	0
Frquency (%)	1.8	2.0	13.9	28.7	30.6	17.1	4.9	0.8	0.3	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.8	3.8	17.7	46.4	76.9	94.0	98.9	99.7	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency of speed class (f_i)	21	24	165	341	363	203	58	9	4	0	0	0	
$f_i u_i^2$	1181.25	2400	25781.25	76725	111168.8	81200	29362.5	5625	3025	0	0	0	
$(f_i u_i)^2$	24806.25	57600	4253906	26163225	40354256	16483600	1703025	50625	12100	0	0	0	

Total Counts

1188

Standard Deviation

14.8



United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.49

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: EB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	20	1	0	2	6	3	8	0	0	0	0	0	0	0
13:00	13	0	0	3	3	5	2	0	0	0	0	0	0	0
14:00	11	0	0	5	0	1	4	1	0	0	0	0	0	0
15:00	43	1	0	3	10	12	12	5	0	0	0	0	0	0
16:00	59	1	2	2	20	15	16	2	1	0	0	0	0	0
17:00	10	0	0	3	1	3	1	2	0	0	0	0	0	0
18:00	12	0	0	0	2	5	3	2	0	0	0	0	0	0
19:00	6	0	0	1	1	2	2	0	0	0	0	0	0	0
20:00	3	0	0	0	2	1	0	0	0	0	0	0	0	0
21:00	2	0	0	0	0	1	1	0	0	0	0	0	0	0
22:00	3	0	0	0	1	0	1	0	1	0	0	0	0	0
23:00	13	1	0	1	0	3	3	2	2	1	0	0	0	0
09/28/2011														
00:00	7	0	0	0	0	0	5	2	0	0	0	0	0	0
01:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
02:00	3	0	0	0	2	1	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
05:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
06:00	12	0	2	2	2	4	2	0	0	0	0	0	0	0
07:00	5	0	0	2	3	0	0	0	0	0	0	0	0	0
08:00	13	0	0	2	6	4	1	0	0	0	0	0	0	0
09:00	20	2	0	2	11	4	1	0	0	0	0	0	0	0
10:00	16	0	0	2	6	6	2	0	0	0	0	0	0	0
11:00	11	2	0	3	3	1	1	0	1	0	0	0	0	0
Total	286	8	4	33	82	72	65	16	5	1	0	0	0	0
%		2.8	1.4	11.5	28.7	25.2	22.7	5.6	1.7	0.3	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.6	24.8	30.5	38.0	38.8

10 mph Pace Speed
Number in Pace

26.6 - 36.6	Average	30.9 mph
164 (57.3 %)	Minimum	7.2 mph
	Maximum	50.3 mph

Speeds Exceeded

45 mph	55 mph	65 mph
2.1 %	0.0 %	0.0 %
Count	6	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.49

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: EB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	9	0	0	3	1	4	1	0	0	0	0	0	0	0
13:00	10	0	2	2	2	3	1	0	0	0	0	0	0	0
14:00	13	0	0	1	3	4	3	2	0	0	0	0	0	0
15:00	61	0	1	1	13	20	23	3	0	0	0	0	0	0
16:00	65	0	0	1	25	25	11	2	0	1	0	0	0	0
17:00	10	0	0	0	1	4	2	2	0	1	0	0	0	0
18:00	10	0	1	2	2	1	2	2	0	0	0	0	0	0
19:00	4	0	0	0	3	1	0	0	0	0	0	0	0	0
20:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
21:00	2	0	0	0	0	1	0	1	0	0	0	0	0	0
22:00	5	0	0	0	0	1	3	1	0	0	0	0	0	0
23:00	9	0	0	0	1	2	3	1	0	1	1	0	0	0
09/29/2011														
00:00	12	0	0	0	2	3	5	2	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
05:00	2	0	0	0	0	1	1	0	0	0	0	0	0	0
06:00	6	0	0	0	0	6	0	0	0	0	0	0	0	0
07:00	14	0	0	0	5	2	7	0	0	0	0	0	0	0
08:00	16	1	1	5	5	1	1	2	0	0	0	0	0	0
09:00	8	0	0	2	1	5	0	0	0	0	0	0	0	0
10:00	13	0	1	2	2	3	5	0	0	0	0	0	0	0
11:00	17	0	0	4	2	8	3	0	0	0	0	0	0	0
Total	291	1	6	23	70	98	71	18	0	3	1	0	0	0
%		0.3	2.1	7.9	24.1	33.7	24.4	6.2	0.0	1.0	0.3	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
24.8	26.2	32.1	38.0	38.8

10 mph Pace Speed
Number in Pace

26.6 - 36.6	Average	32.2 mph
189 (64.9 %)	Minimum	12.0 mph
	Maximum	56.4 mph

Speeds Exceeded

45 mph	55 mph	65 mph
1.4 %	0.3 %	0.0 %
Count	4	1
		0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.49

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: WB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	12	0	0	1	4	3	2	2	0	0	0	0	0	0
13:00	16	1	0	0	5	7	1	1	0	0	0	0	0	1
14:00	19	1	0	1	0	5	5	3	2	1	0	0	1	0
15:00	7	0	0	1	3	3	0	0	0	0	0	0	0	0
16:00	8	0	0	1	3	2	2	0	0	0	0	0	0	0
17:00	9	0	0	0	2	5	2	0	0	0	0	0	0	0
18:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
19:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
20:00	3	0	0	0	0	0	2	1	0	0	0	0	0	0
21:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
22:00	12	0	0	0	1	5	4	1	1	0	0	0	0	0
23:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
09/28/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	0	1	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
04:00	3	0	0	0	0	1	2	0	0	0	0	0	0	0
05:00	47	0	0	2	5	21	12	6	1	0	0	0	0	0
06:00	81	0	3	8	24	20	20	5	1	0	0	0	0	0
07:00	19	0	0	0	4	7	7	1	0	0	0	0	0	0
08:00	9	0	0	0	7	0	1	1	0	0	0	0	0	0
09:00	13	0	1	2	4	2	4	0	0	0	0	0	0	0
10:00	16	0	0	0	5	8	2	1	0	0	0	0	0	0
11:00	14	3	1	3	4	3	0	0	0	0	0	0	0	0
Total	296	5	5	19	72	96	68	23	5	1	0	0	1	1
%		1.7	1.7	6.4	24.3	32.4	23.0	7.8	1.7	0.3	0.0	0.0	0.3	0.3

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
24.8	26.2	32.1	38.8	40.5

10 mph Pace Speed
Number in Pace

25.9 - 35.9	Average	32.3 mph
189 (63.9 %)	Minimum	8.6 mph
	Maximum	71.6 mph

Speeds Exceeded

45 mph	55 mph	65 mph
2.7 %	0.7 %	0.7 %
Count	8	2

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.49

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: WB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	10	0	0	2	6	2	0	0	0	0	0	0	0	0
13:00	19	0	0	0	5	14	0	0	0	0	0	0	0	0
14:00	21	0	1	2	2	7	3	4	1	1	0	0	0	0
15:00	7	0	0	1	2	2	1	0	1	0	0	0	0	0
16:00	3	0	0	0	1	1	1	0	0	0	0	0	0	0
17:00	9	0	0	0	1	2	4	1	0	1	0	0	0	0
18:00	4	0	0	0	2	2	0	0	0	0	0	0	0	0
19:00	2	0	0	0	1	0	0	1	0	0	0	0	0	0
20:00	2	0	0	0	0	0	0	2	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	8	0	1	0	2	2	3	0	0	0	0	0	0	0
23:00	4	0	0	0	0	1	2	0	1	0	0	0	0	0
09/29/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
03:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
04:00	5	0	0	0	1	3	1	0	0	0	0	0	0	0
05:00	41	0	0	2	5	23	8	3	0	0	0	0	0	0
06:00	74	0	0	5	20	25	18	3	2	1	0	0	0	0
07:00	18	0	0	0	3	4	8	2	1	0	0	0	0	0
08:00	10	0	0	1	3	2	4	0	0	0	0	0	0	0
09:00	15	1	0	1	7	3	1	0	1	1	0	0	0	0
10:00	3	0	0	0	1	0	2	0	0	0	0	0	0	0
11:00	17	0	0	0	6	7	4	0	0	0	0	0	0	0
Total	274	1	2	14	70	100	60	16	7	4	0	0	0	0
%		0.4	0.7	5.1	25.5	36.5	21.9	5.8	2.6	1.5	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
25.9	27.4	32.1	38.8	39.6

10 mph Pace Speed
Number in Pace

27.4 - 37.4	Average	32.9 mph
180 (65.7 %)	Minimum	14.9 mph
	Maximum	51.7 mph

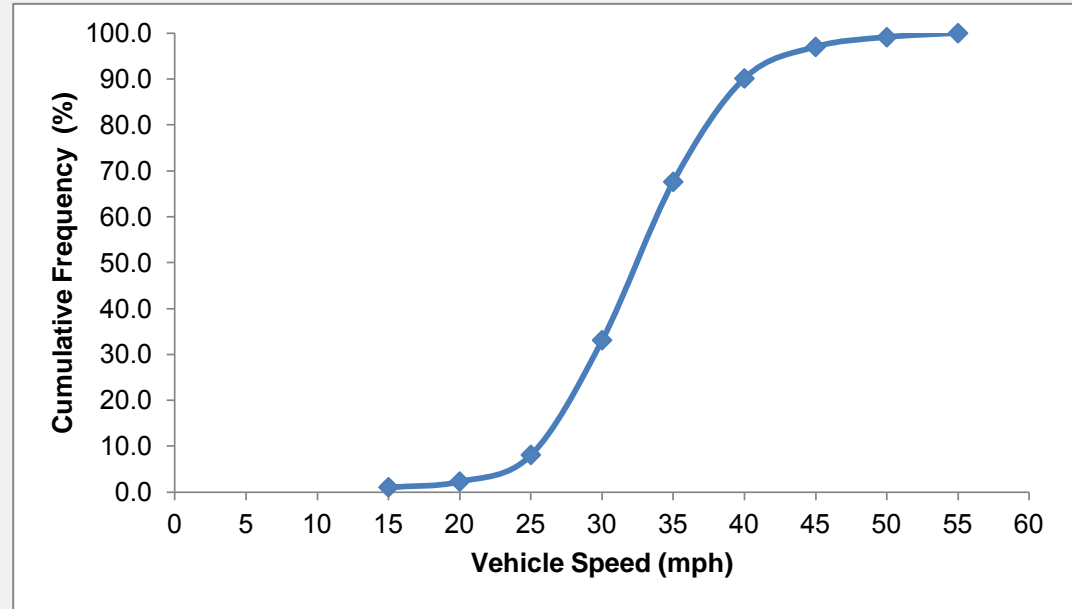
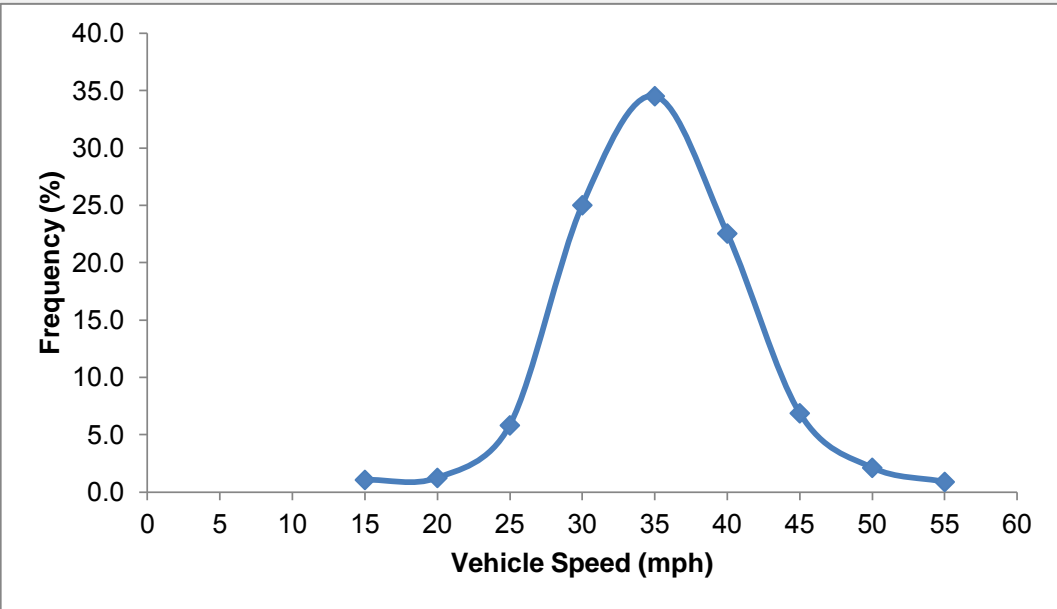
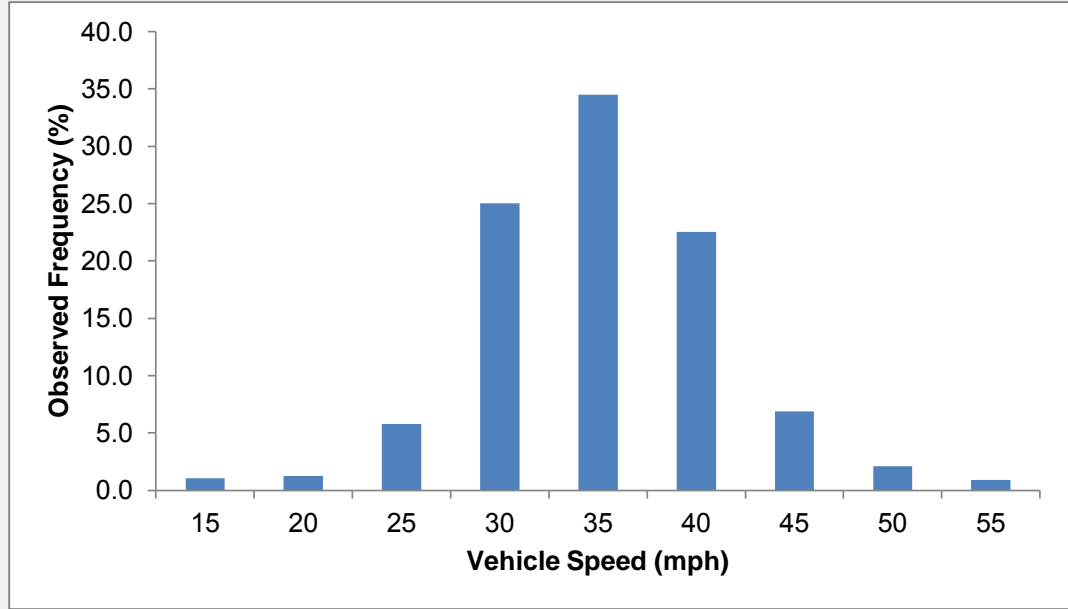
Speeds Exceeded

45 mph	55 mph	65 mph
4.0 %	0.0 %	0.0 %
Count	11	0

Street: Magma Mine Road
Location: At Mile Post 0.49 SB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	6	7	33	142	196	128	39	12	5	0	0	0	0
Frquency (%)	1.1	1.2	5.8	25.0	34.5	22.5	6.9	2.1	0.9	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.1	2.3	8.1	33.1	67.6	90.1	97.0	99.1	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	6	7	33	142	196	128	39	12	5	0	0	0	
$f_i u_i^2$	337.5	700	5156.25	31950	60025	51200	19743.75	7500	3781.25	0	0	0	
$(f_i u_i)^2$	2025	4900	170156.3	4536900	11764900	6553600	770006.3	90000	18906.25	0	0	0	

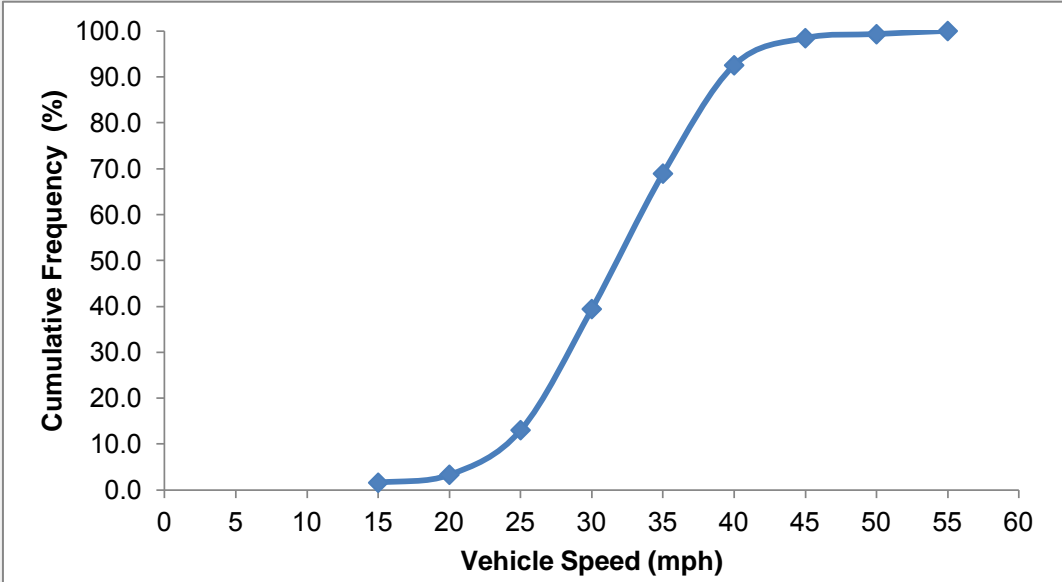
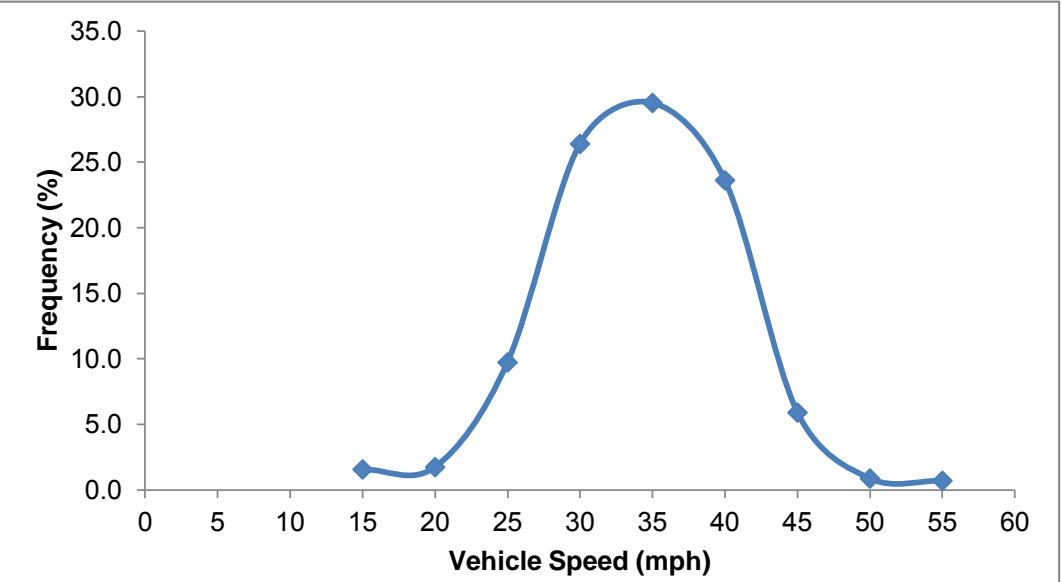
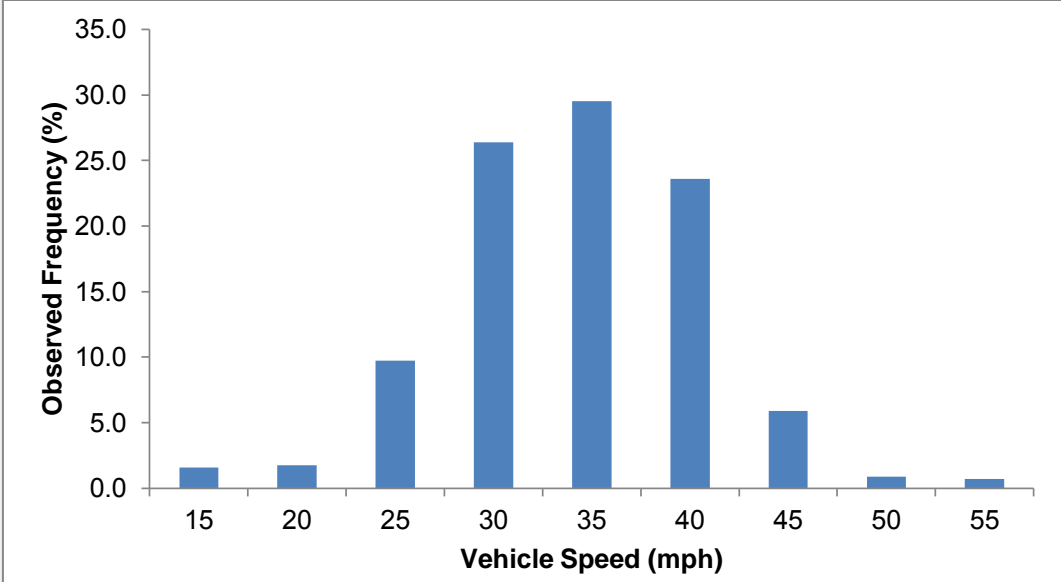
Total Counts
568
Standard Deviation
15.6



Street: Magma Mine Road
Location: At Mile Post 0.49 NB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	9	10	56	152	170	136	34	5	4	0	0	0	0
Frquency (%)	1.6	1.7	9.7	26.4	29.5	23.6	5.9	0.9	0.7	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.6	3.3	13.0	39.4	68.9	92.5	98.4	99.3	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	9	10	56	152	170	136	34	5	4	0	0	0	
$f_i u_i^2$	506.25	1000	8750	34200	52062.5	54400	17212.5	3125	3025	0	0	0	
$(f_i u_i)^2$	4556.25	10000	490000	5198400	8850625	7398400	585225	15625	12100	0	0	0	

