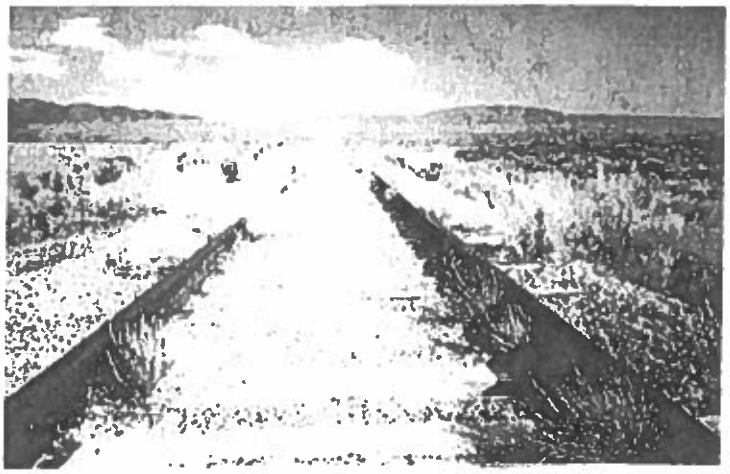
Nevada Northern Railroad Project
Engineering Study and Cost Estimate



A Report To The

City of Ely, Nevada

Submitted By

R.L. Banks & Associates, Inc.

Transportation Economists and Engineers

1717 K Street, NW
Washington, DC and Tiburon, CA

July 15, 2002

Nevada Northern Railroad Project

Engineering Study and Cost Estimate

Table of Contents

Nevada Northern Railroad Project

Engineering Study and Cost Estimate

Table of Contents
(concluded)

Tables

Appendices

Engineering Study and Cost Estimate

Introduction

This report constitutes the Engineering Study and Cost Estimate portion of the Nevada Northern Railroad Project Environmental and Engineering Studies, performed by R.L. Banks & Associates, Inc., (RLBA) for the City of Ely.

A. Survey Track/Current Status

REQUIREMENT

Survey track from McGill Junction to Shafter on a mile by mile basis and identify the current status of track including weight of the rail, condition of the roadbed, and condition of track in relation to potential use including the cars and the product in the cars (both fluid and solid).

FINDINGS

General

In coordination with Karen Rajala and following melting of snow cover, RLBA arranged to visit the site March 25-29, 2002. The track was inspected on a mile by mile basis on March 26, 27 and 28 by Jim Winger and Ken Withers, P.E., RLBA, assisted by Steve Leith, who operated the hi-rail vehicle provided by the Nevada Northern Railway Historical Operating Museum. Lance Hunt of the Nevada Northern Railway Historical Operating Museum made the arrangements for the hi-rail vehicle. Steve Goins of David Evans and Associates, Inc., performing the Environmental Review portion of this study, joined Winger, Withers and Leith for the May 28 portion of the inspection.

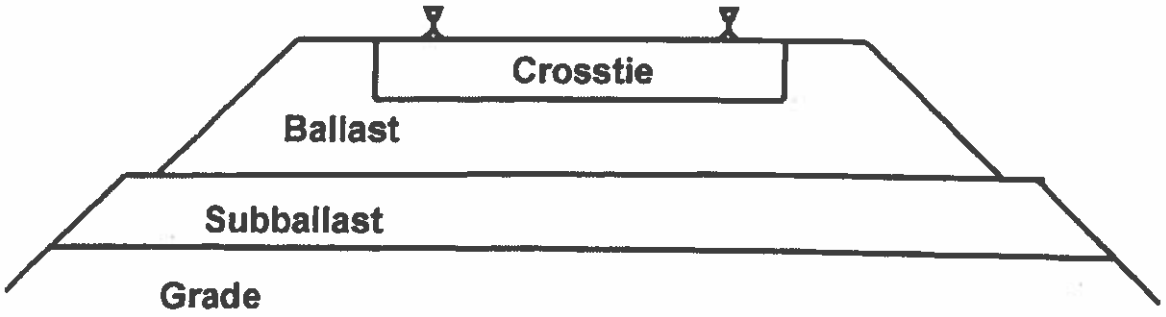
Throughout this study, the potential use of this track is assumed to be delivery of coal to a prospective power plant located on the railroad, perhaps at milepost (MP) 84.5, and movement of inbound crude oil to and outbound finished petroleum products from a facility being considered at Cherry Creek, MP 91.3. Anticipated traffic is assumed to be carried in 263,000 pound railcars; however, track rehabilitated as prescribed in this report will safely carry 286,000 pound railcars also.