Total Counts
576
Standard Deviation
15.3

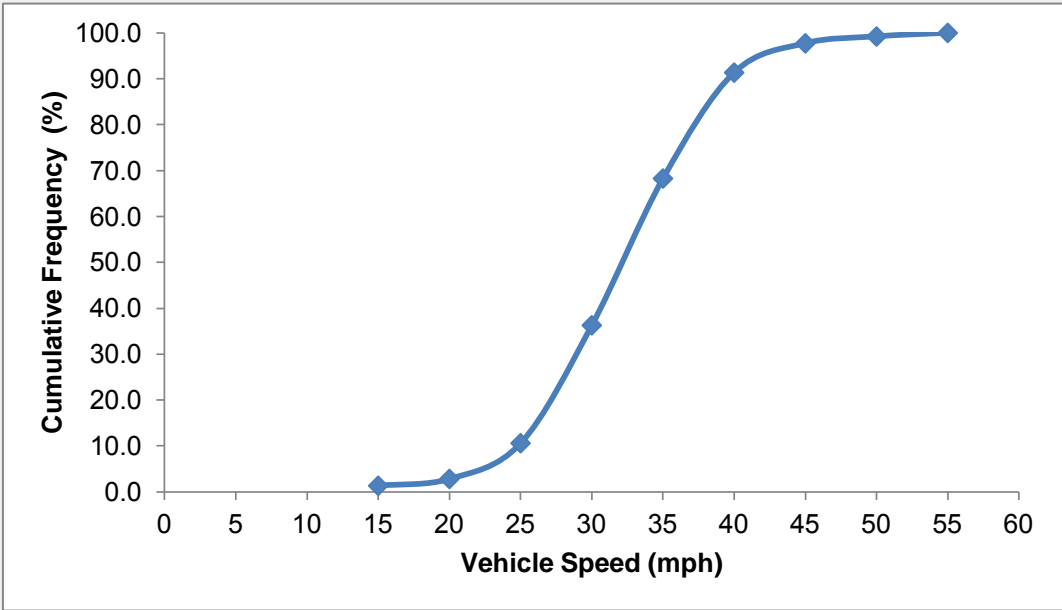
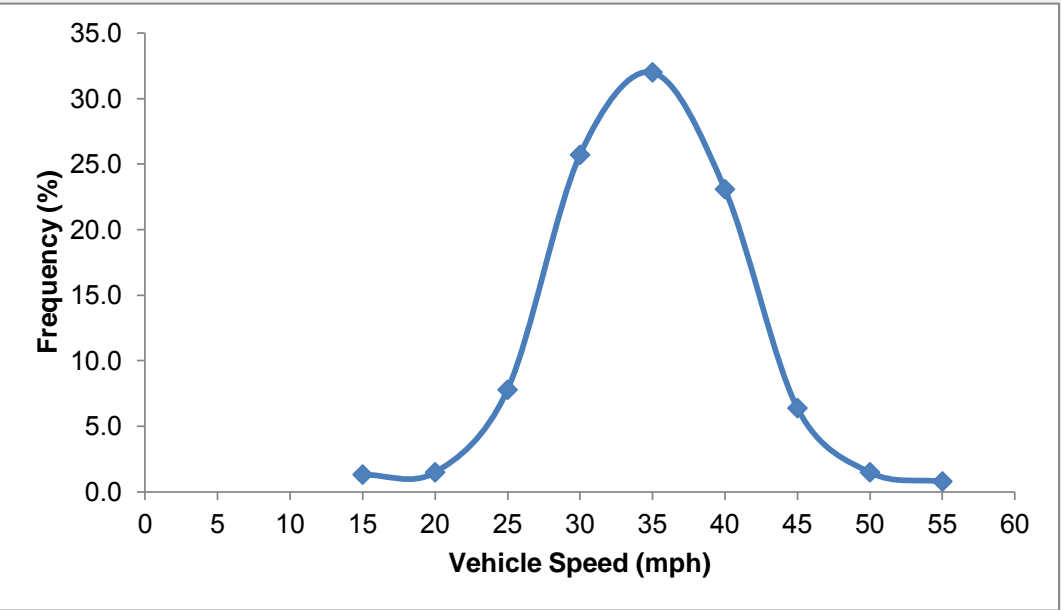
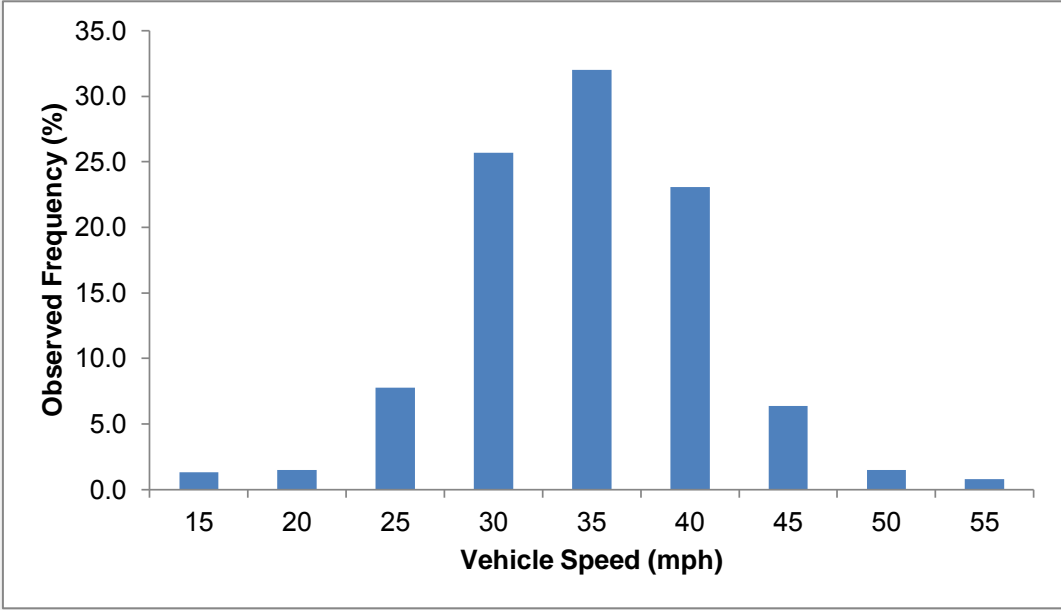


Street: Magma Mine Road
Location: At Mile Post 0.49 SB&NB Combined

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	15	17	89	294	366	264	73	17	9	0	0	0	0
Frquency (%)	1.3	1.5	7.8	25.7	32.0	23.1	6.4	1.5	0.8	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.3	2.8	10.6	36.3	68.3	91.3	97.7	99.2	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency of speed class (f_i)	15	17	89	294	366	264	73	17	9	0	0	0	
$f_i u_i^2$	843.75	1700	13906.25	66150	112087.5	105600	36956.25	10625	6806.25	0	0	0	
$(f_i u_i)^2$	12656.25	28900	1237656	19448100	41024025	27878400	2697806	180625	61256.25	0	0	0	

Total Counts1144

Standard Deviation15.5



United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.86

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: WB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	10	0	0	2	5	2	1	0	0	0	0	0	0	0
13:00	17	0	0	5	5	4	2	0	0	0	0	1	0	0
14:00	16	0	1	0	2	7	4	2	0	0	0	0	0	0
15:00	9	1	0	2	4	0	1	0	0	0	0	1	0	0
16:00	6	0	0	2	3	0	1	0	0	0	0	0	0	0
17:00	9	0	1	0	4	4	0	0	0	0	0	0	0	0
18:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
19:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
20:00	3	0	0	0	0	2	1	0	0	0	0	0	0	0
21:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
22:00	12	0	0	1	3	3	5	0	0	0	0	0	0	0
23:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
09/28/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	1	1	0	0	0	0	0	0	0	0	0
04:00	3	0	0	0	1	1	1	0	0	0	0	0	0	0
05:00	43	0	1	4	12	19	6	1	0	0	0	0	0	0
06:00	82	0	6	21	24	24	7	0	0	0	0	0	0	0
07:00	23	0	0	7	6	6	2	1	1	0	0	0	0	0
08:00	9	0	0	4	3	2	0	0	0	0	0	0	0	0
09:00	12	1	0	3	2	6	0	0	0	0	0	0	0	0
10:00	16	0	0	4	7	3	2	0	0	0	0	0	0	0
11:00	15	3	1	5	2	4	0	0	0	0	0	0	0	0
Total	293	5	10	61	84	92	34	4	1	0	0	2	0	0
%		1.7	3.4	20.8	28.7	31.4	11.6	1.4	0.3	0.0	0.0	0.7	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
22.2	23.0	29.1	34.5	35.8

10 mph Pace Speed
Number in Pace

25.2 - 35.2	Average	29.0 mph
186 (63.5 %)	Minimum	13.4 mph
	Maximum	60.1 mph

Speeds Exceeded

45 mph	55 mph	65 mph
1.0 %	0.7 %	0.0 %
Count	3	2
		0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.86

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: WB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	9	0	1	2	6	0	0	0	0	0	0	0	0	0
13:00	20	0	0	7	8	4	1	0	0	0	0	0	0	0
14:00	16	1	0	4	3	4	3	0	1	0	0	0	0	0
15:00	13	1	1	0	4	0	5	2	0	0	0	0	0	0
16:00	3	0	0	0	0	3	0	0	0	0	0	0	0	0
17:00	8	0	0	1	1	3	2	0	1	0	0	0	0	0
18:00	5	0	0	1	3	1	0	0	0	0	0	0	0	0
19:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
20:00	3	0	0	0	1	0	2	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	8	0	2	0	3	3	0	0	0	0	0	0	0	0
23:00	4	0	0	0	3	0	1	0	0	0	0	0	0	0
09/29/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
04:00	6	0	0	0	3	3	0	0	0	0	0	0	0	0
05:00	39	0	0	7	16	11	5	0	0	0	0	0	0	0
06:00	74	0	0	15	25	26	6	1	1	0	0	0	0	0
07:00	18	0	0	2	6	6	4	0	0	0	0	0	0	0
08:00	11	0	0	3	0	8	0	0	0	0	0	0	0	0
09:00	15	1	0	4	6	2	1	1	0	0	0	0	0	0
10:00	3	0	0	1	0	0	2	0	0	0	0	0	0	0
11:00	16	0	0	3	6	5	1	1	0	0	0	0	0	0
Total	273	3	4	50	95	80	33	5	3	0	0	0	0	0
%		1.1	1.5	18.3	34.8	29.3	12.1	1.8	1.1	0.0	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
22.7	24.2	29.1	34.5	35.8

10 mph Pace Speed
Number in Pace

24.5 - 34.5	Average	29.3 mph
191 (70.0 %)	Minimum	11.5 mph
	Maximum	49.0 mph

Speeds Exceeded

45 mph	55 mph	65 mph
1.1 %	0.0 %	0.0 %
Count	3	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.86

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: EB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	19	0	2	5	4	5	3	0	0	0	0	0	0	0
13:00	13	0	0	5	5	2	1	0	0	0	0	0	0	0
14:00	10	1	0	3	0	4	2	0	0	0	0	0	0	0
15:00	43	1	0	6	5	13	14	4	0	0	0	0	0	0
16:00	59	2	2	4	12	23	14	1	1	0	0	0	0	0
17:00	8	0	0	3	0	3	1	1	0	0	0	0	0	0
18:00	12	1	0	0	3	3	1	4	0	0	0	0	0	0
19:00	6	0	0	0	2	2	2	0	0	0	0	0	0	0
20:00	2	0	0	1	0	1	0	0	0	0	0	0	0	0
21:00	3	0	0	0	0	2	1	0	0	0	0	0	0	0
22:00	3	0	0	0	1	0	1	1	0	0	0	0	0	0
23:00	13	0	0	1	1	5	1	2	3	0	0	0	0	0
09/28/2011														
00:00	7	0	0	0	0	1	1	5	0	0	0	0	0	0
01:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
02:00	3	0	1	0	2	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
05:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
06:00	11	0	0	2	2	6	0	1	0	0	0	0	0	0
07:00	6	0	1	2	2	0	1	0	0	0	0	0	0	0
08:00	13	0	1	0	6	4	1	1	0	0	0	0	0	0
09:00	20	2	1	2	8	7	0	0	0	0	0	0	0	0
10:00	16	0	0	2	8	5	1	0	0	0	0	0	0	0
11:00	12	2	0	3	4	2	0	1	0	0	0	0	0	0
Total	283	9	8	39	67	90	45	21	4	0	0	0	0	0
%		3.2	2.8	13.8	23.7	31.8	15.9	7.4	1.4	0.0	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
21.6	23.9	30.5	37.2	39.6

10 mph Pace Speed
Number in Pace

24.5 - 34.5	Average	30.5 mph
165 (58.3 %)	Minimum	5.3 mph
	Maximum	47.7 mph

Speeds Exceeded

45 mph	55 mph	65 mph
1.4 %	0.0 %	0.0 %
Count	4	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 0.86

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: EB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
12:00	9	0	1	2	1	3	2	0	0	0	0	0	0	0
13:00	9	0	1	2	4	2	0	0	0	0	0	0	0	0
14:00	13	1	0	4	2	3	1	1	1	0	0	0	0	0
15:00	59	0	2	7	11	20	15	4	0	0	0	0	0	0
16:00	66	0	0	6	20	20	15	3	2	0	0	0	0	0
17:00	9	0	0	0	2	2	3	1	0	1	0	0	0	0
18:00	11	0	1	2	2	2	2	1	1	0	0	0	0	0
19:00	4	0	0	0	1	3	0	0	0	0	0	0	0	0
20:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
21:00	2	0	0	0	0	1	0	1	0	0	0	0	0	0
22:00	4	0	0	0	0	3	0	1	0	0	0	0	0	0
23:00	10	0	0	0	1	1	3	3	0	1	0	1	0	0
09/29/2011														
00:00	11	0	0	0	1	2	6	2	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	2	0	0	0	0	1	1	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
05:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
06:00	6	0	0	1	0	4	1	0	0	0	0	0	0	0
07:00	14	1	0	0	4	6	3	0	0	0	0	0	0	0
08:00	15	2	1	3	5	0	3	1	0	0	0	0	0	0
09:00	8	0	0	2	2	3	1	0	0	0	0	0	0	0
10:00	13	0	0	4	1	3	5	0	0	0	0	0	0	0
11:00	17	0	0	5	4	7	1	0	0	0	0	0	0	0
Total	287	4	6	38	63	89	62	18	4	2	0	1	0	0
%		1.4	2.1	13.2	22.0	31.0	21.6	6.3	1.4	0.7	0.0	0.3	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.3	24.5	31.6	38.0	39.6

10 mph Pace Speed
Number in Pace

26.6 - 36.6	Average	31.4 mph
168 (58.5 %)	Minimum	9.5 mph
	Maximum	60.1 mph

Speeds Exceeded

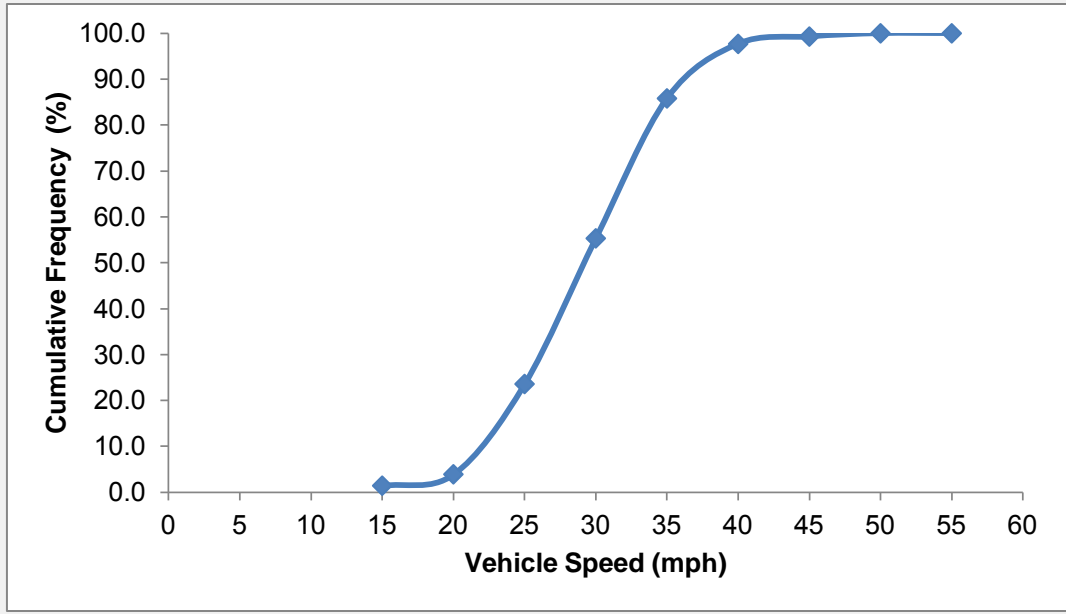
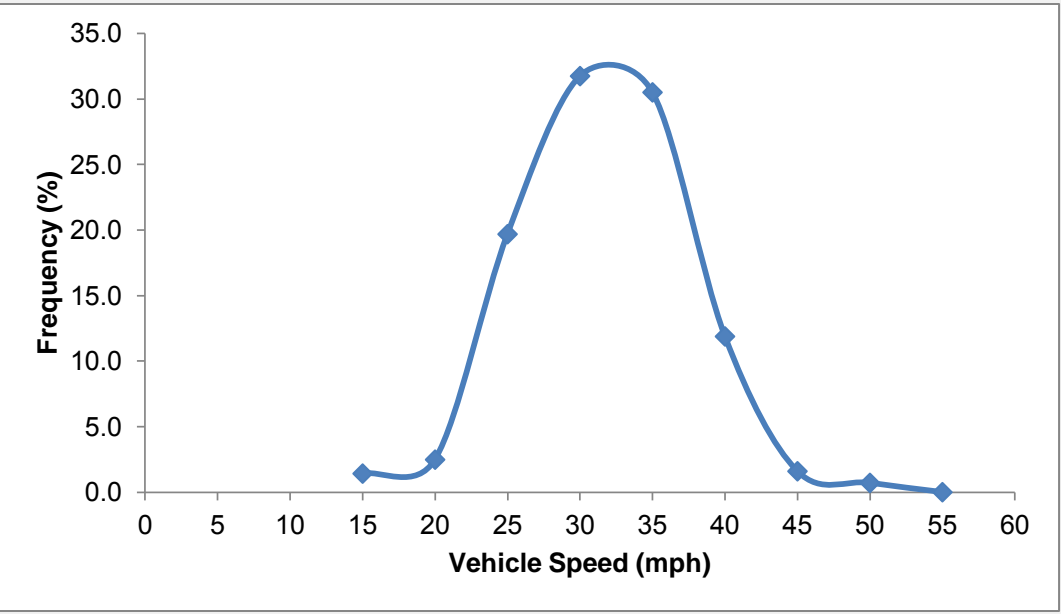
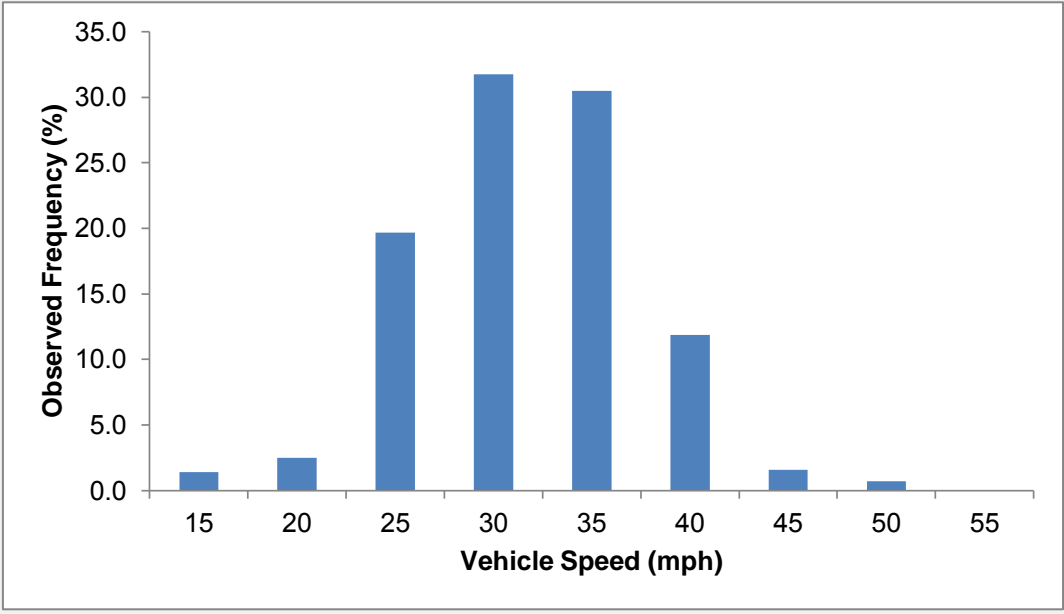
45 mph	55 mph	65 mph
2.4 %	0.3 %	0.0 %
Count	7	1
		0

Street: Magma Mine Road
Location: At Mile Post 0.86 SB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	8	14	111	179	172	67	9	4	0	0	0	0	0
Frquency (%)	1.4	2.5	19.7	31.7	30.5	11.9	1.6	0.7	0.0	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.4	3.9	23.6	55.3	85.8	97.7	99.3	100.0	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	8	14	111	179	172	67	9	4	0	0	0	0	
$f_i u_i^2$	450	1400	17343.75	40275	52675	26800	4556.25	2500	0	0	0	0	
$(f_i u_i)^2$	3600	19600	1925156	7209225	9060100	1795600	41006.25	10000	0	0	0	0	

Total Counts564

Standard Deviation14.0

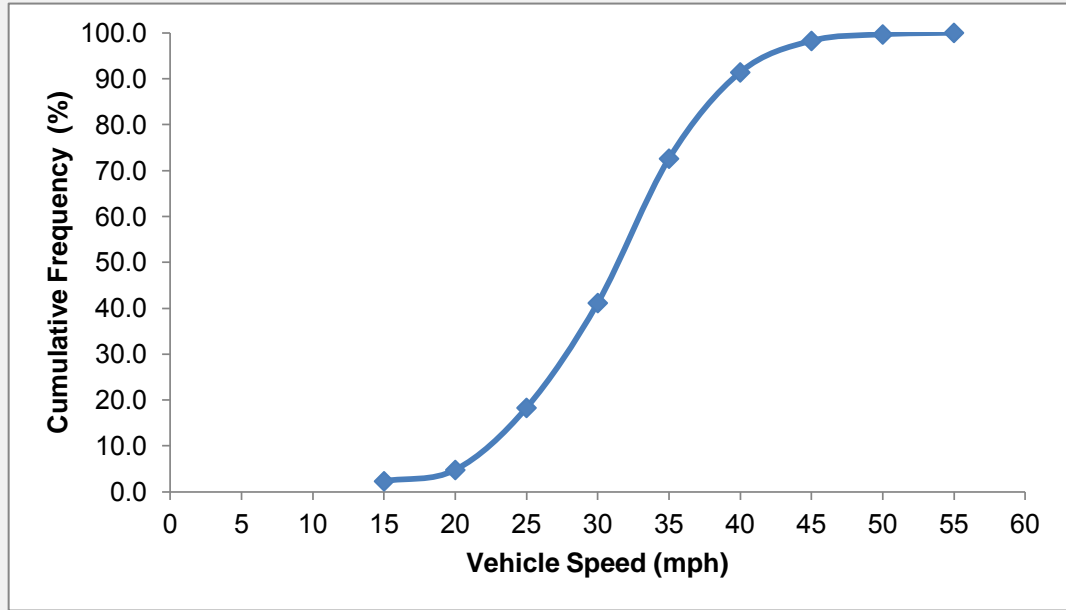
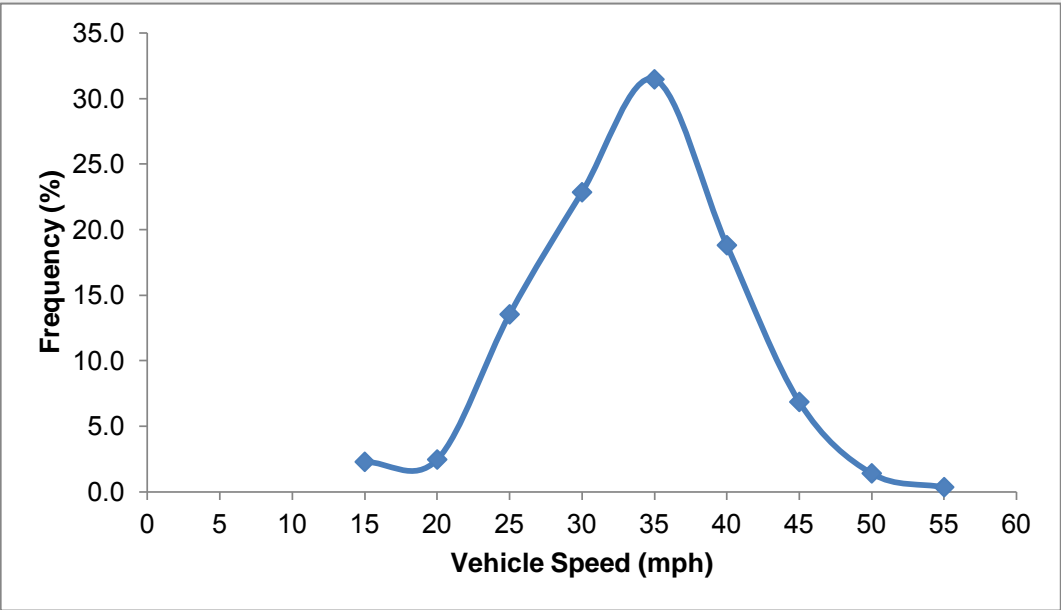
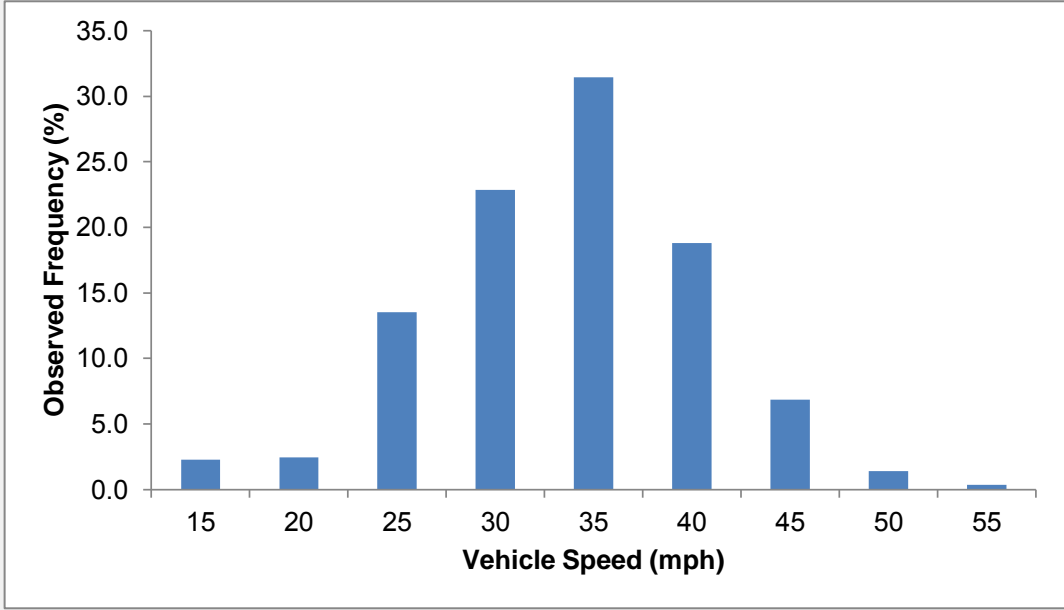


Street: Magma Mine Road
Location: At Mile Post 0.86 NB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	13	14	77	130	179	107	39	8	2	0	0	0	0
Frquency (%)	2.3	2.5	13.5	22.8	31.5	18.8	6.9	1.4	0.4	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	2.3	4.7	18.3	41.1	72.6	91.4	98.2	99.6	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	13	14	77	130	179	107	39	8	2	0	0	0	
$f_i u_i^2$	731.25	1400	12031.25	29250	54818.75	42800	19743.75	5000	1512.5	0	0	0	
$(f_i u_i)^2$	9506.25	19600	926406.3	3802500	9812556	4579600	770006.3	40000	3025	0	0	0	

Total Counts569

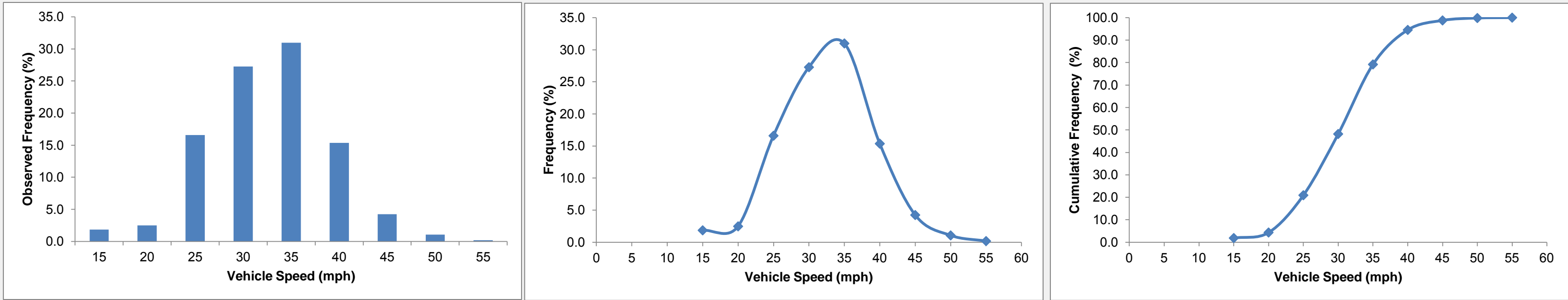
Standard Deviation15.3



Street: Magma Mine Road
Location: At Mile Post 0.86 SB&NB Combined

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	21	28	188	309	351	174	48	12	2	0	0	0	0
Frquency (%)	1.9	2.5	16.6	27.3	31.0	15.4	4.2	1.1	0.2	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.9	4.3	20.9	48.2	79.2	94.5	98.8	99.8	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency of speed class (f_i)	21	28	188	309	351	174	48	12	2	0	0	0	
$f_i u_i^2$	1181.25	2800	29375	69525	107493.8	69600	24300	7500	1512.5	0	0	0	
$(f_i u_i)^2$	24806.25	78400	5522500	21483225	37730306	12110400	1166400	90000	3025	0	0	0	

Total Counts
1133
Standard Deviation
14.7



United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.05

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: SB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	16	0	1	2	4	4	3	0	1	0	0	0	0	1
14:00	18	1	0	0	1	3	5	3	2	1	2	0	0	0
15:00	8	0	0	0	4	2	1	1	0	0	0	0	0	0
16:00	7	0	0	0	1	3	3	0	0	0	0	0	0	0
17:00	9	0	0	1	0	4	4	0	0	0	0	0	0	0
18:00	2	0	0	0	0	0	1	1	0	0	0	0	0	0
19:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
20:00	3	0	0	0	0	0	2	0	1	0	0	0	0	0
21:00	1	0	0	0	0	0	0	0	1	0	0	0	0	0
22:00	12	0	0	0	0	3	5	2	2	0	0	0	0	0
23:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
09/28/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	0	1	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	1	0	0	0	0	1	0	0	0	0	0
04:00	3	0	0	0	0	0	1	1	1	0	0	0	0	0
05:00	44	0	0	3	3	8	22	6	2	0	0	0	0	0
06:00	83	2	1	12	17	17	20	12	1	1	0	0	0	0
07:00	20	0	0	2	3	6	5	1	3	0	0	0	0	0
08:00	9	0	0	0	4	2	3	0	0	0	0	0	0	0
09:00	13	0	1	0	3	5	3	1	0	0	0	0	0	0
10:00	15	1	0	0	3	6	4	1	0	0	0	0	0	0
11:00	15	2	0	3	4	4	1	1	0	0	0	0	0	0
12:00	10	0	0	2	3	3	2	0	0	0	0	0	0	0
Total	293	6	3	26	50	71	86	31	15	2	2	0	0	1
%		2.0	1.0	8.9	17.1	24.2	29.4	10.6	5.1	0.7	0.7	0.0	0.0	0.3

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.9	26.6	34.5	40.5	43.3

10 mph Pace Speed
Number in Pace

28.2 - 38.2	Average	33.9 mph
162 (55.3 %)	Minimum	5.5 mph
	Maximum	88.7 mph

Speeds Exceeded

45 mph	55 mph	65 mph
6.8 %	1.0 %	0.3 %
Count	20	3
		1

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.05

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: SB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	19	0	0	1	3	9	4	2	0	0	0	0	0	0
14:00	21	0	0	2	2	4	4	5	3	0	0	0	1	0
15:00	8	1	0	0	0	2	2	1	2	0	0	0	0	0
16:00	3	0	0	0	0	1	2	0	0	0	0	0	0	0
17:00	9	0	0	0	1	0	4	3	0	0	1	0	0	0
18:00	4	0	0	0	0	4	0	0	0	0	0	0	0	0
19:00	2	0	0	0	1	0	0	1	0	0	0	0	0	0
20:00	2	0	0	0	0	0	0	1	1	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	8	0	1	0	0	2	4	1	0	0	0	0	0	0
23:00	4	0	0	0	0	0	2	1	1	0	0	0	0	0
09/29/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	0	0	1	1	0	0	0	0	0	0	0
04:00	5	0	0	0	1	1	2	1	0	0	0	0	0	0
05:00	41	0	0	1	6	10	19	5	0	0	0	0	0	0
06:00	74	0	0	4	10	26	24	7	2	1	0	0	0	0
07:00	18	0	0	1	1	2	7	3	4	0	0	0	0	0
08:00	12	0	1	1	3	1	4	2	0	0	0	0	0	0
09:00	15	1	0	1	4	4	2	2	0	1	0	0	0	0
10:00	3	0	0	0	1	0	1	1	0	0	0	0	0	0
11:00	17	0	0	0	2	8	4	2	1	0	0	0	0	0
12:00	13	0	0	0	1	6	4	2	0	0	0	0	0	0
Total	280	2	2	11	36	81	90	40	14	2	1	0	1	0
%		0.7	0.7	3.9	12.9	28.9	32.1	14.3	5.0	0.7	0.4	0.0	0.4	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
27.8	28.6	35.1	41.4	43.3

10 mph Pace Speed
Number in Pace

30.5 - 40.5	Average	35.3 mph
175 (62.5 %)	Minimum	14.8 mph
	Maximum	69.0 mph

Speeds Exceeded

45 mph	55 mph	65 mph
6.4 %	0.7 %	0.4 %
Count	18	2
		1

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.05

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: NB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	14	0	0	1	4	5	3	1	0	0	0	0	0	0
14:00	10	0	0	2	0	0	5	2	1	0	0	0	0	0
15:00	47	0	0	1	9	12	18	5	2	0	0	0	0	0
16:00	57	1	0	1	8	13	22	11	0	1	0	0	0	0
17:00	10	0	0	1	3	1	3	2	0	0	0	0	0	0
18:00	12	0	0	0	2	3	3	1	3	0	0	0	0	0
19:00	5	0	0	0	1	1	3	0	0	0	0	0	0	0
20:00	4	0	0	0	1	0	2	1	0	0	0	0	0	0
21:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
22:00	3	0	0	0	0	0	1	1	1	0	0	0	0	0
23:00	15	0	0	0	0	4	4	3	0	2	0	2	0	0
09/28/2011														
00:00	5	0	0	0	0	0	3	1	0	0	1	0	0	0
01:00	1	0	0	1	0	0	0	0	0	0	0	0	0	0
02:00	2	0	0	0	1	0	1	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
05:00	2	0	0	1	0	1	0	0	0	0	0	0	0	0
06:00	12	0	1	2	1	1	5	2	0	0	0	0	0	0
07:00	5	0	1	2	0	1	0	1	0	0	0	0	0	0
08:00	14	0	0	0	5	5	2	2	0	0	0	0	0	0
09:00	20	0	2	2	9	6	1	0	0	0	0	0	0	0
10:00	15	1	0	1	4	8	1	0	0	0	0	0	0	0
11:00	10	2	0	0	2	3	2	0	0	0	0	1	0	0
12:00	9	0	0	0	1	3	4	0	1	0	0	0	0	0
Total	274	4	4	15	52	68	83	33	8	3	1	3	0	0
%		1.5	1.5	5.5	19.0	24.8	30.3	12.0	2.9	1.1	0.4	1.1	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
25.5	27.0	34.5	40.5	43.3

10 mph Pace Speed
Number in Pace

28.2 - 38.2	Average	34.0 mph
156 (56.9 %)	Minimum	9.2 mph
	Maximum	64.2 mph

Speeds Exceeded

45 mph	55 mph	65 mph
5.5 %	1.5 %	0.0 %
Count	15	4
		0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.05

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: NB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	9	0	1	2	1	3	2	0	0	0	0	0	0	0
14:00	13	1	0	2	2	3	3	1	0	1	0	0	0	0
15:00	65	1	0	4	11	12	27	10	0	0	0	0	0	0
16:00	61	0	0	2	11	15	21	7	4	1	0	0	0	0
17:00	10	0	0	1	0	1	5	2	0	0	1	0	0	0
18:00	10	0	1	0	2	3	1	2	1	0	0	0	0	0
19:00	4	0	0	0	1	1	2	0	0	0	0	0	0	0
20:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
21:00	2	0	0	0	0	1	0	1	0	0	0	0	0	0
22:00	5	0	0	0	0	0	4	1	0	0	0	0	0	0
23:00	8	0	0	0	1	1	2	1	1	0	0	1	1	0
09/29/2011														
00:00	12	0	0	0	1	2	4	3	2	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	2	0	0	0	0	1	1	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	2	0	0	0	0	0	1	1	0	0	0	0	0	0
05:00	2	0	0	0	0	0	2	0	0	0	0	0	0	0
06:00	8	0	0	0	1	3	3	1	0	0	0	0	0	0
07:00	13	0	1	1	2	4	2	3	0	0	0	0	0	0
08:00	18	2	2	4	4	3	0	1	1	1	0	0	0	0
09:00	8	0	0	1	2	1	4	0	0	0	0	0	0	0
10:00	12	0	0	2	2	3	3	2	0	0	0	0	0	0
11:00	19	0	0	3	3	6	4	3	0	0	0	0	0	0
12:00	10	1	0	0	1	5	1	2	0	0	0	0	0	0
Total	294	5	5	22	45	68	93	41	9	3	1	1	1	0
%		1.7	1.7	7.5	15.3	23.1	31.6	13.9	3.1	1.0	0.3	0.3	0.3	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
24.2	26.2	35.1	40.5	42.3

10 mph Pace Speed
Number in Pace

30.5 - 40.5	Average	34.2 mph
172 (58.5 %)	Minimum	5.4 mph
	Maximum	66.5 mph

Speeds Exceeded

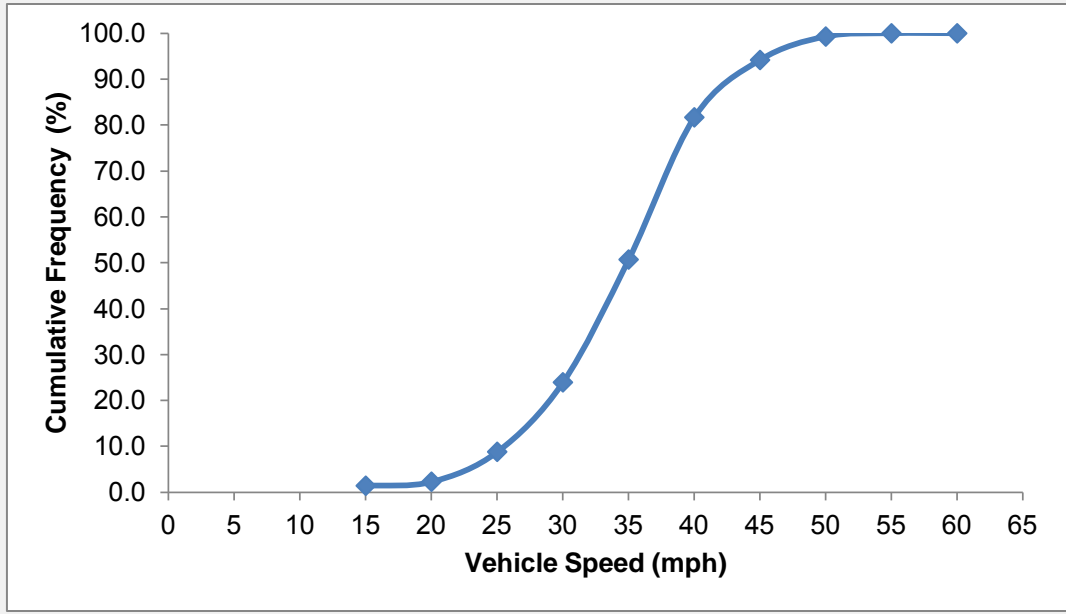
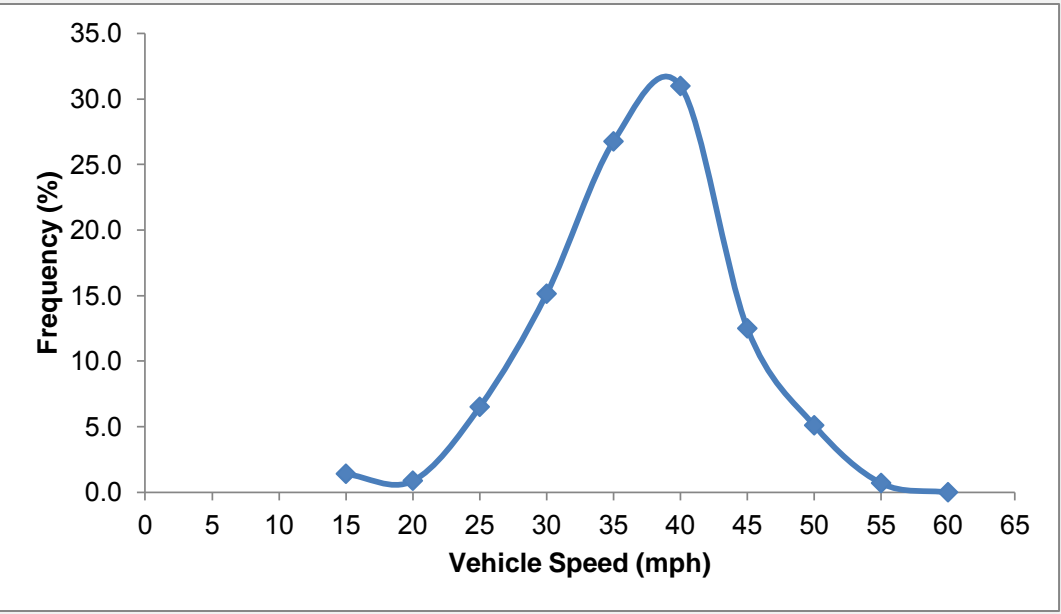
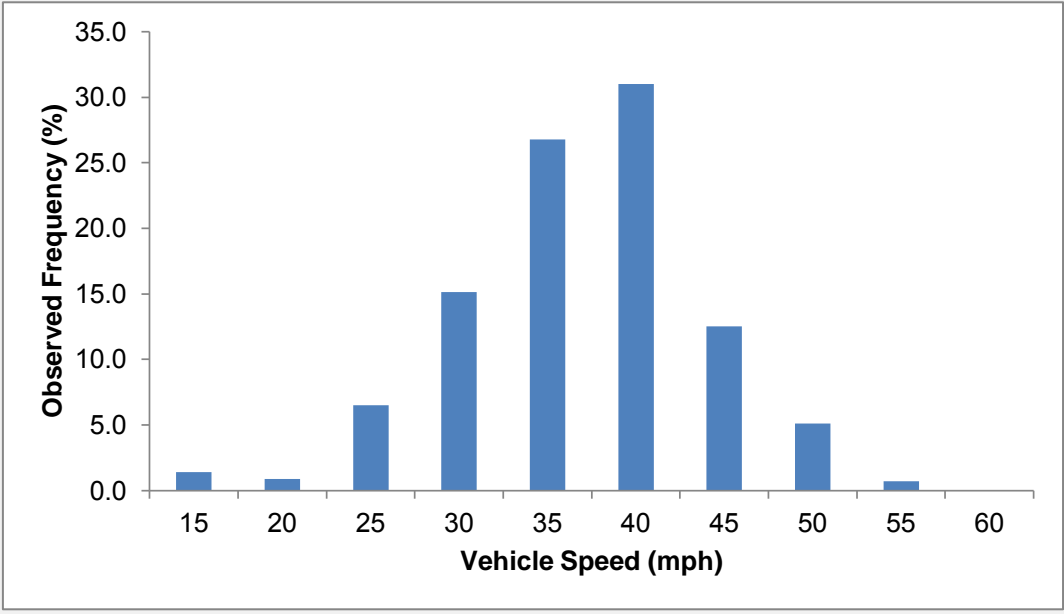
45 mph	55 mph	65 mph
5.1 %	1.0 %	0.3 %
Count	15	3
		1

Street: Magma Mine Road
Location: At Mile Post 1.05 SB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	8	5	37	86	152	176	71	29	4	0	0	0	0
Frquency (%)	1.4	0.9	6.5	15.1	26.8	31.0	12.5	5.1	0.7	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.4	2.3	8.8	23.9	50.7	81.7	94.2	99.3	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	8	5	37	86	152	176	71	29	4	0	0	0	
$f_i u_i^2$	450	500	5781.25	19350	46550	70400	35943.75	18125	3025	0	0	0	
$(f_i u_i)^2$	3600	2500	213906.3	1664100	7075600	12390400	2552006	525625	12100	0	0	0	

Total Counts568

Standard Deviation16.6

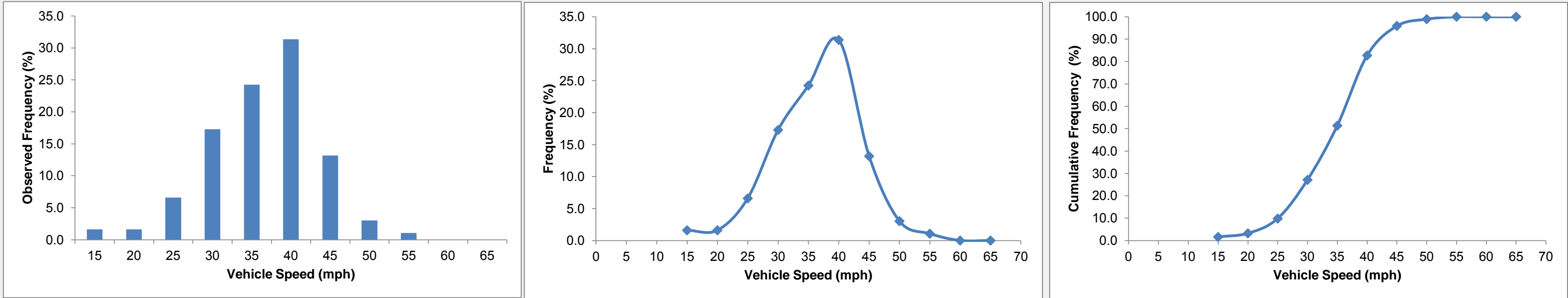


Street: Magma Mine Road
Location: At Mile Post 1.05 NB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	9	9	37	97	136	176	74	17	6	0	0	0	0
Frquency (%)	1.6	1.6	6.6	17.3	24.2	31.4	13.2	3.0	1.1	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.6	3.2	9.8	27.1	51.3	82.7	95.9	98.9	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	9	9	37	97	136	176	74	17	6	0	0	0	
$f_i u_i^2$	506.25	900	5781.25	21825	41650	70400	37462.5	10625	4537.5	0	0	0	
$(f_i u_i)^2$	4556.25	8100	213906.3	2117025	5664400	12390400	2772225	180625	27225	0	0	0	