The inventory of the railroad line between Shafter, MP18.5, and McGill Junction, MP128.4, included the following:

- weight of rail
- condition of rail
- size and condition of joint bars, bolts and tie plates
- tie condition and spacing
- presence or absence of spikes and other track components
- ballast and roadbed condition including presence of vegetation

- drainage features and their adequacy

The track system of a railroad consists of a combination of components which functions as a system to safely, efficiently and economically provide the basis for a transportation service. The components of the track system are interdependent upon each other, and the failure of any can adversely affect the performance of the system.



Typical Section Track Structure

The subballast and grade act as a foundation for the railroad track system. Sometimes railroads are constructed without subballast; this appears to have been the case with the Nevada Northern Railroad, and the generally dry climate of its location tends to allow this. Culverts, ditches and grading of the roadbed divert water from this foundation. In addition to its load-transferring function, ballast acts as a filter, allowing surface water to pass through it, onto the subballast, into the ditches and away from the roadbed. Crossties support the rail and transfer the load to the ballast. Together, rail and crossties support the loads of the locomotives and cars and transfer these loads, via the ballast, to the subballast and grade. To function properly, all components must perform their intended purpose. Being interdependent, if one fails, the entire system is adversely affected. The presence of water within this track system is generally quite detrimental to it; hence the emphasis on drainage through the ballast, and on the design and maintenance of other drainage components of the track system, such as subballast and grade gradients, and drainage structures such as culverts. Moisture has an adverse effect on the railroad structure, if allowed to saturate the ballast, subballast and grade.

Inspection Results

The Nevada Northern Railroad, constructed almost 100 years ago, is in reasonably good condition for its age. However, the line shows signs of neglect with regard to maintenance of the track system.

Photos taken during the March 26-28 inspection are in Appendix A.

The almost 110 miles of line inspected is exposed to varying conditions, as is evidenced by the type and amount of vegetation in the track and on the adjacent right-of-way. This vegetation tends to hold water in the track structure and along the right-of-way. In fact, there are places where this rail line displays problems caused by water.

In general, the track structure between MP18.5 (Shafter) and MP82.8 is in fair condition and would require minimum rehabilitation work to comply with Federal Railroad Administration (FRA) Class 1 Track standards.[1] The territory south of MP82.8 is in poor condition, and will require more corrective action to attain the level of FRA standards desired.

Overall, the entire rail line is presently out of service in that locomotives and rail cars cannot use it safely. (As one example, there are 13 locations where joint bars are broken or the bolts are missing.)

The deficiencies of the northern portion of this railroad are generally less than those of the southern portion. For example, the percent defective ties between MP18.5 and MP74 is less than that between MP74 and MP128.4. Between MP18.5 and MP74, the trackbed is intermittently covered with a light concentration of sage grass and salt brush which appears not to be significantly detrimental to the track structure. South of MP 74, vegetation on the trackbed, in particular on the ballast, tends to be thicker.

There are few ditches on the northern portion of the railroad, but since there is little surface water present, the need for ditches is marginal. On the southern portion, lakes and streams existed at the time of the inspection.

The right of way south of MP74 displays numerous locations where water either has been or existed at the time of the inspection, on one side or both sides of the track. Between MP74 and MP79 there are several lakes adjacent to the railroad where the water level was, at time of the inspection, between 3' and 6' below the top of the crossties. Similar conditions exist between MP80 and MP97, and MP98 and MP107. In the vicinity of MP123 there is a lake on the west side of the track and flat, cracked, baked and parched flatlands on the east side, indicating that water adjacent to the track has existed within 2' to 4' below the top of the ties. Further south of MP123 there is a free flowing stream, eight to ten feet wide and approximately 25' from the centerline, on the west side of the track. At this location, the stream has eroded the bank on the west side of the right of way for a distance of ¼ mile, leaving a sharply-sloping embankment beginning about 2 to 3 feet from the shoulder of the track and including an abrupt drop-off 6 to 8 feet deep. This is a very unstable section of trackage, and requires repair so that there is a minimum of 12 feet of shoulder measured from track centerline.