Total Counts561

Standard Deviation16.5

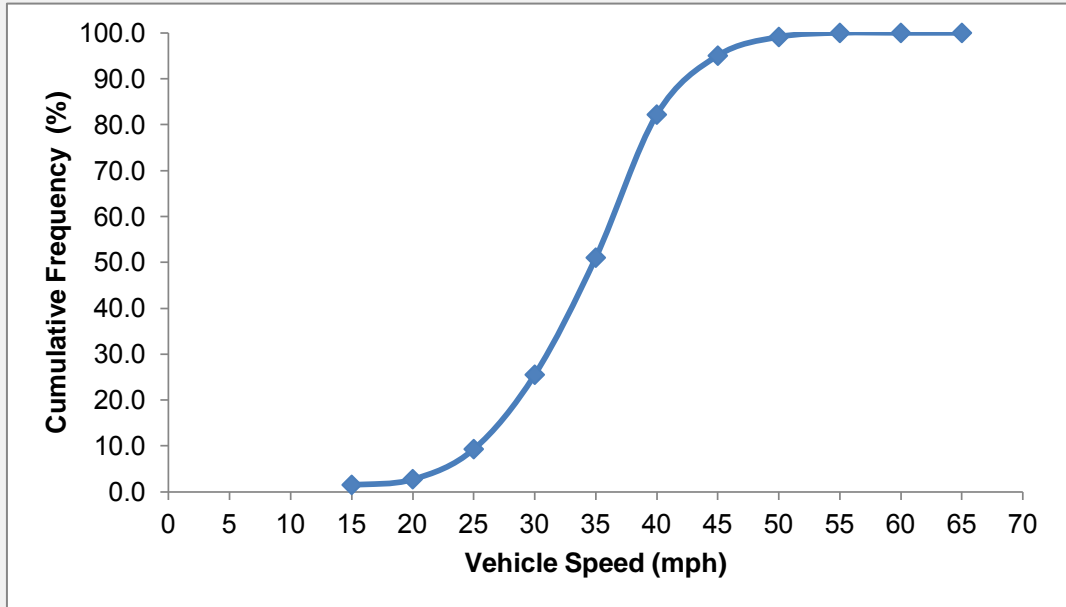
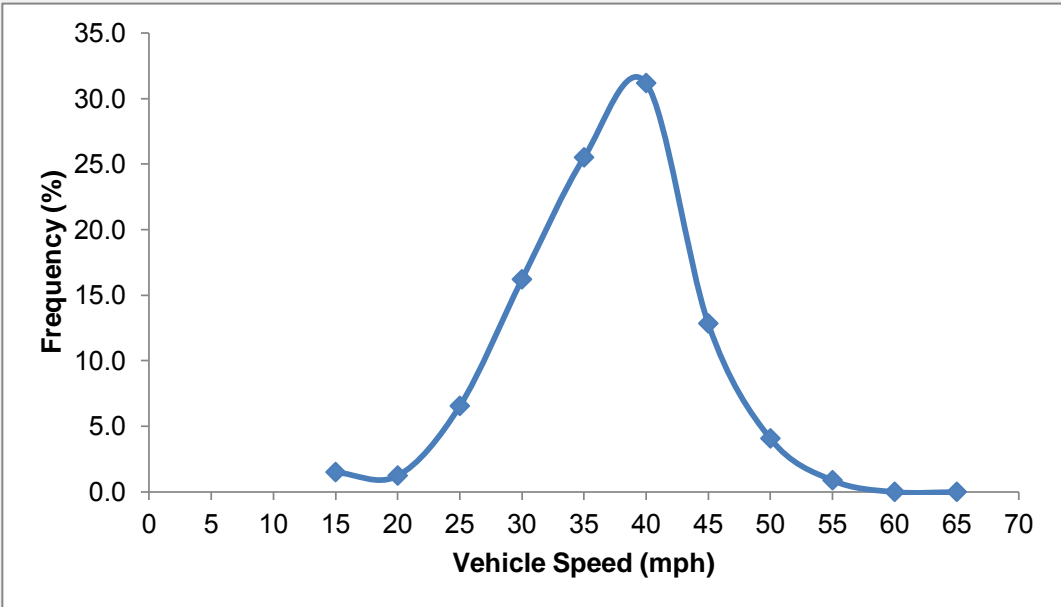
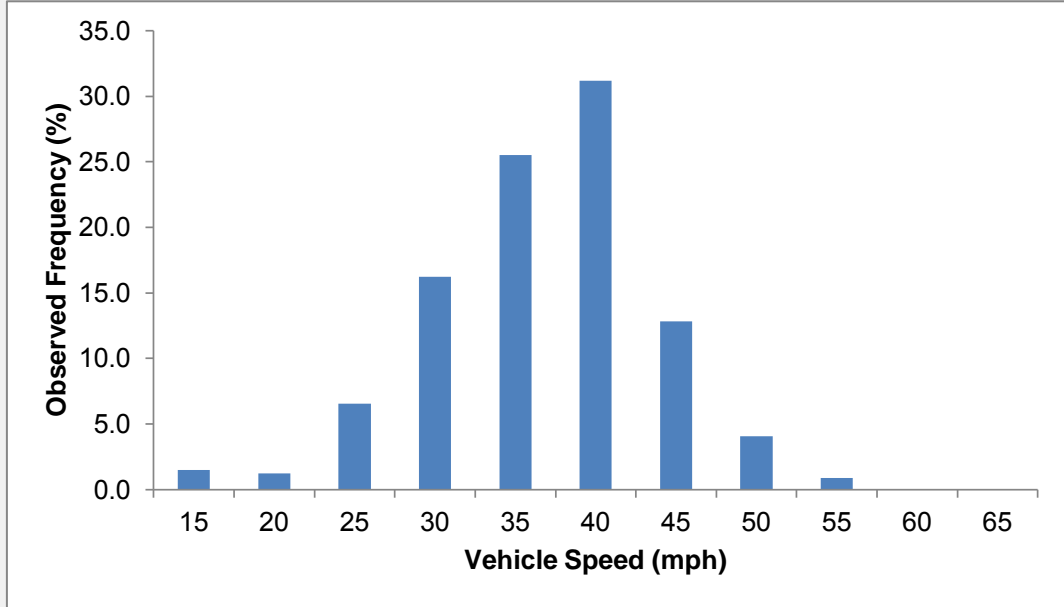


Street: Magma Mine Road
Location: At Mile Post 1.05 SB&NB Combined

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	17	14	74	183	288	352	145	46	10	0	0	0	0
Frquency (%)	1.5	1.2	6.6	16.2	25.5	31.2	12.8	4.1	0.9	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.5	2.7	9.3	25.5	51.0	82.2	95.0	99.1	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency of speed class (f_i)	17	14	74	183	288	352	145	46	10	0	0	0	
$f_i u_i^2$	956.25	1400	11562.5	41175	88200	140800	73406.25	28750	7562.5	0	0	0	
$(f_i u_i)^2$	16256.25	19600	855625	7535025	25401600	49561600	10643906	1322500	75625	0	0	0	

Total Counts
1129

Standard Deviation
16.6



United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.36

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: SB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	16	0	0	4	3	7	0	1	0	0	1	0	0	0
14:00	16	0	1	0	0	4	7	2	2	0	0	0	0	0
15:00	10	0	0	1	5	2	1	0	0	0	0	1	0	0
16:00	6	0	0	1	2	1	2	0	0	0	0	0	0	0
17:00	9	0	0	1	2	5	1	0	0	0	0	0	0	0
18:00	2	0	0	0	0	1	1	0	0	0	0	0	0	0
19:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
20:00	3	0	1	0	0	1	1	0	0	0	0	0	0	0
21:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
22:00	12	0	0	0	3	4	4	1	0	0	0	0	0	0
23:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
09/28/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
04:00	3	0	0	1	0	1	1	0	0	0	0	0	0	0
05:00	43	0	0	1	10	19	11	2	0	0	0	0	0	0
06:00	84	1	2	18	19	29	14	1	0	0	0	0	0	0
07:00	20	0	0	1	7	8	2	2	0	0	0	0	0	0
08:00	8	0	0	1	4	1	2	0	0	0	0	0	0	0
09:00	12	0	1	1	6	3	1	0	0	0	0	0	0	0
10:00	15	1	1	1	5	5	2	0	0	0	0	0	0	0
11:00	15	3	1	1	5	3	2	0	0	0	0	0	0	0
12:00	9	0	0	3	3	3	0	0	0	0	0	0	0	0
Total	289	5	7	35	75	100	54	9	2	0	1	1	0	0
%		1.7	2.4	12.1	26.0	34.6	18.7	3.1	0.7	0.0	0.3	0.3	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.0	24.5	31.0	36.5	37.2

10 mph Pace Speed
Number in Pace

26.6 - 36.6	Average	30.7 mph
194 (67.1 %)	Minimum	7.8 mph
	Maximum	64.2 mph

Speeds Exceeded

45 mph	55 mph	65 mph
1.4 %	0.7 %	0.0 %
Count	4	2
		0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.36

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: SB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	20	0	0	0	11	8	1	0	0	0	0	0	0	0
14:00	17	1	0	2	2	7	3	1	0	1	0	0	0	0
15:00	12	0	1	0	2	2	4	3	0	0	0	0	0	0
16:00	3	0	0	0	1	2	0	0	0	0	0	0	0	0
17:00	8	0	0	0	2	3	1	1	1	0	0	0	0	0
18:00	5	0	0	0	1	3	1	0	0	0	0	0	0	0
19:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
20:00	3	0	0	0	1	1	1	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	8	0	1	0	4	2	1	0	0	0	0	0	0	0
23:00	4	0	0	0	0	2	0	2	0	0	0	0	0	0
09/29/2011														
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	0	2	0	0	0	0	0	0	0	0	0
04:00	5	0	0	0	1	2	2	0	0	0	0	0	0	0
05:00	39	0	0	1	9	24	5	0	0	0	0	0	0	0
06:00	76	0	0	9	23	25	19	0	0	0	0	0	0	0
07:00	16	0	0	0	6	4	5	1	0	0	0	0	0	0
08:00	14	0	0	4	5	1	4	0	0	0	0	0	0	0
09:00	15	0	1	4	5	3	1	1	0	0	0	0	0	0
10:00	3	0	0	1	0	2	0	0	0	0	0	0	0	0
11:00	16	0	0	0	9	5	2	0	0	0	0	0	0	0
12:00	13	0	0	0	6	7	0	0	0	0	0	0	0	0
Total	280	1	3	21	90	103	51	9	1	1	0	0	0	0
%		0.4	1.1	7.5	32.1	36.8	18.2	3.2	0.4	0.4	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
25.5	26.2	31.0	35.8	37.2

10 mph Pace Speed
Number in Pace

25.9 - 35.9	Average	31.1 mph
207 (73.9 %)	Minimum	9.3 mph
	Maximum	50.3 mph

Speeds Exceeded

45 mph	55 mph	65 mph
0.7 %	0.0 %	0.0 %
Count	2	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.36

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: NB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	14	0	0	3	4	5	2	0	0	0	0	0	0	0
14:00	10	0	1	1	0	0	7	1	0	0	0	0	0	0
15:00	47	0	0	4	11	14	14	4	0	0	0	0	0	0
16:00	56	0	2	4	13	19	15	3	0	0	0	0	0	0
17:00	10	0	0	3	0	4	3	0	0	0	0	0	0	0
18:00	12	0	0	1	1	3	6	1	0	0	0	0	0	0
19:00	5	0	0	0	2	3	0	0	0	0	0	0	0	0
20:00	4	0	0	1	1	1	1	0	0	0	0	0	0	0
21:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
22:00	3	0	0	0	0	2	0	1	0	0	0	0	0	0
23:00	15	0	0	0	3	6	1	4	1	0	0	0	0	0
09/28/2011														
00:00	5	0	0	0	1	1	3	0	0	0	0	0	0	0
01:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
02:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	0	0	1	0	0	0	0	0	0	0	0	0	0
05:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
06:00	12	0	2	2	0	5	3	0	0	0	0	0	0	0
07:00	5	0	1	3	0	0	1	0	0	0	0	0	0	0
08:00	14	0	0	5	4	3	2	0	0	0	0	0	0	0
09:00	21	0	0	4	8	5	4	0	0	0	0	0	0	0
10:00	15	1	0	3	8	2	1	0	0	0	0	0	0	0
11:00	11	1	1	0	5	3	1	0	0	0	0	0	0	0
12:00	9	0	1	2	0	4	2	0	0	0	0	0	0	0
Total	275	2	8	37	62	85	66	14	1	0	0	0	0	0
%		0.7	2.9	13.5	22.5	30.9	24.0	5.1	0.4	0.0	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
22.4	24.5	31.6	37.2	38.8

10 mph Pace Speed
Number in Pace

25.9 - 35.9	Average	31.0 mph
169 (61.5 %)	Minimum	8.0 mph
	Maximum	45.4 mph

Speeds Exceeded

45 mph	55 mph	65 mph
0.4 %	0.0 %	0.0 %
Count	1	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.36

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: NB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	10	2	0	3	2	1	2	0	0	0	0	0	0	0
14:00	13	0	1	2	2	5	2	1	0	0	0	0	0	0
15:00	63	0	3	2	8	31	17	2	0	0	0	0	0	0
16:00	63	0	0	5	20	20	11	5	2	0	0	0	0	0
17:00	10	0	0	1	1	4	3	0	0	1	0	0	0	0
18:00	10	0	1	2	2	2	2	1	0	0	0	0	0	0
19:00	4	0	0	1	0	3	0	0	0	0	0	0	0	0
20:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
21:00	2	0	0	0	0	1	0	1	0	0	0	0	0	0
22:00	5	0	0	0	0	2	3	0	0	0	0	0	0	0
23:00	8	0	0	0	1	1	2	2	1	0	1	0	0	0
09/29/2011														
00:00	12	0	0	0	3	3	6	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	2	0	0	0	0	2	0	0	0	0	0	0	0	0
05:00	1	0	0	0	0	1	0	0	0	0	0	0	0	0
06:00	8	0	0	0	3	3	1	1	0	0	0	0	0	0
07:00	13	0	0	5	4	2	2	0	0	0	0	0	0	0
08:00	17	2	1	6	2	2	4	0	0	0	0	0	0	0
09:00	9	0	0	2	2	4	1	0	0	0	0	0	0	0
10:00	12	0	0	2	5	1	4	0	0	0	0	0	0	0
11:00	19	1	0	2	3	8	2	2	0	1	0	0	0	0
12:00	10	0	0	0	3	4	3	0	0	0	0	0	0	0
Total	294	5	6	33	62	102	65	15	3	2	1	0	0	0
%		1.7	2.0	11.2	21.1	34.7	22.1	5.1	1.0	0.7	0.3	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.6	24.8	31.6	37.2	38.8

10 mph Pace Speed
Number in Pace

26.6 - 36.6	Average	31.5 mph
184 (62.6 %)	Minimum	7.0 mph
	Maximum	56.4 mph

Speeds Exceeded

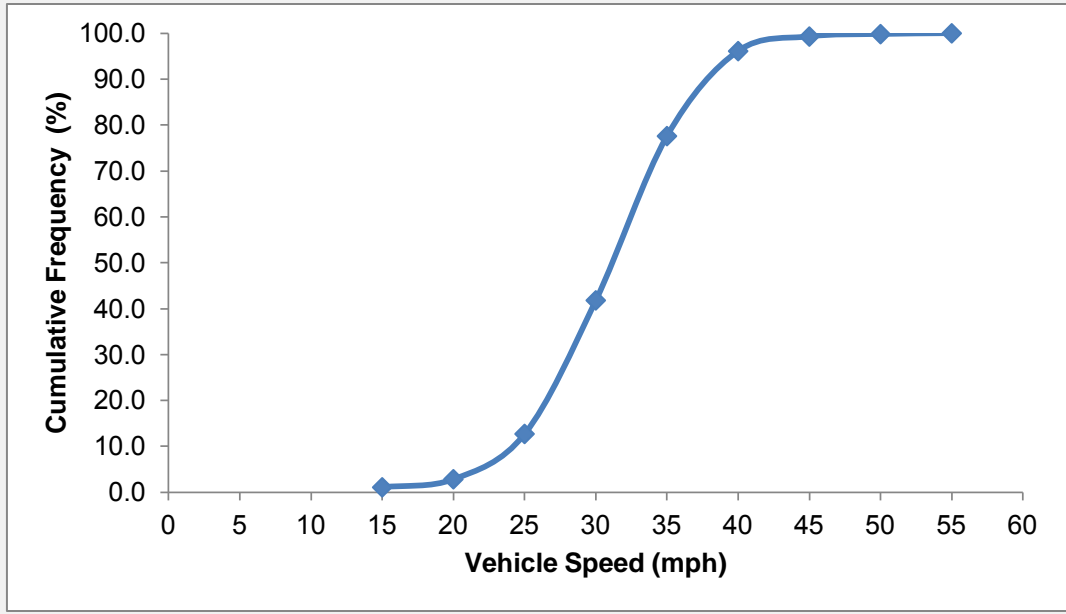
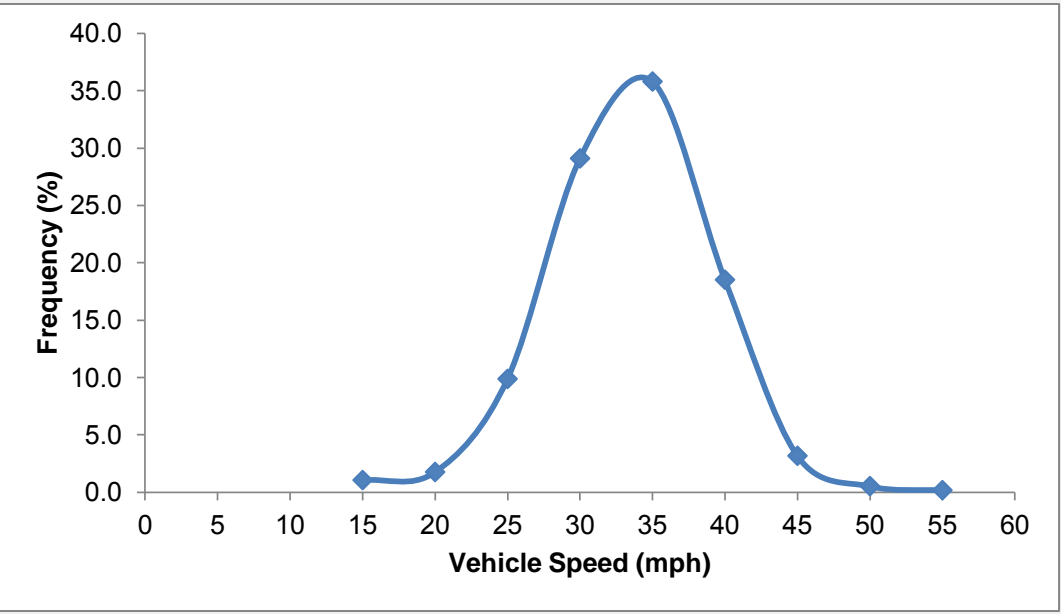
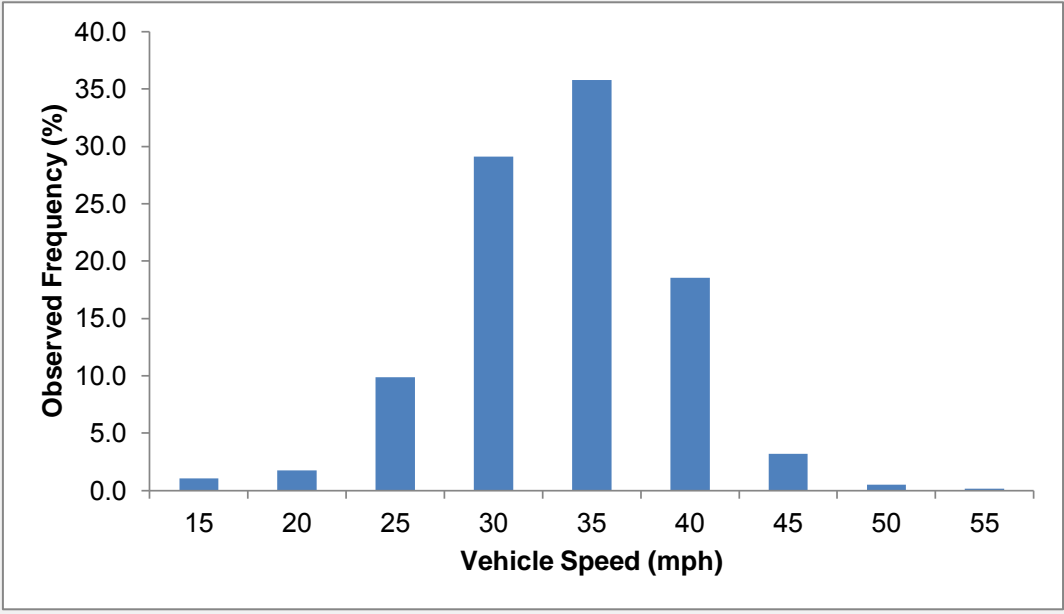
45 mph	55 mph	65 mph
2.0 %	0.3 %	0.0 %
Count	6	1
		0

Street: Magma Mine Road
Location: At Mile Post 1.36 SB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	6	10	56	165	203	105	18	3	1	0	0	0	0
Frquency (%)	1.1	1.8	9.9	29.1	35.8	18.5	3.2	0.5	0.2	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.1	2.8	12.7	41.8	77.6	96.1	99.3	99.8	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	6	10	56	165	203	105	18	3	1	0	0	0	
$f_i u_i^2$	337.5	1000	8750	37125	62168.75	42000	9112.5	1875	756.25	0	0	0	
$(f_i u_i)^2$	2025	10000	490000	6125625	12620256	4410000	164025	5625	756.25	0	0	0	

Total Counts567

Standard Deviation14.6

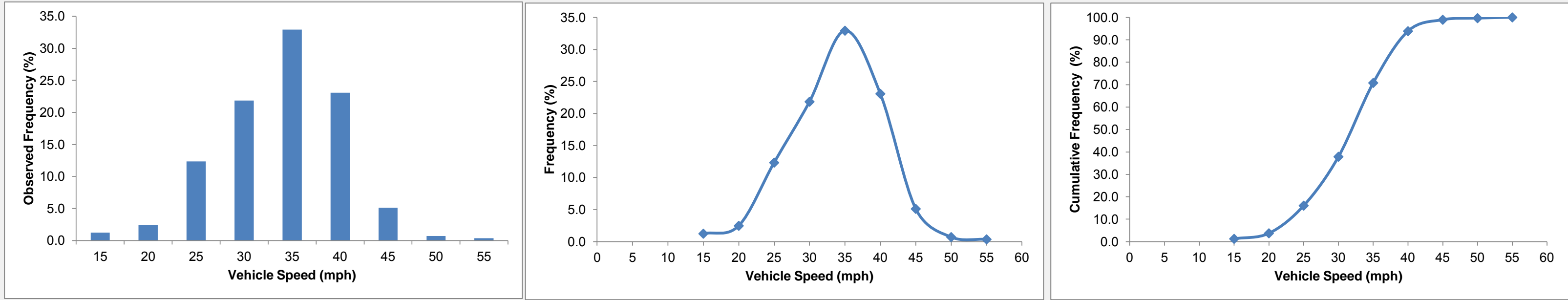


Street: Magma Mine Road
Location: At Mile Post 1.36 NB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	7	14	70	124	187	131	29	4	2	0	0	0	0
Frquency (%)	1.2	2.5	12.3	21.8	32.9	23.1	5.1	0.7	0.4	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.2	3.7	16.0	37.9	70.8	93.8	98.9	99.6	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	7	14	70	124	187	131	29	4	2	0	0	0	
$f_i u_i^2$	393.75	1400	10937.5	27900	57268.75	52400	14681.25	2500	1512.5	0	0	0	
$(f_i u_i)^2$	2756.25	19600	765625	3459600	10709256	6864400	425756.3	10000	3025	0	0	0	

Total Counts568

Standard Deviation15.1

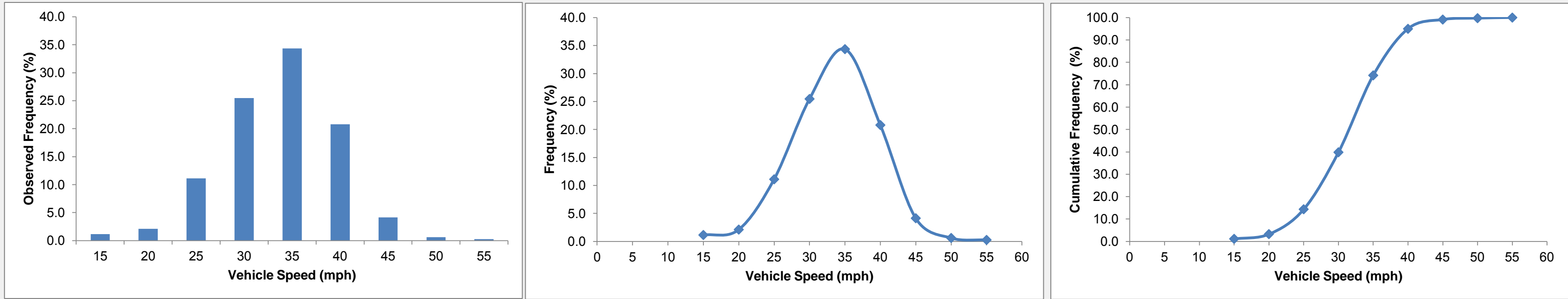


Street: Magma Mine Road
Location: At Mile Post 1.36 SB&NB Combined

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	13	24	126	289	390	236	47	7	3	0	0	0	0
Frquency (%)	1.1	2.1	11.1	25.5	34.4	20.8	4.1	0.6	0.3	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.1	3.3	14.4	39.8	74.2	95.0	99.1	99.7	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency of speed class (f_i)	13	24	126	289	390	236	47	7	3	0	0	0	
$f_i u_i^2$	731.25	2400	19687.5	65025	119437.5	94400	23793.75	4375	2268.75	0	0	0	
$(f_i u_i)^2$	9506.25	57600	2480625	18792225	46580625	22278400	1118306	30625	6806.25	0	0	0	

Total Counts1135

Standard Deviation14.9



United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.74

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: NB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	17	0	1	3	6	4	1	1	1	0	0	0	0	0
14:00	16	0	0	1	2	7	4	1	1	0	0	0	0	0
15:00	14	1	1	5	4	2	0	0	1	0	0	0	0	0
16:00	6	0	0	1	1	3	1	0	0	0	0	0	0	0
17:00	4	0	0	0	1	2	0	0	0	1	0	0	0	0
18:00	3	0	0	0	0	2	1	0	0	0	0	0	0	0
19:00	2	0	0	0	1	1	0	0	0	0	0	0	0	0
20:00	5	0	0	1	2	2	0	0	0	0	0	0	0	0
21:00	1	0	0	0	0	0	1	0	0	0	0	0	0	0
22:00	13	0	0	1	7	4	1	0	0	0	0	0	0	0
23:00	3	0	1	1	0	1	0	0	0	0	0	0	0	0
09/28/2011														
00:00	1	0	0	1	0	0	0	0	0	0	0	0	0	0
01:00	1	0	1	0	0	0	0	0	0	0	0	0	0	0
02:00	1	0	0	1	0	0	0	0	0	0	0	0	0	0
03:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
04:00	5	0	2	0	1	1	1	0	0	0	0	0	0	0
05:00	40	0	0	4	11	17	7	1	0	0	0	0	0	0
06:00	76	0	12	17	14	19	14	0	0	0	0	0	0	0
07:00	24	0	1	5	8	8	1	1	0	0	0	0	0	0
08:00	11	0	2	1	5	2	1	0	0	0	0	0	0	0
09:00	13	1	0	4	4	3	1	0	0	0	0	0	0	0
10:00	15	0	3	2	4	4	1	0	1	0	0	0	0	0
11:00	16	1	2	6	5	2	0	0	0	0	0	0	0	0
12:00	10	0	0	2	6	2	0	0	0	0	0	0	0	0
Total	298	3	26	56	83	86	35	4	4	1	0	0	0	0
%		1.0	8.7	18.8	27.9	28.9	11.7	1.3	1.3	0.3	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
19.8	23.0	28.6	34.5	36.5

10 mph Pace Speed
Number in Pace

23.9 - 33.9	Average	28.8 mph
193 (64.8 %)	Minimum	9.5 mph
	Maximum	54.8 mph

Speeds Exceeded

45 mph	55 mph	65 mph
1.7 %	0.0 %	0.0 %
Count	5	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.74

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: NB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	24	0	3	1	12	6	2	0	0	0	0	0	0	0
14:00	17	0	0	3	7	4	2	0	0	1	0	0	0	0
15:00	15	1	0	0	6	2	3	3	0	0	0	0	0	0
16:00	4	0	0	0	2	2	0	0	0	0	0	0	0	0
17:00	7	0	0	0	2	2	2	1	0	0	0	0	0	0
18:00	4	0	0	0	3	1	0	0	0	0	0	0	0	0
19:00	2	0	0	1	0	0	1	0	0	0	0	0	0	0
20:00	4	0	0	1	1	1	1	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	8	0	0	3	2	2	1	0	0	0	0	0	0	0
23:00	4	0	0	0	2	0	2	0	0	0	0	0	0	0
09/29/2011														
00:00	1	0	0	1	0	0	0	0	0	0	0	0	0	0
01:00	2	2	0	0	0	0	0	0	0	0	0	0	0	0
02:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	6	0	0	0	3	3	0	0	0	0	0	0	0	0
05:00	34	0	5	3	8	14	4	0	0	0	0	0	0	0
06:00	74	1	4	10	29	19	11	0	0	0	0	0	0	0
07:00	19	0	1	2	6	6	3	1	0	0	0	0	0	0
08:00	16	0	2	3	5	3	3	0	0	0	0	0	0	0
09:00	14	0	4	7	1	1	0	0	1	0	0	0	0	0
10:00	3	0	0	0	1	0	2	0	0	0	0	0	0	0
11:00	17	0	1	3	3	7	3	0	0	0	0	0	0	0
12:00	13	0	1	4	3	5	0	0	0	0	0	0	0	0
Total	289	4	21	42	97	78	40	5	1	1	0	0	0	0
%		1.4	7.3	14.5	33.6	27.0	13.8	1.7	0.3	0.3	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
20.2	23.0	29.1	35.1	36.5

10 mph Pace Speed
Number in Pace

25.2 - 35.2	Average	28.9 mph
184 (63.7 %)	Minimum	12.4 mph
	Maximum	51.7 mph

Speeds Exceeded

45 mph	55 mph	65 mph
0.7 %	0.0 %	0.0 %
Count	2	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.74

Site: TC11040
Date: 09/27/2011
Tuesday

24 Hour Speed
Channel: SB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	14	0	0	2	4	4	4	0	0	0	0	0	0	0
14:00	9	0	0	0	2	0	5	0	2	0	0	0	0	0
15:00	48	0	0	4	10	16	15	3	0	0	0	0	0	0
16:00	58	0	1	6	11	14	19	7	0	0	0	0	0	0
17:00	8	0	1	2	0	2	3	0	0	0	0	0	0	0
18:00	10	0	0	0	4	2	3	1	0	0	0	0	0	0
19:00	7	0	0	0	0	5	2	0	0	0	0	0	0	0
20:00	4	0	0	1	1	2	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	3	0	0	0	0	2	0	1	0	0	0	0	0	0
23:00	16	0	0	0	2	5	4	2	3	0	0	0	0	0
09/28/2011														
00:00	5	0	0	0	0	0	4	0	1	0	0	0	0	0
01:00	3	1	0	0	0	1	0	0	0	1	0	0	0	0
02:00	2	0	0	1	0	0	0	1	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	4	0	0	1	2	1	0	0	0	0	0	0	0	0
06:00	7	0	0	1	1	2	3	0	0	0	0	0	0	0
07:00	7	0	0	3	1	1	1	1	0	0	0	0	0	0
08:00	17	0	0	6	7	2	2	0	0	0	0	0	0	0
09:00	22	0	2	4	10	4	2	0	0	0	0	0	0	0
10:00	17	1	1	5	7	2	1	0	0	0	0	0	0	0
11:00	14	0	1	5	3	3	2	0	0	0	0	0	0	0
12:00	8	0	1	2	2	2	1	0	0	0	0	0	0	0
Total	283	2	7	43	67	70	71	16	6	1	0	0	0	0
%		0.7	2.5	15.2	23.7	24.7	25.1	5.7	2.1	0.4	0.0	0.0	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
22.7	24.2	31.6	38.0	39.6

10 mph Pace Speed
Number in Pace

26.6 - 36.6	Average	31.4 mph
158 (55.8 %)	Minimum	9.1 mph
	Maximum	50.3 mph

Speeds Exceeded

45 mph	55 mph	65 mph
2.5 %	0.0 %	0.0 %
Count	7	0

United Civil Group
2803 N 7th Avenue, # 16
602-265-6155

Street: Magma Mine Road
Location: At Mile Post 1.74

Site: TC11040
Date: 09/28/2011
Wednesday

24 Hour Speed
Channel: SB

mph	Total	0 - < 15	15 - < 20	20 - < 25	25 - < 30	30 - < 35	35 - < 40	40 - < 45	45 - < 50	50 - < 55	55 - < 60	60 - < 65	65 - < 70	70 - < 200
13:00	12	0	1	3	6	1	1	0	0	0	0	0	0	0
14:00	12	0	0	2	2	5	3	0	0	0	0	0	0	0
15:00	67	1	2	4	11	21	23	4	1	0	0	0	0	0
16:00	61	0	1	6	15	17	16	4	2	0	0	0	0	0
17:00	10	0	0	1	1	4	2	1	0	1	0	0	0	0
18:00	8	0	1	1	3	3	0	0	0	0	0	0	0	0
19:00	4	0	0	0	3	1	0	0	0	0	0	0	0	0
20:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
21:00	3	0	0	0	2	1	0	0	0	0	0	0	0	0
22:00	5	0	0	0	0	2	2	1	0	0	0	0	0	0
23:00	10	0	0	0	2	3	0	3	1	0	0	1	0	0
09/29/2011														
00:00	13	1	0	0	4	2	4	2	0	0	0	0	0	0
01:00	1	1	0	0	0	0	0	0	0	0	0	0	0	0
02:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	2	0	0	0	1	0	1	0	0	0	0	0	0	0
05:00	3	0	0	0	1	1	1	0	0	0	0	0	0	0
06:00	6	0	0	0	2	3	1	0	0	0	0	0	0	0
07:00	15	0	0	1	5	5	4	0	0	0	0	0	0	0
08:00	15	1	3	3	4	1	1	2	0	0	0	0	0	0
09:00	9	0	0	3	2	2	2	0	0	0	0	0	0	0
10:00	13	0	1	3	1	5	3	0	0	0	0	0	0	0
11:00	18	0	0	2	4	6	5	1	0	0	0	0	0	0
12:00	10	0	0	0	5	3	2	0	0	0	0	0	0	0
Total	299	4	9	29	76	86	71	18	4	1	0	1	0	0
%		1.3	3.0	9.7	25.4	28.8	23.7	6.0	1.3	0.3	0.0	0.3	0.0	0.0

Percentile Speeds
(mph)

10 %	15 %	50 %	85 %	90 %
23.3	25.2	31.6	38.0	39.6

10 mph Pace Speed
Number in Pace

25.9 - 35.9	Average	31.5 mph
185 (61.9 %)	Minimum	9.9 mph
	Maximum	62.1 mph

Speeds Exceeded

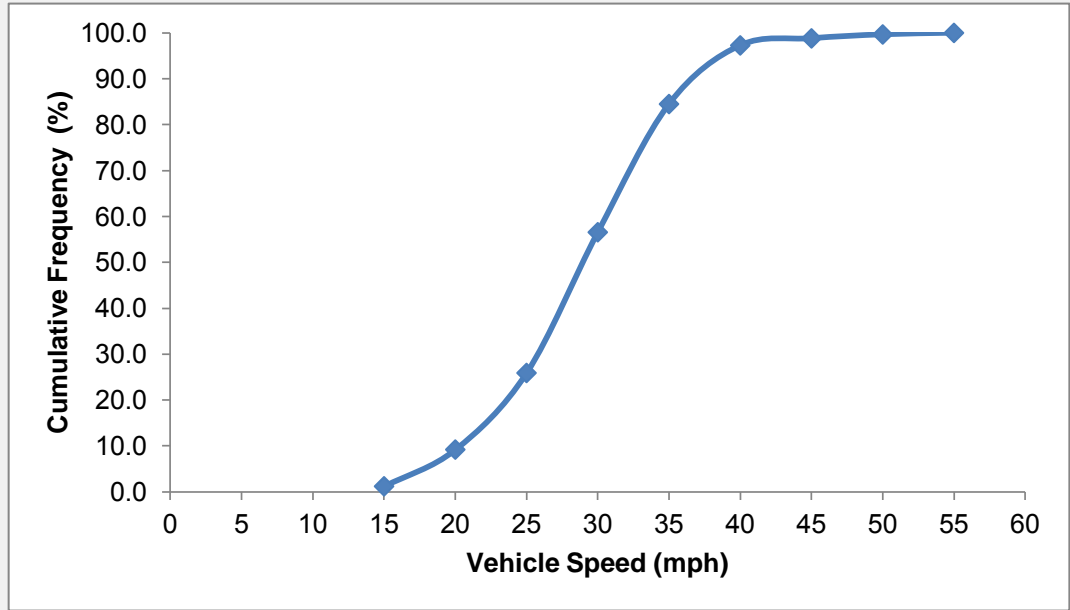
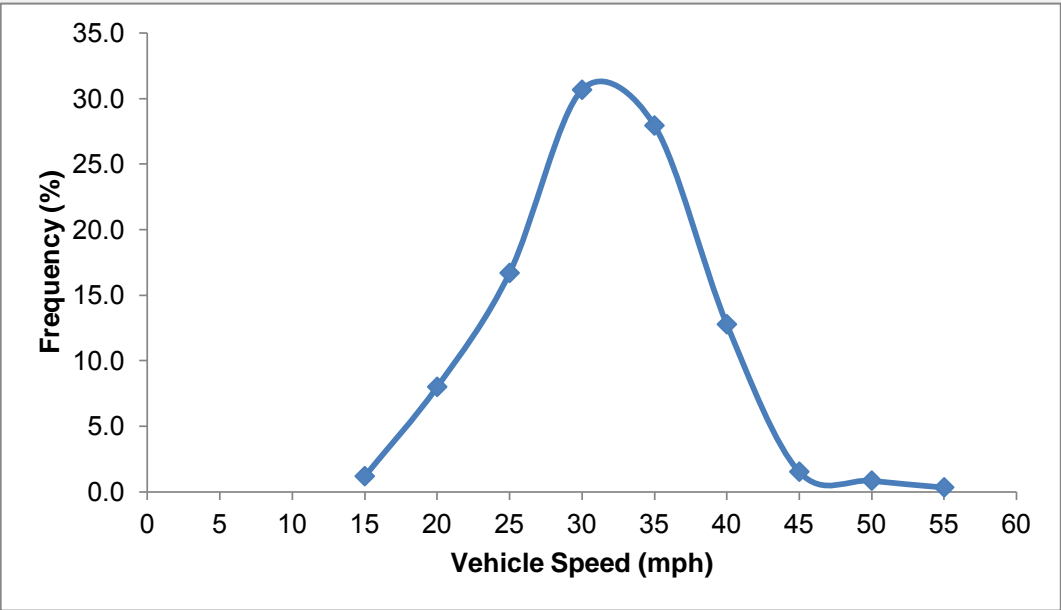
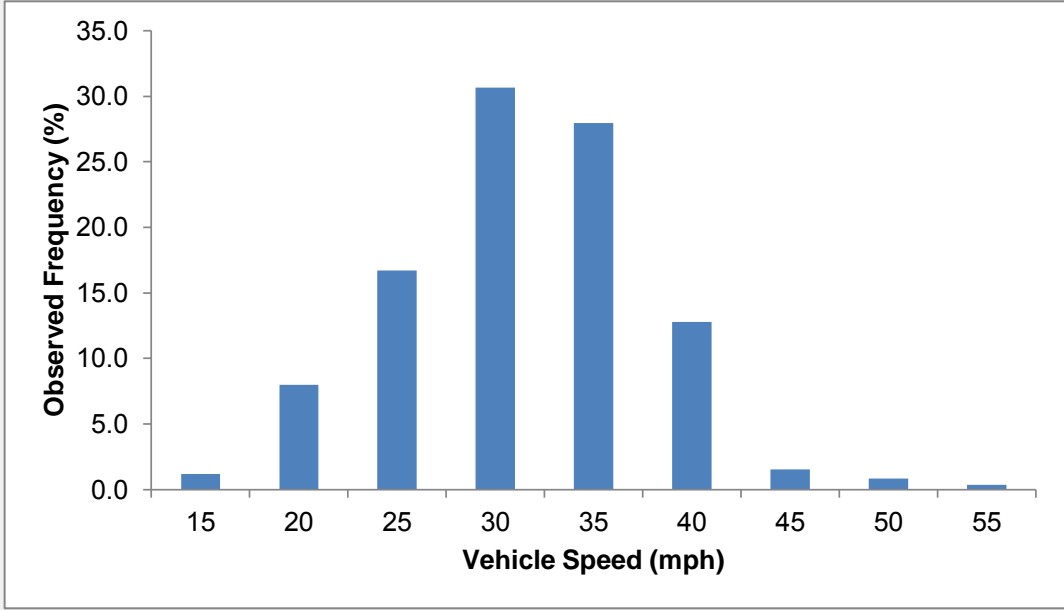
45 mph	55 mph	65 mph
2.0 %	0.3 %	0.0 %
Count	6	1
		0

Street: Magma Mine Road
Location: At Mile Post 1.74 SB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	7	47	98	180	164	75	9	5	2	0	0	0	0
Frquency (%)	1.2	8.0	16.7	30.7	27.9	12.8	1.5	0.9	0.3	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.2	9.2	25.9	56.6	84.5	97.3	98.8	99.7	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	7	47	98	180	164	75	9	5	2	0	0	0	
$f_i u_i^2$	393.75	4700	15312.5	40500	50225	30000	4556.25	3125	1512.5	0	0	0	
$(f_i u_i)^2$	2756.25	220900	1500625	7290000	8236900	2250000	41006.25	15625	3025	0	0	0	

Total Counts587

Standard Deviation14.1

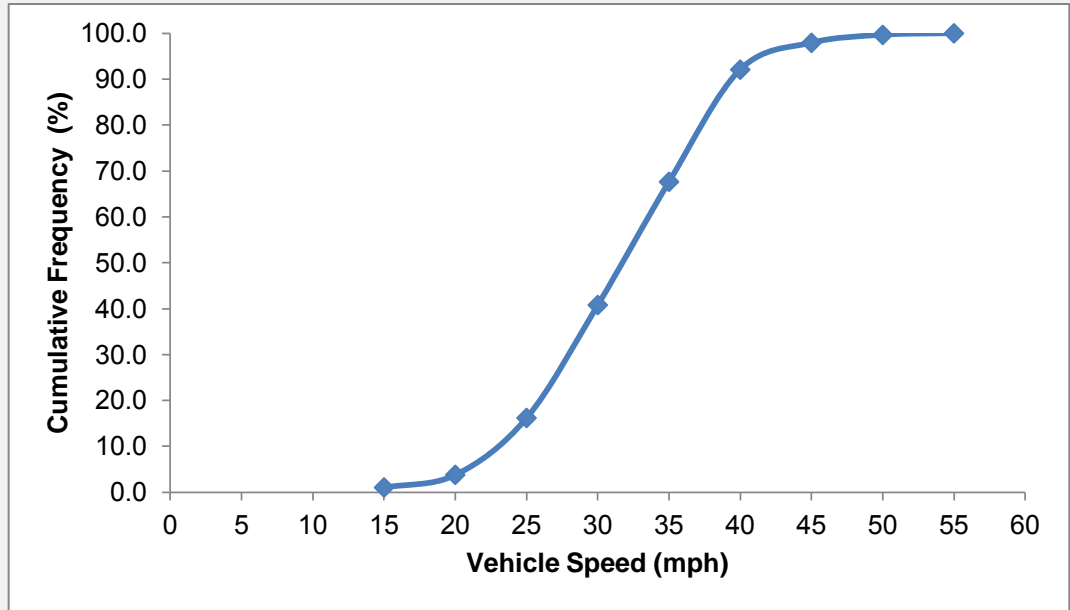
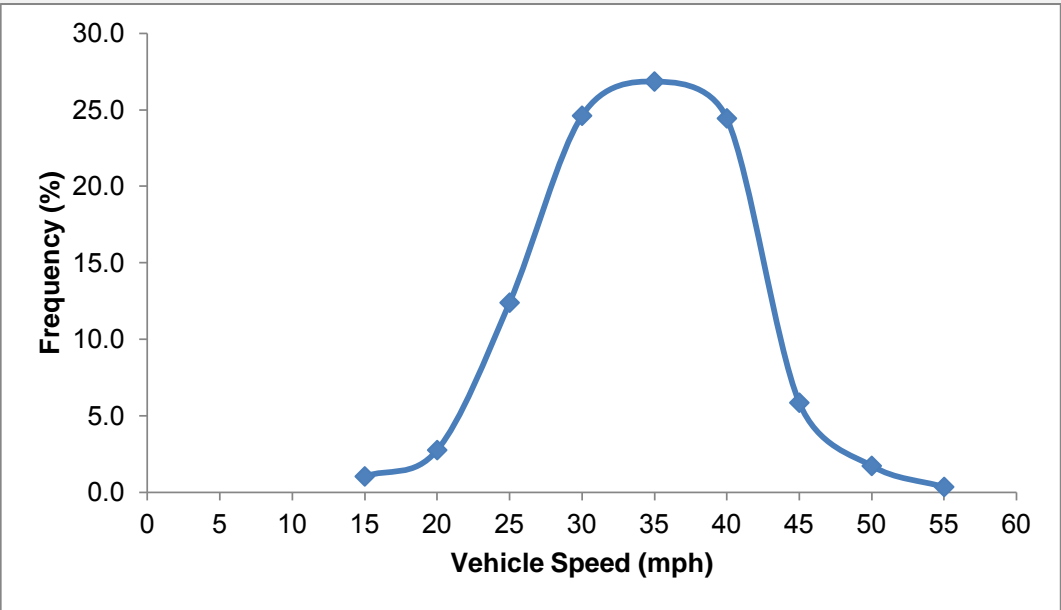
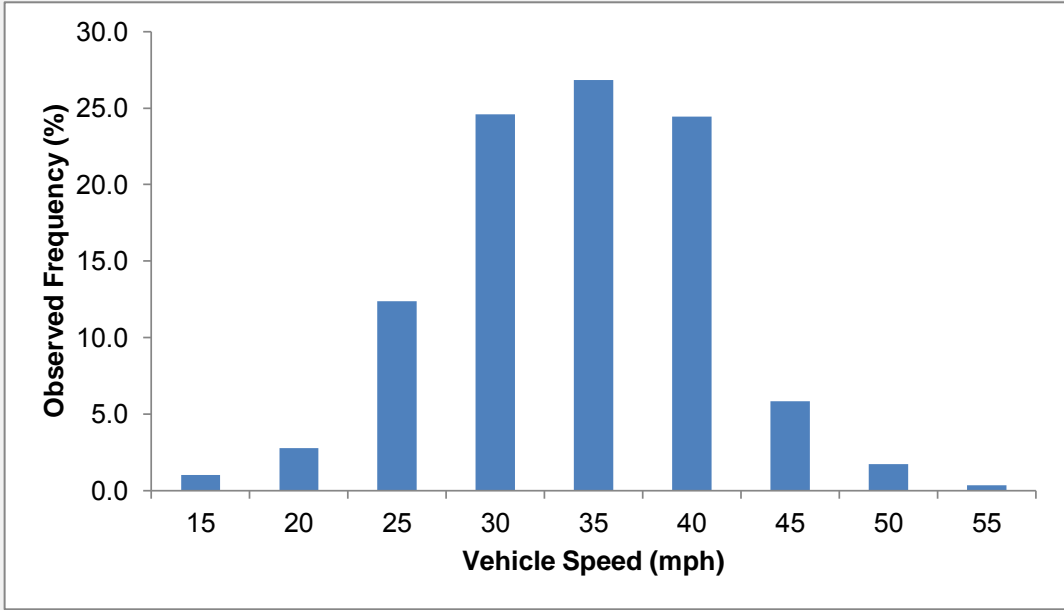