It is apparent that there has been little effort to maintain or improve the right of way on the railroad in recent times. The trackbed is in fair to poor condition. On the northern

[1] In general, FRA Class 1 track is that track which can safely carry freight trains at a maximum speed of 10 miles per hour (mph) (See Title 49Code of Federal Regulations (CFR) Section 213.9)

portion of the railroad, subballast and/or grade consists of a sandy, granular material with a yellow/red clay consistency. It is hard, baked and impervious to moisture; however, since there is little moisture in this segment, it appears that this material is adequate to handle the loads imposed upon it as there is little evidence that the roadbed has failed due to train loads.

In the vicinity of MP122, there is a cut (Steptoe Cut) approximately 300 feet long and 25 to 20 feet high; erosion has filled the track structure shoulder, allowing mud and silt to contaminate the ballast and subballast. A track plow and grader should be operated in this area to establish a new track section.

Between MP126 and MP128, vegetation has taken over the track roadbed to the extent that one cannot see the rail and ties. On the east side of the track, there is an 8' roadway running parallel to the track, and there are spots where a grader has been operated, creating a dike about 2 feet high which would entrap water on the track structure roadbed.

Ballast in this northern segment consists of a mixture of mine waste with gradations including ½" to ¾" stones. Due to its size gradation, the ballast is firmly packed under the crossties and prohibits any filtration of moisture through it to the subballast or grade. However, because of lack of moisture, the ballast performs satisfactorily anyway, and the line and surface of the track has held up remarkably well.

In the southern segment, the ballast, in particular between MP82.8 and 128.4, is mostly a mixture of pulverized rock and mud. This contaminated material should be removed using a track plow[2], and replaced with a 1 to 3 inch gradation stone ballast similar to that dumped in other locations on the track structure. This ballast material, of local origin, appears to have the hardness and other characteristics of a ballast which in this environment is sufficient to provide vertical support and acceptable drainage.

Crossties on the drier northern portion, between MP 18.5 and MP 74, are in good to fair condition, averaging 14.6 percent defective ties per mile. The majority are 6"x8"x8'6" size and creosote-coal tar treated. Average tie spacing is 19 inches center-to-center, which equates to approximately 3335 ties per mile. This is more ties than are required to support anticipated loadings. The inspection showed an average of 487 defective ties per mile, which requires only a modest number of crosstie replacements for compliance with FRA Class 1, 2, and 3 track standards.

Crossties in the segment between MP74 and MP128.4 are also 6"x8"x8'6" treated ties. Most have been incised and at a number of locations show that the ties were treated in 1970, indicating a crosstie renewal at that time. Defective ties average 22.2 percent, a greater percentage than in the northern section, but still not bad considering the age and lack of maintenance performed on the right of way. This defect rate equates to an average of 740 defective tires per mile. A modest number of tie replacements are required to meet FRA Track Class standards.

[2] A plow-shaped device, pulled under the track by a locomotive, which removes fouled ballast by spreading it to the sides of the track.

Main track rail between Shafter and McGill Junction consists of 1.0 mile of 85 pound rail[3] (at Shafter, MP18.5-MP19.5), 2.7 miles of 90 pound rail (MP63.6-MP66.3), and 60 pound rail (the remainder). The ages of these rail sections vary from 1906 for the 60 pound, 1954 for the 85 pound, and 1951 for the 90 pound rail. All of the rail is in good condition; head wear is negligible. Head height wear and base erosion is minimal. There is little rail end batter (at the joints). The 60 pound and 85 pound rail sections would be adequate for FRA Class 1 Track operations at 10 miles per hour (mph) but due to impact and flexure restrictions they would not comply with FRA Class 2 and 3 Track standards. (115 pound rail would meet and suffice for all FRA standards classifications for the anticipated future traffic.)

Other track materials (OTM) includes tie plates, angle bars, bolts, spikes and rail anchors. Tie plates are single shoulder 6"x8¾", most of which are in fair to poor condition. They are satisfactory for use with existing rail, but when rail sections are upgraded, the tie plates should be replaced with double shoulder plates designed for the section of rail being used.

Angle bars (also called joint bars) are 4 hole, head free bars adapted for use with ¾" x 4" bolts and circular lock washers. The bars will be satisfactory for use with existing rail but will require renewal if the rail section (size) is changed.