Street: Magma Mine Road
Location: At Mile Post 1.74 NB

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	6	16	72	143	156	142	34	10	2	0	0	0	0
Frquency (%)	1.0	2.8	12.4	24.6	26.9	24.4	5.9	1.7	0.3	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.0	3.8	16.2	40.8	67.6	92.1	97.9	99.7	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency count (f_i)	6	16	72	143	156	142	34	10	2	0	0	0	
$f_i u_i^2$	337.5	1600	11250	32175	47775	56800	17212.5	6250	1512.5	0	0	0	
$(f_i u_i)^2$	2025	25600	810000	4601025	7452900	8065600	585225	62500	3025	0	0	0	

Total Counts581

Standard Deviation15.4

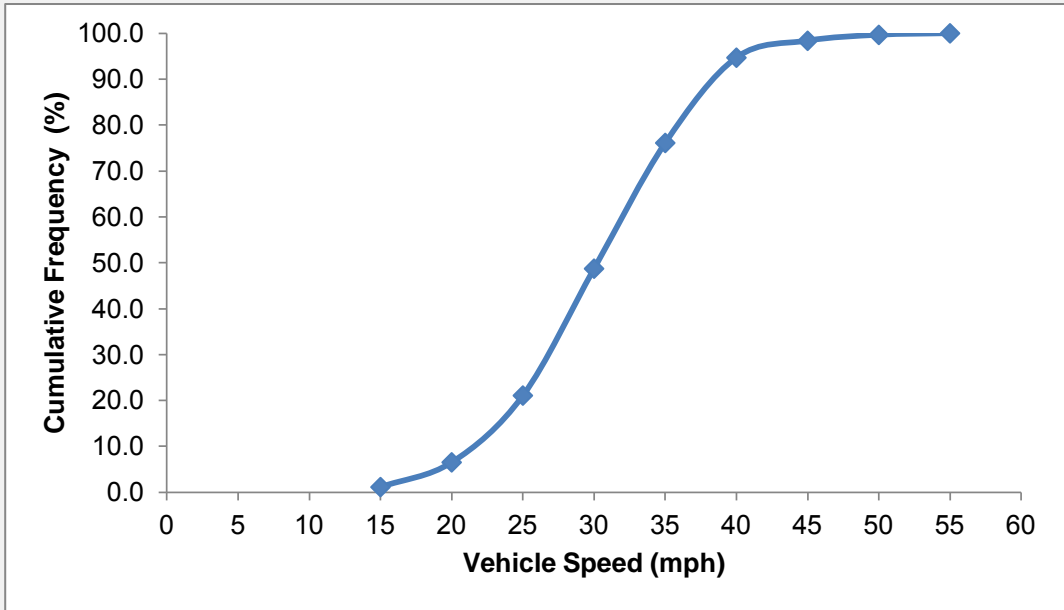
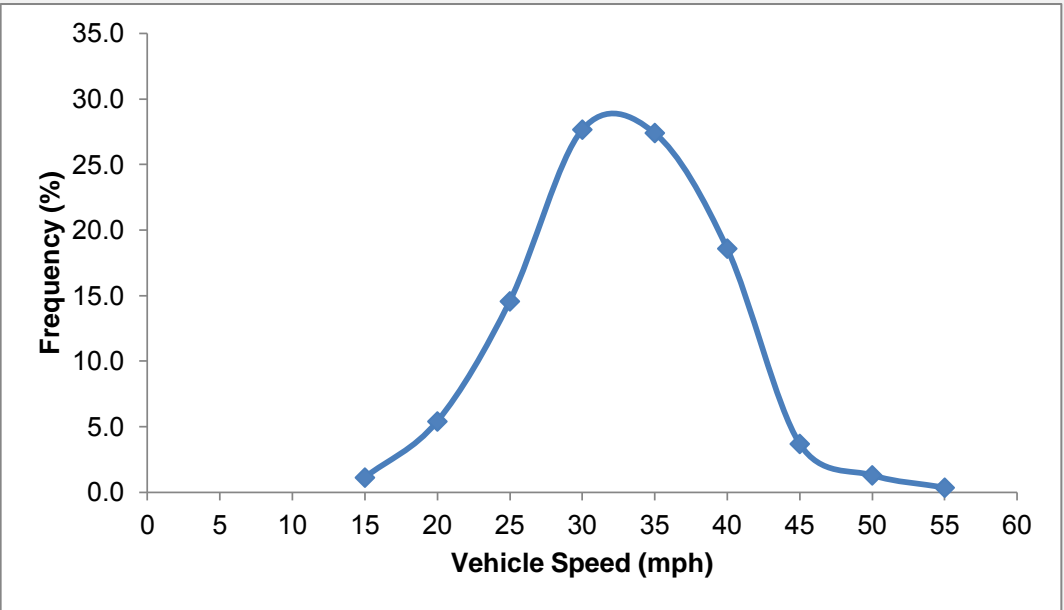
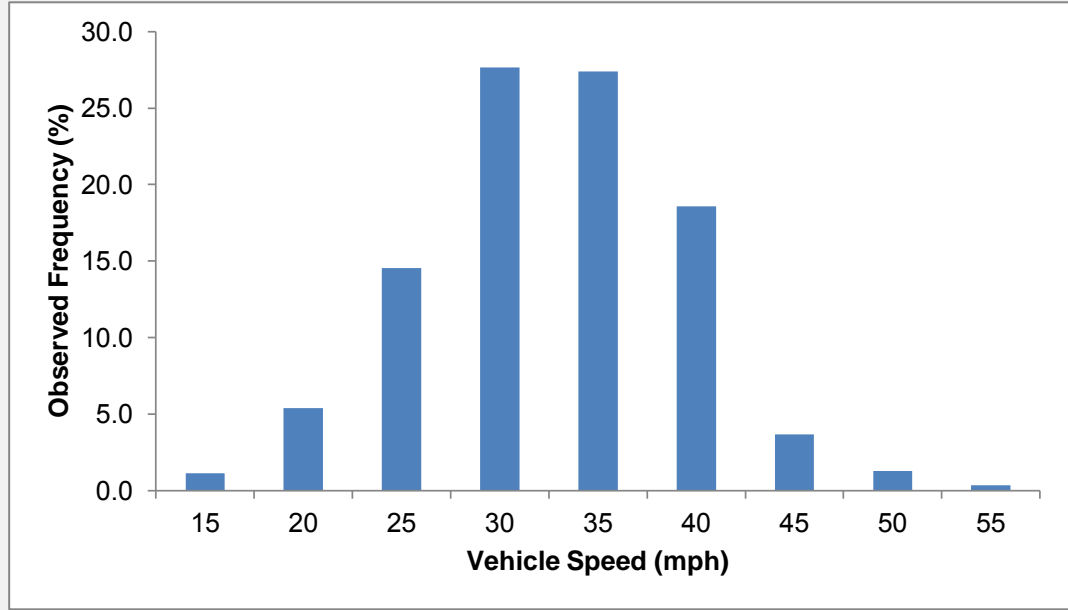


Street: Magma Mine Road
Location: At Mile Post 1.74 SB&NB Combined

mph	15	20	25	30	35	40	45	50	55	60	65	70	70+
counts	13	63	170	323	320	217	43	15	4	0	0	0	0
Frquency (%)	1.1	5.4	14.6	27.7	27.4	18.6	3.7	1.3	0.3	0.0	0.0	0.0	0.0
Cumulative Frequency (%)	1.1	6.5	21.1	48.7	76.1	94.7	98.4	99.7	100.0	100.0	100.0	100.0	100.0
Midvalue of speed class (u_i)	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30	32.5	35	
Frequency of speed class (f_i)	13	63	170	323	320	217	43	15	4	0	0	0	
$f_i u_i^2$	731.25	6300	26562.5	72675	98000	86800	21768.75	9375	3025	0	0	0	
$(f_i u_i)^2$	9506.25	396900	4515625	23474025	31360000	18835600	936056.3	140625	12100	0	0	0	

Total Counts
1168

Standard Deviation
14.8



APPENDIX I
MITIGATION MEASURES

Mitigation and Monitoring Measures

- EA-1) **Dust Emissions along Access Roads.** To minimize dust, unpaved roads will be watered as necessary during periods of regular use by RCM employees or contractors. If dust problems are noted, a watering schedule will be developed and implemented by RCM, or RCM will propose a dust palliative program for review and approval by the Forest Service; and upon approval will implement that program. In addition, as necessary, RCM will minimize land disturbance during site preparations, cover trucks when hauling any soil, minimize soil track-out by washing or cleaning truck wheels before leaving construction sites, create windbreaks, and revegetate disturbed land not used.
- EA-2) **Air Emissions at Drill Sites.** Drill rigs and other mobile and stationary sources of air emissions at drill sites must be operated consistently with past practices to limit oxides of nitrogen emissions from Pre-feasibility Activities to peak estimated emission levels. Using readily available data, RCM will document its conformance with this requirement annually to the Forest Service.
- EA-3) **RCM Vehicle Traffic.** To the extent practical and consistent with the efficient and safe implementation of Pre-feasibility Activities, RCM will reduce vehicle traffic on National Forest System Lands.
- EA-4) **Erosion Control.** Prior to the implementation of any ground-disturbing activities, a SWPPP will be provided to the Forest Service for review and approval (Appendix F).
- EA-5) **Water Quality.** RCM will provide the Forest Service with copies of all applicable water quality permits required for well development and testing prior to ground-disturbing activities at drill sites. Future compliance with Clean Water Act regulations and permitting requirements will be required of RCM throughout the life of the project. Additionally, RCM will be required to demonstrate compliance with State of Arizona Surface and Aquifer water quality standards for the four water sources identified for dust suppression on roads and drilling activities. A Notice of Intent (NOI) for De Minimus Discharge will be filed with ADEQ for all wells that will or may discharge to land surface. Typically, the NOI is submitted 30 days before completion of any well which will be used to conduct pumping tests or discharge during development. All of these activities will be completed under the required AZPDES De Minimus General Permit.
- EA-6) **Spill Prevention, Control, and Countermeasure Plan.** Exploration and Pre-feasibility Activities would not result in the release of any hazardous or nuisance substances to the environment and, if such release occurs, immediate corrective actions will be taken by RCM. An SPCC plan will be prepared in accordance with ADEQ regulations and incorporated into the Pre-feasibility Plan of Operations prior to ground-disturbing activities.

- EA-7) **Temporary and Interim Reclamation Measures.** RCM will be required to develop both temporary shutdown and interim reclamation plans for review and approval by the Forest Service. These plans will address periods of non-activity at exploration drill sites and partial reclamation of drill sites that are transitioning from active drilling phases to groundwater monitoring phases. Upon approval by the Forest Service, these plans will be incorporated into the Pre-feasibility Plan of Operations. Final reclamation will be conducted on all sites not selected for groundwater monitoring immediately after the completion of drilling activities.
- EA-8) **Minimize Vehicle Safety Pull-out Size.** RCM will coordinate with the Forest Service prior to the construction of any safety pull-outs identified in the Pre-feasibility Plan of Operations to ensure that the size of the pull-out is minimized to the extent practical.
- EA-9) **Rock Riprap and Aggregate Surfacing Material.** Riprap or aggregate used during road preparation will be angular, and the color will match native soil. Non-native aggregate surfacing placed on drill sites will be removed or buried at closure.
- EA-10) **Water Quantity.** If RCM wishes to use water from existing well A-06 for dust control or drilling activities, RCM must first prove, through appropriate pump test and monitoring procedures, that the pumping of this well will not affect nearby groundwater-dependent ecosystems.
- EA-11) **Arizona Hedgehog Cactus (AHC) Conservation Measures.** A number of mitigation measures have been developed by the Forest Service to further avoid, minimize, and mitigate for potential adverse impacts to AHC. Conservation measures incorporated into the Resolution Pre-feasibility Activities Plan of Operations Biological Assessment and Evaluation (August 2009) were refined during formal Section 7 consultation with the USFWS. These conservation measures are summarized below.
- **AHC Conservation Measure 1: Transplant.** Two AHC occur in close proximity to existing roads proposed for improvements as part of the Pre-feasibility Activities. The Forest Service has determined that these plants will need to be moved as a precautionary measure. A biological monitor, the Boyce Thompson Arboretum, or other Forest Service-approved entity shall transplant these AHC and any other AHC identified during the resurvey required by AHC Conservation Measure 2 that cannot be avoided during construction of the Pre-feasibility Activities. The transplanted plants will be relocated to the Boyce Thompson Arboretum. RCM shall be responsible for preparing an initial transplant report that documents the origin and new location of each transplanted AHC. Location information provided by RCM to the Forest Service shall include U.S. Geological Survey (USGS) map(s) that depict the origin and transplant location of each transplanted AHC, UTM coordinates of the origin and transplant locations in NAD 83, and a sketch of the transplant location with a photograph of the plant. If an AHC is relocated to the Boyce Thompson Arboretum, the origin location data will be provided in the transplant report, but detailed transplant location information, other than indicating its relocation to the

Arboretum, will not be required. With the exception of the initial transplant data, RCM shall not be responsible for annual transplant monitoring or submittal of annual monitoring data for any AHC relocated to the Boyce Thompson Arboretum. If more than 20 AHC are impacted as a result of the proposed action (i.e., harmed, transplanted, or relocated to the Boyce Thompson Arboretum), the Forest Service will reinitiate consultation with the USFWS.

- **AHC Conservation Measure 2: Resurvey Prior to Construction, Road Repair, and Reclamation Activities.** The survey and monitoring protocols included in the EA (April 2009) shall be expanded to include all areas of the proposed Pre-feasibility Activities that contain AHC habitat or potential habitat for AHC. If the area of proposed construction has been surveyed within the past year as part of the required monitoring efforts (Conservation Measure 5), resurvey is not required prior to construction. Resurvey will be completed no later than one month prior to the planned implementation of road improvement activities authorized by the final Pre-feasibility Plan of Operations. In the event that the planned activities would result in potential unanticipated impacts to known AHC or may impact any newly identified AHC, the biological monitor in conjunction with the Forest Service and RCM will evaluate site-specific conditions and modify the proposed improvement activity to avoid impact. If avoidance is not possible, the AHC in question would be transplanted in accordance with AHC Conservation Measure 1 prior to the initiation of Pre-feasibility Activities in the vicinity of that AHC. Road repair refers to unplanned maintenance activities beyond routine maintenance and could include activities required to address natural erosion or other degradation that extends outside the road footprint.
- **AHC Conservation Measure 3: Measures to Protect Plants During Construction.** All AHC detected during resurvey will be clearly delineated with T-post and wire fencing to establish the limits of surface disturbance and protect the microhabitat associated with each plant. Fencing will be placed as generally depicted in the Pre-feasibility Plan of Operations. In circumstances where additional screening is determined necessary by the biological monitor or the Forest Service, additional screening or protection measures will be implemented. When appropriate, and as determined by the biological monitor and/or Forest Service, concrete jersey barriers or a suitable equivalent will be used where plants are close to proposed road construction activities and additional protection from vehicle traffic is warranted. A jersey barrier shall be placed in a manner that protects the microhabitat of the AHC to the extent practical without causing significant impact to safe vehicle passage.
- **AHC Conservation Measure 4: Coordination with Construction Crews.** Prior to the start of each phase of construction activities, the biological monitor shall inform construction crews of the presence and location of all known AHC proximate to the new proposed construction activities and the procedures required to avoid adverse impact. The biological monitor shall have the authority to stop work in the event that the monitor believes that an AHC would be affected by the action. Work shall not proceed until one or

more of the mitigation measures outlined in AHC Conservation Measures 1 and 3 have been implemented to minimize adverse impacts to AHC to the maximum extent practicable.

- **AHC Conservation Measure 5: Long-Term Monitoring of AHC.** AHC within the Action Area¹ will be monitored every 2 years beginning in 2010 through the period authorized for the Pre-feasibility Activities. Biennial monitoring surveys shall occur in April and May to coincide with the flowering period of the AHC. Biennial monitoring will occur along all roads proposed for improvement or used for the Pre-feasibility Activities that occur within AHC habitat or potential habitat. Biennial monitoring efforts will include resurveys of road corridors and drill site buffers within the Action Area following the procedures and protocols used for the original survey effort (WestLand 2009b). During surveys, special attention will be given to the condition of the road and the maintenance activities that are more than minimal that may require work outside the existing disturbance footprint such as erosion rills or larger erosional features that are forming. These areas shall be identified and the Forest Service and RCM shall develop specific actions to correct these conditions. The location of each AHC detected during biennial monitoring surveys shall be recorded on a USGS map or aerial photograph, UTM coordinates of each AHC or cluster of AHC will be recorded in NAD 83, and each AHC will be photographed and appropriately tagged in the field to facilitate long-term monitoring efforts. Data collected for each of the detected AHC during the biennial monitoring surveys will include photographs, measurements of growth activity (tubercles and secondary stem production), measurement of plant size, assessment of plant health, evidence of reproduction, and an assessment of site integrity. One final monitoring survey will be required at the end of the authorization period for the proposed Pre-feasibility Activities or at the cessation of Pre-feasibility Activities by RCM, whichever occurs first. The biennial monitoring report will be submitted to the Forest Service by RCM on or before December 1 of each monitoring year.
- **AHC Conservation Measure 6: Protection of Downgradient Plants.** Known AHC that occur downhill from the Pre-feasibility Activities will be protected by rock guards when deemed necessary by the biological monitor and the Forest Service. Rock guards will be painted white to minimize potential heat-loading effects. The guards shall be properly pinned to maximize their effectiveness. In the event a guard cannot be properly pinned and the AHC is transplantable,² the biological monitor would recommend transplant if, in the biological monitor's opinion, the potential risk to the plant from rock fall is greater than the risk of transplant. All transplant activities, data recording, and monitoring of transplants will be done in accordance with AHC Conservation Measure 1.

¹ Action Area as defined in the Biological Opinion issued by the USFWS (USFWS 2010).

² Plants may not be transplantable because of poor health, rock or other physical constraint, or the size of the plant.

- **AHC Conservation Measure 7: Use of Native Plants in Reclamation.** RCM would include native vegetation common to AHC habitat in reclamation and closure plans for the Pre-feasibility Activities. The Forest Service will develop this seed mix.
 - **AHC Conservation Measure 8: Reintroduction of AHC Individuals via Seed/Seedlings.** Seeds and/or seedlings would be obtained from previously transplanted AHC housed at the Boyce Thompson Arboretum and/or the Carlota Copper Project AHC test plot. A propagation and monitoring technique plan could be cooperatively developed between the TNF, USFWS, Boyce Thompson Arboretum, RCM, and any other agency and/or individual determined to be appropriate by the TNF and USFWS. Reintroduction areas could include, but may not be limited to, “safe areas” as identified in the Tonto National Forest Conservation Assessment and Plan for AHC. Introductions of seeds and/or seedlings would occur within 2 years after project initiation. Frequency and duration of propagation and monitoring, reintroduction areas, and task responsibilities would be delineated in the propagation and monitoring technique plan developed. Propagations occurring outside the Action Area may require additional Section 7 consultation.
 - **AHC Conservation Measure 9: Closure of User-created Roads.** User-created roads are defined as those roads on National Forest System Lands that were not created and are not maintained by the TNF. User-created roads within potential AHC habitat or AHC habitat would be proposed for closure. These user-created roads would then be surveyed by RCM to establish the presence/absence of AHC. Closure would be the responsibility of RCM and accomplished through the construction of a gate, berm, or other adequate means as determined by the Forest Service. Road closures would serve to limit/reduce adverse impacts from various activities.
- EA-12) **Fire Plan.** Fire restrictions and provisions of the Tonto National Forest Fire Plan will be incorporated into the Pre-feasibility Plan of Operations. This may include shutdown to comply with red-flag conditions unless measures to minimize the risk of fire are employed and agreed to prior to fire seasons.
- EA-13) **Noxious Weeds.** All seed mixes to be used in reclamation are required to be certified weed free of seeds listed on the TNF weed list. All equipment must be cleaned prior to use on the project. Cleaning will remove all dirt, plant parts, and material that could carry noxious weed seeds. Only equipment cleaned and inspected will be allowed to operate in the PAA, and RCM must provide an annual record of this activity to the Forest Service. Cleaning must occur off National Forest System Lands. This requirement does not apply to service vehicles used for transportation to and from the reclamation sites.
- EA-14) **Well and Borehole Abandonment.** All wells and boreholes will be abandoned in accordance with State of Arizona well abandonment rules (Arizona Administrative Code Rule R12-15-816). Copies of Arizona Well Drill Reports, Well Log Forms, and Well Abandonment Completion Reports will be provided to the Forest Service annually.

- EA-15) **OF-2N Drilling Equipment.** The drilling equipment at the OF-2N drill site will be configured so that the power pack, or the engine of the drill if it is integral to the rig, is oriented away from the Boulder Campsite to minimize noise impacts to recreational users at that campsite.
- EA-16) **Visual Screening.** An assessment of the need for screening will be made by the Forest Service following drill setup. RCM will place camouflage netting materials on exploration drill sites OF-1 and OF-3 where they face the Oak Flat Campground if screening from existing boulders or vegetation is not sufficient. The material will be placed so that views of the drill equipment to a maximum height of 15 feet from the Oak Flat Withdrawal Area will be blocked.
- EA-17) **Existing Boulders at Drill Site OF-3.** At exploration drill site OF-3, RCM will leave the large boulders along the eastern edge of the proposed exploration drill pad nearest the road. These boulders could provide some screening from the road and facilitate reclamation efforts upon completion of exploration drilling at this location.
- EA-18) **Boulders at Drill Site H-N.** At drill site H-N, RCM will leave the large boulders along the eastern edge of this drill site nearest the road to provide some screening from the road and facilitate reclamation efforts.
- EA-19) **Rock Treatment.** Annually, RCM will work with the Forest Service to 1) identify any disturbed areas associated with the construction of new roads, improvements to existing roads, and construction of drill sites and 2) develop a rock staining (simulated desert varnish) implementation plan for the following year to reduce visual impacts.
- EA-20) **Nightlight Effects to Recreational Areas.** Lights used for night work and safety at drill sites will be directed or shielded to minimize nightlight effects to recreational areas.
- EA-21) **Boulders for Reclamation.** RCM will, to the extent practical, collect and set aside suitable boulders within the footprint of the proposed disturbance area for later use at drill sites or other reclamation activities. When used for closure and reclamation, salvaged boulders will be placed in a fashion or pattern that mimics boulder configuration in adjacent undisturbed areas.
- EA-22) **Administrative Traffic Controls.** RCM will work with the Forest Service to develop and implement an administrative access control plan to address safety concerns identified during public scoping. Specific items that could be addressed in the plan include, but may not be limited to: 1) signage, 2) training programs and documentation, 3) performance standards and specific policies to identify problems and discipline offenders, 4) plans for limiting traffic during periods of high-use public events, 5) plans to incorporate traffic safety issues into regular “lunch box” safety meetings on site, 6) a traffic monitor when and where appropriate, and 7) a collection agreement to fund Forest Service oversight of the traffic monitor. In response to concerns that were raised regarding possible effects to Tribal traditions and practices, RCM will ensure Tribal members will continue to have safe access to the area for those purposes during this project. RCM will be required to inform the San Carlos and White

Mountain Apache Tribes of their scheduled activities and to coordinate with the Tribes to resolve any potential conflicts arising from needs for access for particular activities. The Forest Service is committed to continuing government-to-government consultation with Tribes related to the implementation of the exploratory drilling and facilitating RCM's collaboration in the consultations.

- EA-23) **Magma Mine Road.** RCM will be responsible for the maintenance and care of Magma Mine Road.
- EA-24) **Roads within the Oak Flat Withdrawal Area.** With the incorporation of Alternative 5, the West Access Route 4b, RCM will restrict its use of roads within the Oak Flat Campground area to the Magma Mine Road, FR 2438, and those portions of Old U.S. Highway 60 that are used to access drill sites PVT-3, PVT-4, and H-L. Use of other roads within the Oak Flat Withdrawal Area will only be allowed for emergency vehicle access and emergency evacuation from the drill sites south of the Oak Flat Campground area. RCM will also limit the time of year that drilling activities will occur at drill sites PVT-3, PVT-4, and H-L. Drilling activities at these sites will not be allowed from October 1 through March 31 of the following calendar year, the primary season of use at the Oak Flat Campground. There will be no seasonal limitation for access to groundwater testing and monitoring well sites for testing and monitoring purposes. Drill sites OF-1, OF-3, M, and RES-13 will not be reoccupied for drilling activities until this alternative access route is constructed.
- EA-25) **Oak Flat Withdrawal Boundary.** RCM will conduct a cadastral survey at proposed drill sites adjacent to the Oak Flat Withdrawal Area to ensure that exploration activities do not encroach on the withdrawal lands. Annual drilling information will be provided to the Forest Service for exploration drill holes in the vicinity of the Oak Flat Withdrawal Area that is of sufficient detail to document that directional drilling activities do not extend under the Oak Flat Withdrawal Area.
- EA-26) **Travel Management.** No roads are being proposed under this analysis for changes in designation. Travel management is expected to be complete before completion of the proposed actions of RCM. Those roads whose status is not changed through consideration under travel management will be returned to their original condition (or in the case of user-created roads, obliterated) when they are no longer in use for this project.
- EA-27) **Archaeological Monitor.** During construction of the road improvements for West Access Route 4b, the PVT-8 access route, the PVT-7 access route, and drill site construction pad improvements for H-C and PVT-8, RCM will provide a qualified archaeologist who will be present to ensure that the limits of construction are established and maintained during construction.
- EA-28) **Outfall Structure.** A cultural resource site is located adjacent to drill site H-C. The outfall structure for this well will be placed along the opposite wall of the drill pad to avoid water flow

over the cultural resource site. Expelled water will flow along an eastward gradient from this location and will be intercepted by an existing livestock watering tank.

- EA-29) **Unidentified Cultural Resources.** If previously unidentified cultural resources are encountered during construction activities, work will cease at that location and Forest Service archaeologists will be contacted for instruction before work continues at that location.
- EA-30) **Early 1920s Superior-Miami Highway.** This existing road segment will be used to access a drill site. RCM will fill the numerous existing potholes within this road with clean fill material to slow erosion of the historic highway.

APPENDIX J
RECLAMATION
PERFORMANCE
BOND AND
BOND
CALCULATION
WORKSHEET

Phased Bond

Summary of Reclamation Costs Associated with All Reclamation Activities

Total Reclamation Activities Associated with New Exploratory Borehole Sites	\$438,318
Total Reclamation Activities Associated with Existing Exploratory Borehole Sites	\$575,445
Total Reclamation Activities Associated with New Well Sites	\$205,093
Total Reclamation Activities Associated with Existing Well Sites	\$120,851
Total Reclamation Activities Associated with New Tunnel Sites	\$0
Total Road Reclamation Costs	\$196,376
Total Miscellaneous Costs	\$177,755
Subtotal of Loaded Contractor Costs for New and Existing Reclamation Activities Associated with Exploratory Boreholes, Groundwater Testing and Monitoring Wells and tunnel Characterization Boreholes	\$1,713,838
Engineering Redesign Costs (2 percent of Subtotal of Loaded Contractor Costs) ¹	\$34,277
Contractor Payment and Performance Bond (3 percent of Subtotal of Loaded Contractor Costs) ²	\$51,415
Agency Project Management Costs (2 percent of Subtotal of Loaded Contractor Costs) ³	\$34,277
Mobilization/Demobilization for All Crews (5 percent of Subtotal of Loaded Contractor Costs) ⁴	\$85,692
Contingencies (4.5 percent of Subtotal of Loaded Contractor Costs) ⁵	\$77,123
Total Reclamation Activities Cost	\$1,996,621

Phased Bond

Exploratory Boreholes - Loaded Contractor Costs for Reclamation Activities Associated with New and Existing Exploratory Boreholes

Ripping and Revegetation (equipment rental costs based on RSMeans and labor rates based on Davis-Bacon rates) ^{6,7}			
Ripping and Revegetation of Exploratory Borehole Sites			
New Exploratory Borehole Sites	Area of New Sites (acres)	Existing Exploratory Borehole Sites	Area of Existing Sites (acres)
Drill Site QC-04	0.26	Drill Site A	0.25
Drill Site MB-03	0.25	Drill Site B	0.07
Drill Site OF-1	0.18	Drill Site C	0.27
Drill Site OF-2	0.22	Drill Site D	0.21
Drill Site OF-3	0.23	Drill Site F	0.15
Drill Site 4E	0.31	Drill Site M	0.55
Drill Site 4W	0.29	Drill Site #1	0.94
		Drill Site #2	0.28
		Drill Site #3	0.3
Total Acres of New Exploratory Borehole Sites to be Ripped and Revegetated	1.74	Total Acres of Existing Exploratory Borehole Sites to be Ripped and Revegetated	3.02
Cost of Ripping and Revegetation of New Exploratory Borehole Sites Assuming \$15,001/acre	\$26,102	Cost of Ripping and Revegetation of Existing Exploratory Borehole Sites Assuming \$15,001/acre	\$45,453

Mud Pit Removal and Backfill and Borehole Abandonment (costs based on Contractor quotes) ⁸									
New Activities					Existing Activities				
New Exploratory Borehole Sites	Boreholes Per New Site (Trunk/Core)	Cost per New Site to Abandon All Boreholes Assuming \$13,485 per Trunk Hole, \$11,733 per Core Hole and \$1,600 for Onsite Mob/Demob	Mud pits per New Site	Cost per New Site to Pump, Haul and Backfill Mud Pits Assuming \$5,100 per Mud Pit	Existing Exploratory Borehole Sites	Boreholes Per Existing Site (Trunk/Core)	Cost per Existing Site to Abandon All Boreholes Assuming \$13,485 per Trunk Hole, \$11,733 per Core Hole and \$1,600 for Onsite Mob/Demob	Mud pits per Existing Site	Cost per Existing Site to Pump, Haul and Backfill Mud Pits Assuming \$5,100 per Mud Pit
Drill Site QC-04	3/1	\$53,788	1	\$5,100	Drill Site A	3/1	\$53,788	1	\$5,100
Drill Site MB-03	3/1	\$53,788	1	\$5,100	Drill Site B	3/1	\$53,788	1	\$5,100
Drill Site OF-1	3/1	\$53,788	1	\$5,100	Drill Site C	3/1	\$53,788	1	\$5,100
Drill Site OF-2	3/1	\$53,788	1	\$5,100	Drill Site D	3/1	\$53,788	1	\$5,100
Drill Site OF-3	3/1	\$53,788	1	\$5,100	Drill Site F	3/1	\$53,788	1	\$5,100
Drill Site 4E	3/1	\$53,788	1	\$5,100	Drill Site M	3/1	\$53,788	1	\$5,100
Drill Site 4W	3/1	\$53,788	1	\$5,100	Drill Site #1	3/1	\$53,788	1	\$5,100
					Drill Site #2	3/1	\$53,788	1	\$5,100
					Drill Site #3	3/1	\$53,788	1	\$5,100
Totals		\$376,516	7	\$35,700	Totals		\$484,092	9	\$45,900

Summary of Reclamation Costs Associated with Exploratory Boreholes					
New Activities			Existing Activities		
Cost of Ripping and Revegetation of New Exploratory Borehole Sites	\$26,102		Cost of Ripping and Revegetation of Existing Exploratory Borehole Sites		\$45,453
Cost to Abandon Boreholes on New Sites	\$376,516		Cost to Abandon Boreholes on Existing Sites		\$484,092
Cost to Pump, Haul and Backfill Mud Pits on New Sites	\$35,700		Cost to Pump, Haul and Backfill Mud Pits on Existing Sites		\$45,900
Total Reclamation Activities Associated with New Exploratory Borehole Sites	\$438,318		Total Reclamation Activities Associated with Existing Exploratory Borehole Sites		\$575,445

Total New and Existing Exploratory Borehole Reclamation Activities **\$1,013,763**

Phased Bond

Groundwater Testing and Monitoring Wells - Loaded Contractor Costs for Reclamation Activities Associated with New and Existing Well Sites

Ripping and Revegetation (equipment rental costs based on RSMeans and labor rates based on Davis-Bacon rates) ^{6,7}			
Ripping and Revegetation of Well Sites			
New Well Sites	Area of New Sites (acres)	Existing Well Sites	Area of Existing Sites (acres)
H-C	0.27	Drill Site A	See Exploratory Borehole Sheet
H-E	0.16	Drill Site F	See Exploratory Borehole Sheet
H-F	0.25	Drill Site M	See Exploratory Borehole Sheet
H-G	0.2	Drill Site #2	See Exploratory Borehole Sheet
H-I	0.18		
H-K	0.3		
H-L	0.15		
H-N	0.35		
Total Acres of New Well Sites to be Ripped and Revegetated	1.86	Total Acres of Well Sites to be Ripped and Revegetated	0
Cost of Ripping and Revegetation of New Well Sites Assuming \$15,001/acre	\$27,902	Cost of Ripping and Revegetation of Well Sites Assuming \$15,001/acre	\$0

Well Abandonment ⁸							
New Activities				Existing Activities			
New Well Sites	Number of Shallow Wells per Site	Number of Deep Wells per Site	Cost per New Site to Abandon Onsite Wells Assuming \$12,485 per Shallow Well Site, \$29,827 per Deep Well Site and \$1,600 for Onsite Mob/Demob	Existing Well Sites	Number of Shallow Wells per Site	Number of Deep Wells per Site	Cost per Existing Site to Abandon Onsite Wells Assuming \$12,485 per Shallow Well Site, \$29,827 per Deep Well Site and \$1,600 for Onsite Mob/Demob
H-C	1	0	\$14,085	Drill Site A	0	1	\$31,427
H-E	1	0	\$14,085	Drill Site F	0	1	\$31,427
H-F	1	0	\$14,085	Drill Site M	1	1	\$43,912
H-G	1	0	\$14,085	Drill Site #2	1	0	\$14,085
H-I	1	0	\$14,085				
H-K	1	1	\$43,912				
H-L	0	1	\$31,427				
H-N	0	1	\$31,427				
Totals	6	3	\$177,191	Totals	2	3	\$120,851

Summary of Reclamation Costs Associated with Well Sites			
New Activities		Existing Activities	
Cost of Ripping and Revegetation of New Well Sites	\$27,902	Cost of Ripping and Revegetation of Existing Well Sites	\$0
Cost to Abandon Wells on New Sites	\$177,191	Cost to Abandon Wells on Existing Sites	\$120,851
Total Reclamation Activities Associated with New Well Sites	\$205,093	Total Reclamation Activities Associated with Existing Well Sites	\$120,851

Total New and Existing Hydrological Wells Reclamation Activities **\$325,944**

Phased Bond

Tunnel Characterization Boreholes - Loaded Contractor Costs for New Tunnel Characterization Boreholes

Ripping and Revegetation (equipment rental costs based on RSMeans and labor rates based on Davis-Bacon rates) ^{6,7}	
Ripping and Revegetation of Borehole Sites	
New Well Sites	Area of New Sites (acres)
PVT-3	0.14
PVT-4	0.15
PVT-5	0.2
PVT-6	0.18
PVT-7	0.3
PVT-8	0.24
PVT-9	0.16
APV-6	0.14
APV-8	0.29
Total Acres of New Well Sites to be Ripped and Revegetated	1.8
Cost of Ripping and Revegetation of New Well Sites Assuming \$15,001/acre	\$0

Mud Pit Removal and Backfill and Borehole Abandonment ⁸				
New Well Sites	Number of Boreholes per Site	Cost per New Site to Abandon the Onsite Borehole Assuming \$10,692 per Borehole and \$1,600 for Onsite Mob/Demob	Number of Mud Pits per Site	Cost per New Site to Pump, Haul and Backfill Mud Pits Assuming \$5,100 per Mud Pit
PVT-3	1	\$0	1	\$0
PVT-4	1	\$0	1	\$0
PVT-5	1	\$0	1	\$0
PVT-6	1	\$0	1	\$0
PVT-7	1	\$0	1	\$0
PVT-8	1	\$0	1	\$0
PVT-9	1	\$0	1	\$0
APV-6	1	\$0	1	\$0
APV-8	1	\$0	1	\$0
Totals	9	\$0	9	\$0

Summary of Reclamation Costs Associated with Tunnel Characterization Boreholes	
Cost of Ripping and Revegetation of Borehole Sites	\$0
Cost to Abandon Boreholes on New Sites	\$0
Cost to Pump, Haul and Backfill Mud Pits on New Sites	\$0
Total Reclamation Activities Associated with New Well Sites	\$0

Total Tunnel Characterization Boreholes Activities \$0

Phased Bond

Costs Associated with Road Reclamation and Closure - Loaded Contractor Costs

Planned Road Reclamation and Closure per Section 5.0 of the Plan of Operations ^{6,7,9}				
Road ID	Disturbance Area (acres)	Associated Activity	Proposed TMR	Cost for Proposed TMR
FR 315	5.05	Groundwater Testing and Monitoring Wells	Maintain and Repair	\$0
FR 320	0.45	Tunnel Characterization Boreholes	Maintain and Repair	\$0
FR 898	0.76	Tunnel Characterization Boreholes	Maintain and Repair	\$0
Existing Road from FR 898 to APV-8	0.08	Tunnel Characterization Boreholes	Reclaim	\$0
FR 2261	0.55	Groundwater Testing and Monitoring Wells	Maintain and Repair	\$0
FR 2440	4.36	Exploratory Boreholes	Close	\$483
FR 2461	1.27	Tunnel Characterization Boreholes	Maintain and Repair	\$0
Existing Extension of 2461	0.59	Tunnel Characterization Boreholes	Reclaim	\$0
FR 2463	0.51	Tunnel Characterization Boreholes	Close	\$0
FR 2466 (and small portion of FR 2467)	8.17	Groundwater Testing and Monitoring Wells	Maintain and Repair	\$0
FR 2469	3.59	Groundwater Testing and Monitoring Wells	Close	\$483
FR 2505	0.48	Tunnel Characterization Boreholes	Close	\$0
FR 2511	1.06	Tunnel Characterization Boreholes	Close	\$0
FR 3139	0.76	Groundwater Testing and Monitoring Wells	Close	\$483
FR 3153	0.18	Exploratory Boreholes	Close	\$483
Existing Road from FR 315 to H-E	0.65	Groundwater Testing and Monitoring Wells	Reclaim	\$9,751
Existing Road from FR 2440 to QC-04 (FR 3786)	0.06	Exploratory Boreholes	Reclaim	\$900
Existing Road from FR 2466 to H-F	0.73	Groundwater Testing and Monitoring Wells	Reclaim	\$10,951
Existing Road from U.S. Highway 60 to PVT-9	0.13	Tunnel Characterization Boreholes	Reclaim	\$0
Existing Road from Magma Mine Road to Private Holding	0.08	Groundwater Testing and Monitoring Wells	Maintain and Repair	\$0
Magma Mine Road	2.05	Exploratory Boreholes	Maintain and Repair	\$0
Existing Road from Magma Mine Road near Superior East Plant Site south to private in-holding	0.11	Exploratory Boreholes	Reclaim	\$1,650
Existing road from Magma Mine road to Site No. 1	0.13	Exploratory Boreholes	Reclaim	\$1,950
Existing user-created road from Magma Mine north to PVT-3	0.14	Tunnel Characterization Boreholes	Reclaim	\$0
FR 2438 from Magma Mine Road east to a user-created bypass road to FR 3153	0.49	Exploratory Boreholes	Reclaim	\$7,350
User-created bypass road from FR 2438 to FR 3153	0.48	Exploratory Boreholes	Reclaim	\$7,200
User-created road (old US 60) from FR 2438 to H-L and PVT-4	0.78	Tunnel Characterization Boreholes	Reclaim	\$0
FR 3153 south to proposed new road to OF-1	0.95	Exploratory Boreholes	Reclaim	\$14,251
Two New Access Roads from FR 2458 to Drill Site H-K	0.06	Groundwater Testing and Monitoring Wells	Reclaim	\$914
	0.05	Groundwater Testing and Monitoring Wells	Reclaim	\$780
New Access from FR 2461 to Drill Site PVT-5	0.11	Tunnel Characterization Boreholes	Reclaim	\$0
New Access from FR 3153 to Drill Site OF-1	0.37	Exploratory Boreholes	Reclaim	\$5,522
Road to Site M	0.15	Exploratory Boreholes	Reclaim	\$2,250
Alternative 4B	2.10	Exploratory Boreholes	Reclaim	\$31,502
Removal of three gates at \$1,500 each gate	-	-	-	\$4,500
Miscellaneous earth work associated with reclamation construction and final grading for roadway and site closure	6.33	All	Reclaim	\$94,972
			TOTAL	\$196,376

Phased Bond

Miscellaneous Reclamation Costs Associated with All Reclamation Activities^{10,11, 12, 13,14}

Total AHC Survey Costs	\$60,000
Miscellaneous Material Removal per the Resolution Copper Mining Pre-Feasibility Activities Plan of Operations, October 2010, Assuming a Total of Five Days at \$1,014/day	\$5,070
Total Water Distribution Pipeline Removal Costs Assuming a Total of Four Days of Work for All Pipeline Removal at \$1,014/day	\$4,056
Total Signage Removal Costs Assuming a Total of Two Days of Work for All Signage Removal at \$1,014/day	\$2,028
Total Boulder Placement/Treatment Costs Assuming a Total of Four Days of Work for All Boulder Placement/Treatment at \$1,014/day	\$4,056
Total Reclamation SWPPP Costs Assuming Five Days of Work to Implement all SWPPP Requirements at \$1,014/day	\$5,070
Total ADWR Filing Fees for Well Abandonment	\$9,300
Total Water Truck Rental Costs for 6 months at \$5,030/month	\$30,180
Total Water Purchasing Costs	\$16,830
Total Water Truck Labor at \$16.77/hr	\$17,709
Demo and Restore Apron; Remove Culverts	\$23,456
Total Miscellaneous Reclamation Cost	\$177,755

Phased Bond

Footnotes for All Reclamation Activities

¹Engineering costs for reclamation activities are estimated based on the Cost Estimating Guide for Road Construction, Regions 2, 3, 4 USDA-Forest Service; Office of Surface Mining, Handbook for the Calculation of Reclamation Bond Amounts, which states that engineering redesign costs typically range between 2 and 10 percent. The amount of engineering redesign necessary is assumed to be minimal based on a review of the typical engineering work items listed in the Training Guide for Reclamation Bonding Estimation and Administration, FS, April 2004, and is assumed to be a total of 2 percent of the direct costs.

²Equipment rental, labor and contractor quotes include profit and overhead. Due to the fact that this reclamation project is estimated to cost more than \$25,000, 3 percent of the direct costs is added for the required performance and payment bond.

³Project Management Costs are estimated for Agency Administration and for Contract Administration. Due to the simplicity of this reclamation project, the Agency Administration fees are not assumed to go beyond the amount normally budgeted for Agency Administration. Contract Administration is estimated per Figure 3 of the Training Guide for Reclamation Bonding Estimation and Administration, FS, April 2004, to be approximately 2 percent of the direct costs.

⁴Mobilization/Demobilization costs are tabulated using hourly rates for RSMeans crews and the Stewart Brothers quote and reviewed with the Subtotal of Loaded Contractor Costs to determine the appropriated percentage to use for an indirect cost. The actual contractor costs are tabulated below to be \$3,100 for (2) B-10M Crews, \$330 for (4) B-80B Crews, and \$12,000 for the well abandonment crew for a total of \$15,430. The total of \$15,430 is less than 2 percent of the Subtotal of Loaded contractor Costs, and therefore 5 percent is chosen as a reasonable Mobilization/Demobilization indirect cost.