Spikes vary; those used on the original rail are 9/16" x 5" and those used on subsequent tie replacement are 5/8" x 6". A portion could be salvaged for reuse.

Most of the rail anchors (also called anti-creepers) are drive-on type, averaging 6 anti-creepers per 39' rail length, and are in good to fair condition.

Existing OTM will be satisfactory if the existing rail remains in use. If replacement rail is installed, it would be advisable to use new or good second-hand bars, bolts, plates, and spikes.

Currently there is no connecting switch between the Nevada Northern Railroad and the Union Pacific Railroad (UP) interchange track at Shafter.

There are 24 corrugated metal pipe (CMP) culverts, one concrete pipe culvert, and seven concrete box culverts between MP18.5 and MP128.4. The CMP culverts vary in diameter from 6" to 72" and are in acceptable condition except for the culverts at MP64.7, 64.8, 80.7, and 98.7, all of which should be replaced. Four of the concrete box culverts are considered marginal, as there is some deterioration. Location and condition of all culverts is shown in Table 1.

There are 30 road crossings between Shafter (MP18.5) and McGill Junction (MP128.4). 26 are ranch crossings constructed of dirt, and four are asphalt-construction crossings. All should be renewed. The asphalt surface crossings should be replaced with tee rails on both sides of the running rails, used as spacers, and asphalt between the running rails and on the approaches. Ranch crossing

[3] Rail weight designations are normally stated in pounds per yard of rail.

replacements should have timbers placed adjacent to the inside and outside of the running rails with ballast between the running rails and on the approaches. See Table 2 for a listing of all road crossings.

There are twelve sidings between MP18.5 and MP128.4. See Table 3. The switches are 60 pound Number 9 Turnouts, with 15' switch points, hard center manganese frogs and 12' guard condition. These sidings are in fair condition. Dependent upon the proposed future siding configuration, the materials could be used, as is (with some rehabilitation), until rail replacements occur. The existing sidings could be used in FRA Class 1 Track territory, but should be replaced with heavier rail for FRA Class 2 and 3 Track operation.

Summary

The above discussion shows that trackbed stability is better on the northern portion of this railroad, where there is less moisture. On the southern portion, surface water was evident in numerous locations at the time of the inspection, vegetation is more or less thick on the trackbed, and more crossties are defective (in comparison with the northern portion). In particular, it is clear that between MP82.8 and MP128.4 fouled ballast and other indications show that a complete new lift of ballast and restoration of the track structure and drainage cross-section are required. To the north of MP 82.8, the railroad requires a lesser degree of rehabilitation.

Table 1
Page 1 of 2

Culverts

Corrugated Metal Pipe

MP	Diameter (Inches)	Length (Feet)	Remarks	Status
56.3	72	25	Double barrel	Serviceable
58.9		24	Elliptical: 38" high x 52" wide	Serviceable
64.7		25	Elliptical: 22" high x 36" wide	Replace
64.7	30	26		Serviceable
64.8	30	32	Deteriorating	Replace with larger
71.3	24	36	Remove large rock	Serviceable
71.4	24	22		Serviceable
72.2	30	24		Serviceable
73.2	42	28		Serviceable
75.2	30	24		Serviceable
80.7	36	18		Replace
83.7	42	26		Serviceable
83.8	42	26		Serviceable
85.7	24	28	Double barrel	Serviceable
98.2	24	24		Serviceable
98.7	6	30		Replace
109.8	24	26		Serviceable
112.1	24	24		Serviceable
112.4	30	24		Serviceable
113.0	24	24		Serviceable
113.3	30	24		Serviceable
113.9	24	24		Serviceable
120.2	18	40	Under siding also	Serviceable
121.0	24	24		Serviceable

Concrete Pipe

123.4	36	38	Double barrel	Serviceable

Table 1
Page 2 of 2

Culverts

Concrete Box

MP	Dimensions (height" x width")	Length (Feet)	Remarks	Status
58.0	62x124	20	Built 1916	Serviceable
64.1	36x96	20		Marginal
77.7	36x96	20		Serviceable
77.8	30x124	24		Serviceable
83.0	36x96	18	Sidewalls deteriorating	Marginal
83.3	40x96	24	Inside deteriorating	Marginal
114.4	36x144	24	16" wide center post	Marginal

Source: RLBA inspection.

Table 2

Road Crossings

Milepost	Type	Crossing Length in Feet	Ballast Length in Feet	Replace Asphalt or Timber/ Place name
30.8	Dirt	12	12	
34.3	Dirt	12	12	
40.4	Dirt	12	12	
40.7	Dirt	12	12	
48.8	Dirt	12	12	
52.5	Dirt	12	12	
58.4	Dirt	12	12	
60.7	Dirt	12	12	
62.2	Dirt	12	12	
64.1	Dirt	20	20	
63.6	Asphalt	30		30/Currie
65.7	Dirt	12	12	
80.9	Dirt	12	12	
81.3	Dirt	12	12	
82.0	Dirt	16	16	
87.1	Dirt	12	12	
91.2	Asphalt	24		24/Cherry Creek
94.4	Dirt	12	12	
96.3	Asphalt	24		24/Shellburne
106.7	Dirt	12	12	
108.0	Dirt/Asphalt	20		20/Warm Spring
110.7	Dirt	12	12	
113.5	Dirt	12	12	
117.1	Dirt	12	12	
118.6	Dirt	12	12	
120.5	Dirt	12	12	
121.1	Dirt	12	12	
123.0	Dirt	16		16/Bassett Road
127.6	Dirt	12	12	
128.0	Dirt	16		16/McGill Jct
Totals		430 Linear feet	300 Linear feet	130 Linear feet

Source: RLBA inspection.

Table 3

Sidings

Location (Milepost)	Length (feet), Rail Weight, Rail Condition	Remarks
Shafter MP19	3690+3690, 60 pound, Fair	
Decoy MP31	1200, 60 pound, Fair	
Dolly Varden MP40.5	250, 60 pound, Fair	
Mizpah MP 52.9	400, 60 pound, Fair	
Currie MP 63.2	2110, 60 pound, Fair	
Goshute MP71.0	1700, 60 pound, Fair	
Greens MP80.4	1056, 60 pound, Fair	
Cherry Creek MP91.4	2640+500, 60 pound, Fair	
Raiff MP100.0	2200, 60 pound, Fair	
Warm Springs MP 107.8	400, 60 pound, Poor	
Glenn MP120.2	2210, 60 pound, Poor	
McGill Jct. MP 127.4	1584, 60 pound, Poor	50% of material is missing
Total – Existing Rail	23,630 track feet	

Source: RLBA inspection.

NOTE: The use of sidings is dependent upon the operating plan; therefore no rehabilitation is deemed appropriate until the operating plan is determined.

B. Engineering Specifications and Ratings

REQUIREMENT

Provide engineering specifications and ratings for design and materials of standards to be met for the track to qualify for Federal Railroad Administration (FRA) Class 1, 2 and 3 Track operations.

FINDINGS

General

Appendices B and C contain the specifications, respectively, recommended for upgrade of the Nevada Northern Railroad to FRA Class 1 and 3 Track.[4] Following is a summary. In general, the specifications cited herein are taken from the American Railway Engineering and Maintenance-of-Way Association (AREMA) *Manual for Railway Engineering 2002*, and from the Federal Railroad Administration (FRA) Track Standards, as published in the Code of Federal Regulations (CFR) Title 49 Transportation, Part 213 Track Safety Standards (49CFR213).

Rail

In the case of rehabilitation to Track Class 1, existing rail shall remain in place. In the case of rehabilitation to Track Class 3, 115 pound secondhand rail is recommended, emplaced as continuous welded rail (CWR), in accordance with pertinent AREMA *Manual for Railway Engineering 2002* specifications regarding secondhand rail, chemical composition, mechanical properties, branding and stamping requirements, ultrasonic testing, fabrication of CWR, transporting and unloading CWR, and laying CWR.

Crossties and Switch Ties

Defective ties are to be replaced. Treated timber railroad crossties shall be used and shall conform to specifications in AREMA *Manual for Railway Engineering* Chapter 30, Part 3, Section 3.1 (hereafter designated AREMA 30-3-3.1) and the Railway Tie Association Specifications for Timber Crossties, Items 1.1 to 1.1.5.10. Switch ties shall conform to AREMA 30-3-3.2.

Ballast

Ballast is a selected crushed and graded aggregate material providing stability and support to the crossties, and allowing for drainage of water, and placed in accord with AREMA 1-2-2.1.