*Mobilization/demobilization costs are estimated for the B-10M Crew and the B-80B Crew based on equipment rental from the Phoenix area. Transport of the dozer for the B-10M Crew is estimated at \$110/hr plus a one way charge of \$1,000 for two pilot cars and two DPS escorts (estimates are per Red Mountain Machinery, Gilbert, Arizona). The pilot cars and escorts are required for crossing the Queen Creek Bridge. Assuming five hours for one way transport, the total one way cost is estimated to be \$1,550, or \$3,100 round trip. Mobilization/demobilization for the well abandonment is included in the contractor's quote.

*The B-80B Crew mobilization/demobilization costs are assumed to be three hours of the crew rental fee for round-trip transport, or approximately \$330.

*Mobilization/demobilization for the well abandonment is estimated per the contractor quote provided by the Stewart Brothers Drilling Company. Mobilization/Demobilization for the abandonment equipment is estimated to be \$12,000.

⁵Contingencies are applied to this bonding analysis to account for errors associated with assumptions made regarding the reclamation efforts. The details of this project are classified as "Definitive" per the Training Guide for Reclamation Bonding Estimation and Administration, FS, April 2004, and a total contingency sum of 4.5 percent of the direct costs is applied (4.5 percent is the average contingency for a "Definitive" classification).

⁶Acreage data is per the Resolution Copper Mining Pre-Feasibility Activities Plan of Operations, October 2010. An additional 100 percent of the acres classified as "Reclaim" is added to account for miscellaneous earth work associated with reclamation construction and final grading for roadway and site closure.

⁷The equipment rental and labor estimates for Ripping and Revegetation are based on the calculated number of hours required for a B-10M to complete construction per production factors in RSMeans Building Construction Cost Data, 2010. Davis-Bacon labor rates are applied to the required number of hours to complete work. The RSMeans cost for B-10M equipment is \$1,932/day ((1) 300 HP dozer) and the Davis-Bacon composite hourly labor rate for a B-10M Crew is \$46.51/hr (General Decision AZ20100011, dated 3/12/2010 for Pinal County Arizona, (1) Group 2 Power Equipment Operator at \$35.01 and Group 2 Laborer at \$23.00 (assumes Group 2 laborer onsite half time). Assuming ripping to 1.5 foot below surface, and productions factors of 0.5 (for onsite mobilization and access) and 110 cy/hr (for the B-10M crew per RSMeans) the cost of equipment and labor per acre ripped is \$10,626. The equipment and labor rates include profit and overhead. Revegetation is estimated to cost \$2,500/acre per Desert Seeders, LLC, Phoenix, Arizona, including profit and overhead. An additional 50 percent and an additional 25 percent of the revegetation cost of \$2,500 are added for second and third seedings respectively. The total loaded cost for Ripping and Revegetation is calculated to be \$15,001/acre. If required, aggregate base will be removed from drill sites and placed on the nearest Forest Service road; the cost of which is included in the \$15,001/acre unit cost. See Footnote 7 Summary next spreadsheet.

⁸Costs are based on information provided by Stewart Brothers Drilling Co. (see the attached quote and calculations for per hole costs). Per ADWR requirements the holes will be completely filled with abandonment material. An additional \$1,600 is added for 4 hours of onsite mob/demob at \$400 per hour. Mud pit pumping, offsite disposal and backfilling is assumed to be a lump sum of \$5,100 per mud pit per the Stewart Brothers Drilling Co. quote. Per communications with Stewart Brothers Drilling Co. on 9/14/10, the fill material quoted in the attached quote is abandonite, tremie pipe work is included and an additional \$350 is added for installation of a 20-foot cement plug per ADWR regulations.

⁹Cost per road is based on the proposed TMR. "Reclaim" refers to Ripping and Revegetation and is calculated at \$15,001/acre above. "Close" refers to simple road closure. Road closure will be performed by constructing a berm at the entrance to the road using a B-10M Crew per Section 5.0 of the Plan of Operations. The total daily cost for a B-10M Crew is \$1,932/day as calculated above. The total number of hours for each road closure is calculated assuming 15-foot long berms, 5 feet in height with a 2:1 slope. The total volume of earthwork required is approximately 14 cy per berm. The B-10M crew can move 110 cy per hour, and therefore can move the earth in less than 8 minutes. However, the time of construction for each berm is rounded up to 2 hours (or 1/4 of a day) due to site constraints, access and onsite mobilization. Therefore a cost of \$483 (1/4 of \$1,932) is applied for road closure. There is no additional cost applied for the "maintain and repair" TMR. Removal of gates along roads is included in the cost per road. A cost of \$1,500 per gate is included for one gate at the road to the Omya Quarry and two gates along 4B.

¹⁰The total cost for the AHC survey is approximatley \$60,000 based on previous surveys done by Westland Resources, Inc. (includes 10 percent markup)

¹¹Per Section 5.0 of the Resolution Copper Mining Pre-Feasibility Activities Plan of Operations, October 2010, all material including, equipment, pipe, lubricants (including petroleum contaminated soil) and other products, portable restrooms, core, plastic sheeting and any other supplies will be removed from the site. In addition to the miscellaneous materials to be removed per the Plan of Operations, removal of water distribution pipeline, signage removal, boulder placement/treatment and SWPPP implementation are all assumed to be completed by a B-80B crew per RSMeans. All construction schedules are assumed to include time for onsite mobilization. The B-80B Crew consists of three laborers, one light equipment operator and a flatbed mounted 3-ton crane. The daily equipment rental cost for the B-80B Crew is \$266.86 per RSMeans and Davis-Bacon hourly rates for Group 1 laborers and Group 1 Power Equipment Operators are \$21.07 and \$30.20 respectively per General Decision AZ20100011, dated 3/12/2010 for Pinal County Arizona. The composite labor rate for a B-80B Crew is \$93.41 (\$21.07 x 3 laborors + 30.20 x 1 equipment operator). The equipment and labor rates include profit and overhead. The total daily cost for a B-80B Crew is \$1,014 (93.41 x 8 hours + 266.86 per day).

¹²ADWR filing fees for well abandonment are \$150 per hole. There are a total of 61 Exploratory Boreholes, 14 Hydrological Wells and 9 Tunnel Characterization Boreholes being bonded, which gives 84 total holes. Therefore the total filing costs are \$12,600.

¹³Water truck rental costs are calculated assuming 6 months of total water truck rental time at \$5,030/ month. The rental rate of \$5,030 is a quote from Sun State Equipment out of Phoenix. The total water required is calculated assuming 22 working days per month, 8 work hours per day and 8 loads of 3,800 gallons used daily. The assumption of 8 loads a day is based on a constant water truck usage throughout the work day at one cyle per hour. The rate per gallon is based on historical rates for water sold to RCM from the Arizona Water Company. The cost of water is calculated in a memo dated January 13, 2011. A Group 1 Truck Driver labor rate of \$16.77/hour (per Davis-Bacon General Decision AZ20100011, dated 3/12/2010 for Pinal County Arizona) is applied for the entire work period of 6 months (total of 1,056 hours).

¹⁴Assume 8 locations along the roads and drill sites will require restoration of the aprons and removal of culverts. Assumes each of the 8 locations require one full 8-hour day. Assume all work by same Labor and Equipment Crew for Item 7 which costs \$1,932 per day (see Footnote 7 Summary Item 6). Costs to restore apron and remove culverts = \$15,456 (\$1,932 x 8 sites). Assumes \$1,000 each site to haul and legally dispose of removed materials using a haul truck. Total construction and disposal costs = \$23,456 (\$15,456 + \$1,000 x 8 sites)

Phased Bond

Footnote 7 Summary		
Equipment and Labor Summary		
1	\$ 1,560	per day (300 HP Dozer)
2	\$ 35.01	per hour (Group 2 Power Equipment Operator including Fringe Costs)
3	\$ 23.00	per hour (Group 2 Laborer including Fringe Costs)
4	\$ 46.51	per hour operator and laborer (laborer there half the time) (Item 2 + 0.5 x Item3)
5	\$ 372	per 8-hour day operator and laborer (Item 4 x 8 hours)
6	\$ 1,932	per day for labor and bulldozer (Item 1 + Item 5)
Time for Equipmentand Crew to Complete Ripping One Acre		
7	1.50	ft depth
8	43,560	square feet in one acre
9	2,420	cubic yards/acre (Item 7 x Item 8 / 27 cubic ft / cubic yard)
10	110.00	cubic yards/hour (Assumed Working Rate RS Means)
11	22.00	hours (Item 9 / Item 10)
12	0.5	Assumed Efficiency of Crew Moving from Site to Site
13	44.00	hours to complete one acre (Item 12 x 2)
14	5.50	days to comlete one acre (Item 13 / 8 hour days)
Cost for labor and equipment over a 5.5 day period.		
15	\$ 10,626	Item 6 x Item 14
Reseeding		
16	\$ 2,500	Initial Reseeding based on Contractor's Estimate
17	\$ 1,250	Second Seeding (Assumes half original site will need reseeding)
18	\$ 625	Final (Assumes one quarter initial seeding will need reseeding)
19	\$ 4,375	Total reseeding (Item 16 + Item 17 + Item 18)
Total ripping and reseeding costs per acre		
20	\$ 15,001	Item 15 + Item 19

SUPPORTING DOCUMENTATION

Cost of Abandonment for Different Hole Types Using Stewart Brothers Unit Costs

8/26/2010

Note: Unit costs include \$400 per hour of work, \$20 per bag of fill material and 2.8 ft³ of fill per bag per the attached Stewart Brothers Drilling Co. quote. The volume of 2.8 ft³ of fill per bag is calculated by dividing the volume of a 5.5 inch diameter hole 3,000 ft deep hole (495 ft³) by 176 bags (See Site #1 and Item 4B of the attached quote). Per communications with the Stewart Brothers Drilling Co. on 9/14/10 the abandonment material in the attached quote is Abondonite, all tremie pipe work is included and the cement plug cost is \$350/each.

Exploratory Holes¹	
Trunk Hole Length (ft)	3,000
Trunk Hole Diameter (in)	5.5
Trunk Hole Volume (ft3)	495
Trunk Hole Bags	177
Trunk Hole Bags Cost	\$3,535
Trunk Hole Labor	24
Trunk Hole Labor Cost	\$9,600
Cement Plug Cost	\$350
Trunk Hole Subtotal	\$13,485
Core Hole Length (ft)	4,000
Core Hole Diameter (in)	3.7
Core Hole Volume (ft3)	299
Core Hole Bags	107
Core Hole Bags Cost	\$2,133
Core Hole Labor	24
Core Hole Labor Cost	\$9,600
Core Hole Subtotal	\$11,733
Total	\$25,219

Shallow Hydro²	
Length (ft)	1,500
Diameter (in)	4.0
Volume (ft3)	131
Bags	47
Cost of Bags	\$935
Hours of Work	28
Cost of Labor	\$11,200
Cement Plug Cost	\$350
Total	\$12,485

Deep Hydro²	
Length (ft)	4,600
Diameter (in)	7.0
Volume (ft3)	1,229
Bags	439
Length (ft)	2,400
Diameter (in)	4.0
Volume (ft3)	209
Bags	75
Total Bags	514
Cost of Bags	\$10,277
Hours of Work	48
Cost of Labor	\$19,200
Cement Plug Cost	\$350
Total	\$29,827

Tunnels³	
Length (ft)	1,670
Diameter (in)	6.0
Volume (ft3)	328
Bags	117
Cost of Bags	\$2,342
Hours of Work	20
Cost of Labor	\$8,000
Cement Plug Cost	\$350
Total	\$10,692

¹Exploratory Borehole abandonment costs assume 5.5-inch trunk holes to a depth of 3,000 ft, one 3.7-inch core hole 4,000 feet in length per site and 24 hours of work at \$400 per hour per trunk hole (an additional 24 hours of labor is added to the Stewart Brothers Drilling Co. quote of 24 hours to account for the core hole labor). The total abandonment cost for each trunk hole is approximately \$13,485, with an additional \$11,733 per site for a single core hole abandonment.

²Hydrological Well abandonment costs assume shallow wells drilled to a depth of 1,500 ft with a 4-inch casing and deep wells drilled to a depth of 4,600 ft with a 7-inch casing and then to a depth of 7,000 ft with a 4-inch casing. Shallow wells are assumed to require 28 hours of labor (8 hours for column pipe and pump removal and 20 hours for well abandonment) and deep wells are assumed to require 48 hours of work. The total abandonment cost for each Shallow Well is approximately \$12,485, and the total abandonment cost for each deep well is approximately \$29,827.

³Tunnel Characterization holes abandonment costs assume 6-inch holes to a depth of 1,670 ft. The total abandonment cost for each Tunnel Characterization Borehole is approximately \$10,692.

MEMORANDUM

TO: Kathy Whitman, WestLand Resources, Inc.

FROM: Robert Archer, P.E., WestLand Resources, Inc.

DATE: January 18, 2011

RE: **COST OF WATER FOR RECLAMATION FOR RESOLUTION PRE-FEASIBILITY BONDING, WESTLAND PROJECT NO. 807.30**

The purpose of this memorandum is to document the methods used to calculate the cost of water to be used for reclamation as part of bonding the Resolution Pre-feasibility project. It is assumed that the water will be purchased from the Arizona Water Company in Superior, Arizona. The quantity of water required for reclamation has already been calculated at 668,800 gallons per month for six months for a total of 4,012,800 gallons. The monthly quantity is based on eight 3,800-gallon truck loads per day and 22 days per month.

The attached "Eastern Group Billing Rate Chart" shows Arizona Water Company's water rates for Apache Junction, Miami, and Superior. On the billings rate chart, flow is in hundreds of gallons, and the commodity rate and water use tax are in dollars per one hundred gallons. Table 1 shows the base rate and commodity rates for construction water assuming a 4-inch meter.

Table 1. Base rate and commodity rates for construction water assuming a 4-inch meter.

Base rate	\$437.95 per month
Tier 1 for 0 to 450,000 gallons	\$0.28527 per 100 gallons
Tier 2 for 450,100 gallons and above	\$0.35663 per 100 gallons

The applicable taxes are the Water Use Tax of \$0.00065 per 100 gallons, and a sales tax of 11.93% (Personal communication with Jessica Castillo, Arizona Water Company, Superior, January 13, 2011). The sales tax is shown on the attached billing rate chart in the third column, bottom row of the table at the bottom. The sales tax does not apply to the Water Use Tax.

Based on Arizona Water Company's construction water rates, using 668,800 gallons in one month would cost about \$2,805. The calculation is shown in Table 2. The total cost for six months is about \$16,830.

Table 2. Calculation of the cost of water for one month.

	Rate	Quantity (hundreds of gallons)	Amount
Base Rate	\$437.95		\$437.95
Tier 1	\$0.28527	4,500	\$1,283.72
Tier 2	\$0.35663	2,188	\$780.31
Subtotal			\$2,501.98
Sales Tax (on subtotal)	11.93%		\$298.48
Water Use Tax	\$0.00065	6,688	\$4.35
Total			\$2,804.81

EASTERN GROUP BILLING RATE CHART

January 1, 2011

Apache Jct./Miami/Superior

RATES Effective 7/1/10			Tax Rates Effective 6/01/10		MAP Effective 1/1/10
<u>WR</u>			<u>WC</u>		
5/8"	\$ 17.52		Fire Sprinkler \$26.24		
1"	43.80		5/8"	\$ 18.44	
2"	140.14	MAP	1"	46.10	
3"	280.29	091- .23	2"	147.52	
4"	437.95	121- .25	3"	295.04	
6"	875.90		4"	461.00	
8"	1401.45		6"	922.01	
10"	2014.58		8"	1475.21	
5/8"			10"	2120.61	
Tier 1 - 0 to 30 usage		.22820	5/8"		
Tier 2 - 31 to 100 usage		.28527	Tier 1 - 0 to 100 usage		.28527
Tier 3 - 101 and above		.35663	Tier 2 - 101 and above		.35663
1"			1"		
Tier 1 - 0 to 100 usage		.28527	Tier 1 - 0 to 300 usage		.28527
Tier 2 - 101 and above		.35663	Tier 2 - 301 and above		.35663
2"			2"		
Tier 1 - 0 to 1250 usage		.28527	Tier 1 - 0 to 1000 usage		.28527
Tier 2 - 1251 and above		.35663	Tier 2 - 1001 and above		.35663
3"			3"		
Tier 1 - 0 to 3000 usage		.28527	Tier 1 - 0 to 2750 usage		.28527
Tier 2 - 3001 and above		.35663	Tier 2 - 2751 and above		.35663
4"			4"		
Tier 1 - 0 to 5000 usage		.28527	Tier 1 - 0 to 4500 usage		.28527
Tier 2 - 5001 and above		.35663	Tier 2 - 4501 and above		.35663
6"			6"		
Tier 1 - 0 to 10000 usage		.28527	Tier 1 - 0 to 9250 usage		.28527
Tier 2 - 10001 and above		.35663	Tier 2 - 9251 and above		.35663
8"			8"		
Tier 1 - 0 to 15000 usage		.28527	Tier 1 - 0 to 15000 usage		.28527
Tier 2 - 15001 and above		.35663	Tier 2 - 15001 and above		.35663
10"			10"		
Tier 1 - 0 to 22250 usage		.28527	Tier 1 - 0 to 22250 usage		.28527
Tier 2 - 22251 and above		.35663	Tier 2 - 22251 and above		.35663
<u>WI</u>			<u>Construction (OT)</u>		
5/8"	\$ 18.44		2"	140.14	
1"	46.10		3"	280.29	
2"	147.52		4"	437.95	
3"	295.04		2"		
4"	461.00		Tier 1 - 0 to 1000 usage		.28527
6"	922.01		Tier 2 - 1001 and above		.35663
8"	1475.21		3"		
10"	2120.61		Tier 1 - 0 to 2750 usage		.28527
All meter sizes and all gallons		.27660	Tier 2 - 2751 and above		.35663
			4"		
			Tier 1 - 0 to 4500 usage		.28527
			Tier 2 - 4501 and above		.35663

SALES FOR RE-SALE MINIMUM-REFER TO WR ALL METER SIZES AND ALL GALLONS .27660

WATER USE TAX: .00065

ACC TAX: .00230

System	Water System	Inside	Outside	County
021	11-004	.10730	.07530	MA
021-14, 021-21, 021-22 & 021-55	11-004	.09280	.07530	MA
021-50	11-004		.07530	MA
021	11-004	.11130	.07930	PI
091-03 - 091-18	04-002	.12830	.07830	GL
091-20 - 091-28	04-002	.12830	.07830	GL
121	11-021	.11930	.07930	PI

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 TELEPHONE NUMBER (505) 287-2986 • FAX NUMBER (505) 287-7660



**Abandon Multiple Wells and Backfill Pits
 Globe, Arizona
 Prepared for Westland Resources on May 14, 2010**

Item	Description	Units	No. Units	Unit Price	Extended Price
1	Mobilization and Demobilization	1	LS	\$ 12,000	\$ 12,000
2	Moving from Well to Well	20	HR	\$ 400	\$ 8,000
3	Water Hauling*	20	HR	\$ 90	\$ 1,800
Site #1 (5.5 inch wells to 3,000 Ft)					
4A	Time to abandon Well #1	24	HR	\$ 400	\$ 9,600
4B	Materials to Abandon Well #1	176	Bags	\$ 20	\$ 3,520
5A	Time to abandon Well #2	24	HR	\$ 400	\$ 9,600
5B	Materials to Abandon Well #2	176	Bags	\$ 20	\$ 3,520
6A	Time to abandon Well #3	24	HR	\$ 400	\$ 9,600
6B	Materials to Abandon Well #3	176	Bags	\$ 20	\$ 3,520
7A	Time to abandon Well #4	24	HR	\$ 400	\$ 9,600
7B	Materials to Abandon Well #4	176	Bags	\$ 20	\$ 3,520
8	Hauling of Mud and Cuttings from On site Mud Pits**	3	Truck Load	\$ 3,100	\$ 9,300
9	Backfill mud pits***	4	Sites	\$ 2,000	\$ 8,000
Site #2 (5.5 inch wells to 3,000 Ft)					
10A	Time to abandon Well #1	24	HR	\$ 400	\$ 9,600
10B	Materials to Abandon Well #1	176	Bags	\$ 20	\$ 3,520
11A	Time to abandon Well #2	24	HR	\$ 400	\$ 9,600
11B	Materials to Abandon Well #2	176	Bags	\$ 20	\$ 3,520
12A	Time to abandon Well #3	24	HR	\$ 400	\$ 9,600
12B	Materials to Abandon Well #3	176	Bags	\$ 20	\$ 3,520

13	Hauling of Mud and Cuttings from On site Mud Pits**	3	Truck Load	\$ 3,100	\$ 9,300
14	Backfill mud pits***	3	Sites	\$ 2,000	\$ 6,000
Site #3 (7 inch well to 4,600 Ft, then 4 inch from 4,600 to 7,000)					
15A	Time to abandon Well #1	48	HR	\$ 400	\$ 19,200
15B	Materials to Abandon Well #1	515	Bags	\$ 20	\$ 10,300
16	Hauling of Mud and Cuttings from On site Mud Pits**	2	Truck Load	\$ 3,100	\$ 6,200
17	Backfill mud pits***	1	Sites	\$ 2,000	\$ 2,000
Site #4 (4 inch well to 1,500 Ft)					
18A	Time to abandon Well #1	20	HR	\$ 400	\$ 8,000
18B	Materials to Abandon Well #1	46	Bags	\$ 20	\$ 920
19	Hauling of Mud and Cuttings from On site Mud Pits**	1	Truck Load	\$ 3,100	\$ 3,100
20	Backfill mud pits***	1	Sites	\$ 2,000	\$ 2,000
Site #5 (6 inch well to 1,670 Ft)					
21A	Time to abandon Well #1	20	HR	\$ 400	\$ 8,000
21B	Materials to Abandon Well #1	117	Bags	\$ 20	\$ 2,340
22	Hauling of Mud and Cuttings from On site Mud Pits**	1	Truck Load	\$ 3,100	\$ 3,100
23	Backfill mud pits***	1	Sites	\$ 2,000	\$ 2,000
24	Rig Hourly Rate				
	A. Operating Rate	0	HR	\$ 400	\$ -
	B. Standby Rate	0	HR	\$ 325	\$ -
TOTAL BID					
					\$ 213,400

Payment Terms are NET 30 days. Applicable taxes will be added to all invoices and are not included herein.

*Stewart Brothers has no information on the water availability or location of water source. Water hauling rate will be charged anytime water truck is going to, loading, or return from Company provided water source.

** Hauling of mud and cuttings from Superior (or other location) to Phoenix valley will be subcontracted. Costs will include total subcontracted costs plus 15%. The amount shown is an estimate only based on mileage and full truckloads (5,000 gallons) to disposal facility. Depending upon actual locations, disposal locations & site conditions, actual costs may vary.

*** Backfilling of mud pits will be accomplished by placed native material, presumably bermed onsite, into the pits. No compaction standards apply.

It is assumed that displaced water will be the concern of the Owner or Engineer. If these wells are permitted through the ADWR, permitting shall be the Owner's responsibility & may require abandonment according to ADWR Rules. Use of cement is not planned herein.