In the section of the Nevada Northern Railroad between MP82.8 and MP 128.4, new ballast shall be emplaced to a minimum depth of 12 inches in accord with AREMA 1-

[4] The reason there is no separate specification for Class 2 is provided later in this report.

2-2.1.1.5.2.1; new ballast shoulder width and side slope shall be in accord with AREMA 1-2-2.1.1.5.2.2 and 1-2-2.1.1.5.2.3.

Ballast gradation size number 3, also called AREMA No. 3 (see AREMA 2.4.4) is recommended. This same gradation is recommended for any other new ballast added in the line and surface work between MP18.5 and MP82.8.

It appears that local ballast has been used on this railroad from the time it was constructed, and local ballast is recommended for the Class 1 and 3 upgrades.

Other Track Material

With regard to the Class 3 rehabilitation, other track material (OTM: tie plates, joints bars, track bolts and nuts, spring washers, track spikes and rail anchors) shall comply with pertinent specifications in AREMA Chapters 4 and 5. With regard to the rehabilitation to FRA Class 1 Track, existing OTM may be utilized. Replacement OTM should comply with pertinent AREMA standards.

Highway-Railway Crossings and Farm Crossings

All highway-railway and farm crossings shall comply with State of Nevada and pertinent County requirements, and to the extent that they do not conflict, with requirements stated in Appendices B and C.

Track Structure Cross Section/Drainage

Track structure cross section shall be restored, and drainage provided, in accordance with AREMA 1-2-2.1.

Ballast will be removed and replaced with one-foot depth new ballast between MP82.8 and MP128.4.

Track structure between MP18.5 and MP82.8 shall be lined and surfaced, adding two to four inches of ballast.

Switches (Turnouts)

One switch must be installed, to join the Nevada Northern Railroad with Union Pacific at MP18.5. In the case of the Class 3 rehabilitation, this shall be a 115 pound number 10 turnout. In the case of the Class 1 rehabilitation, this shall be an 85 pound number 9 turnout.

Track Construction, Maintenance, Line and Surface

In the case of the FRA Class 3 Track rehabilitation, the rehabilitation work shall comply with the Appendix C specifications, cited AREMA specifications, and the FRA

Class 3 Track standards as published in the Code of Federal Regulations (CFR) Title 49 Transportation Part 213 (49CFR213) for Class 3 Track. In the case of the FRA Class 1 Track rehabilitation, the rehabilitation work shall comply with Appendix B specifications, cited AREMA specifications, and FRA Class 1 Track standards as published in 49CFR213 for Class 1 Track.

C. Analysis of Rehabilitation Required and Estimated Costs

REQUIREMENT

Mile by mile, from McGill Junction to Shafter, provide a detailed analysis of the renovation required for the roadbed and track and estimated costs broken down by materials, use of equipment and labor to restore track to full Track Class 1 operational status, Track Class 2 status, and Track Class 3 status.

FINDINGS

The Federal Railroad Administration (FRA) has established a classification system for track conditions based upon the strength of the track structure (roadbed, ballast, crossties, fasteners and rail), the track geometry (cross-level, gage and alignment) and the maintenance and inspection schedule for the track. Maximum FRA speed for freight trains on the various levels of track contemplated in this study are shown in the following table:

FRA Track Class	Maximum Freight Train Speed (mph)
1	10
2	25
3	40

The rehabilitation cost estimate is the cost to upgrade the track from its present condition to the desired track class.

Required Rehabilitation

General

Overall subballast and grade will require minor rehabilitation.

Ballast on the segment between MP18.5 and MP82.8 will safely accommodate unit coal trains with minor improvements including addition of two to four inches of new ballast and out of face lining and surfacing. The ballast on the segment between MP82.8 and MP128.4 has been fouled by mud. A track plow should be employed over this territory to remove all existing ballast, and new ballast must be added to restore the roadbed. This entire segment should be surfaced and lined out of face. (The term "out of face" connotes a continuous rehabilitation operation performed over an entire section of track, as opposed to "spot" rehabilitation work, which focuses on individual locations.) Also a road grader or Jordan spreader should be run over the entire line in order to establish a new shoulder and drainage cross section, including a

6' gradual sloping berm to allow for better track drainage. This operation will at the same time eliminate (temporarily) the vegetation growth.

Crosstie renewals are required for FRA Class 1 Track railroad operations, and also to meet FRA Class 2 and 3 Track standards.

The rail is 60 pound and, if the railroad is to be used for frequent and heavy haul for a major industrial operation, such as hauling coal to a large electrical generating plant, the rail should be replaced with 100 pound rail or heavier. 115 pound rail is an appropriate section and is readily available both new and second hand.

Sidings on the line are all 60 pound rail and in fair to good condition. They are adequate for locations where FRA Class 1 Track standards are being used. The sidings are not included in the cost estimates, inasmuch as their use depends upon the operational plan, but if found to be advantageous, could remain and be utilized under FRA Class 1 Track standards.

OTM is in fair to poor condition and can be used in FRA Class 1 Track territory but must be replaced if the rail section is upgraded to a higher FRA track class.

Road crossings are mostly dirt with a few asphalt-surfaced. All should be rehabilitated using timber and ballast for the farm (ranch) crossings and tee rail and asphalt for the highway crossings.

Culverts are corrugated uncoated pipes and concrete boxes. There are four that should be replaced (see Table 1) but in general they are in good condition.

It is recommended that any plan to use this railroad for frequent and heavy haul for a major industrial operation include upgrade of the track structure to FRA Class 2 or 3.

Rehabilitation to FRA Class 1 Track

The following text describes specific actions required to restore the track structure to full FRA Class 1 Track status.

A switch must be installed at Shafter in order to connect the Nevada Northern Railroad to the UP interchange track, to allow transfer of traffic to and from the latter railroad's main line.

Because of its relatively good condition despite its age, the existing 60 pound rail may remain in use under FRA Class 1 Track standards. This would result in a 10 mph railroad. This degree of rehabilitation would not, however, be economical or efficient with respect to any plan to support coal-hauling rail service to a large electrical power plant over a long period of time.

The subballast and grade act as a foundation for the railroad track system. Above the subballast, ballast, ties and track complete the rail structure system. The railroad

between Shafter and McGill Junction may be divided into two regimes, based upon observed condition of the subballast and grade, including drainage.

The northern segment, between MP18.5 and MP82.8, is in fair condition relative to drainage, subballast and grade. Here there are few signs of ground and surface water problems. Rehabilitation will consist of replacing defective crossties, a light ballast dump (two to four inches), an out of face line and surface operation, and assurance of drainage.

In the southern segment, between MP82.8 and MP128.4, railroad and track conditions worsen and moisture problems are more prevalent. Ballast is muddy and fouled, the right of the way is ragged, and vegetation covers most of the track, due to moisture. It is recommended that these conditions be corrected by running a special track plow over the southern segment. The plow consists of a wedge shaped sled which is inserted under the ties and rail and pulled by a locomotive. This action removes the ballast (all of which is considered fouled), spreading it to the sides. After the track is thus "skeletonized", defective ties are replaced, ties are spaced, new ballast is dumped, and the track is lined and surfaced. In the process, vegetation is mechanically removed and a drainage cross section is cut, permitting better water run-off (away from the track structure).

In the northern segment, MP18.5-MP82.8, use of the track plow to remove fouled ballast is not deemed necessary. Rather, some ballast should be added, and the track should be lined and surfaced. As in the case of the southern segment, vegetation should be mechanically removed and the drainage cross section cut by a grader or Jordan spreader (maintenance of way equipment designed to be pulled or pushed by a locomotive, with pneumatic or hydraulic-operated "wings" which may be utilized to spread ballast, cut a ditch template, etc.).

In both segments, all road crossings require rehabilitation (Table 2) and four culverts require replacement (Table 1). Considering the nature of many of the ranch crossings—unpaved crossings with little traffic—minimum rehabilitation is recommended: installation of ballast, as indicated in column four of Table 2. Other crossings, with either asphalt paved roads or evidence of appreciable traffic, require complete replacement with asphalt or timber crossing structures as shown in the fifth column of Table 2. The road crossing improvements apply equally to FRA Class 1 and 3 Track rehabilitations.

In summary, restoration of the Nevada Northern Railroad between Shafter (MP18.5) and McGill Junction (MP128.4) to Class 1 standards requires the following actions, all in accordance with specifications provided in Section B. Engineering Specifications and Ratings:

1. Install connecting switch between Nevada Northern Railroad and UP interchange track at Shafter (85 pound, number 9 turnout).
2. Replace 7,500 main track defective crossties.
3. Line and surface MP18.5-MP82.8, adding two to four inches ballast.

4. Use track plow or undercutter to remove fouled ballast between MP82.8 and MP128.4; replace with one foot depth new ballast. Install to appropriate trackbed cross section, and line and surface. At MP123, restore and stabilize, to prevent further erosion, approximately one-quarter mile of bank between trackbed and stream.
5. Replace the four culverts listed as "replace" on Table 1.
6. Reconstruct all road crossings shown in Table 2.

The estimated cost of rehabilitation to achieve FRA Class 1 Track standards (Appendix B) is $1.87 million (see Table 4).

Renovation to FRA Class 2 and 3 Track

This section describes actions necessary to attain Track Classes 2 and 3, assuming no prior renovation to FRA Class 1 Track.

The principal differences in the FRA track safety standards, between Class 2 and Class 3, lie in track surface limits, which have to do with the degree to which the track surface changes direction, horizontally or vertically. To put it simply, a slow-moving train can tolerate greater track surface changes than can a faster-moving train, given equal weights. FRA track safety standards with regard to gage (distance between rails), number of nondefective crossties per unit distance, and minimum number of spikes per rail per tie, are the same for Classes 2 and 3. The track surface limits are in part a function of stability of the overall track structure, where ballast plays an important role. Inasmuch as the minimum depth of new ballast deemed feasible to install in the ballast replacement operation recommended for the 45.6 miles of track structure between MP82.8 and 128.4 is a nominal one foot, this will provide the essential track stability required for Class

Table 4
Rehabilitation Cost Estimate
FRA Class 1 Track Standards

This rehabilitation effort assumes 10 mph maximum speed operation of the railroad between Shafter to McGill Junction, and no rehabilitative effort on sidings pending development of an operating plan. This level of rehabilitation is not deemed economical or efficient for a long-term heavy rail haul operation, such as transport of coal to a large power plant.

1. Install connecting switch with UP plus interchange track at Shafter (MP18.5): One 85 pound, number 9 turnout.

Material	$ 4,680
Labor	3,078
Equipment	3,721
Total	11,479

2. Replace 7,500 defective main track crossties and 5 sets of switch ties, MP18.5-MP128.4.

Material	$ 166,500
Labor	153,832
Equipment	52,500
Total	372,832

3. Line and surface, add ballast, MP18.5-MP82.8 (64.3 track miles).

Material	$ 228,254
Labor	68,435
Equipment	218,300
Total	514,990

4. Track plow, install new ballast, restore track structure, MP82.8-MP128.4, (45.6 track miles).

Material	$ 615,600
Labor	54,464
Equipment	104,038
Total	774,102

5. Restore road crossings (See Table 2).

Material	$ 20,150
Labor	3,256
Equipment	170
Total	23,576

6. Rehabilitate culverts.

Material	$ 2,360
Labor	1,302
Equipment	300
Total	3,962
Subtotal	$1,700,942

7. Contingency (10 percent). $ 170,094

Total Rehab Cost, FRA Class 1 Track $1,871,036

Source: RLBA estimates.

2 as well as Class 3 track. (The remainder of the line, MP18.5-MP82.8, is deemed stable today, given relatively modest rehabilitation.)

It is deemed appropriate, for both Class 2 and Class 3, to replace 60, 85 and 90 pound rail with 115 pound continuous welded rail (CWR) to allow the speeds (25 mph and 40 mph, respectively) associated with those classes. Furthermore, the installation of CWR is deemed preferable to bolted 115 pound rail because the former will reduce long-term track maintenance costs.

The replacement 115 pound rail may be relay (used, secondhand) rail, and CWR (as opposed to bolted rail) is recommended so as to reduce the incidence of derailments and the level of track maintenance required. Costs are based upon use of relay rail, emplaced as CWR.

A feature of this alternative is that the 60, 85 and 90 pound rail and OTM taken up may be sold as scrap, somewhat offsetting the cost.

The estimated cost of the Track Class 2 and 3 alternative is $20,089,794. This is a stand-alone cost, exclusive of the Track Class 1 alternative; that is, this alternative assumes starting with the current track and rehabilitating it all the way to Track Class 2 and 3.

In summary, restoration of the Nevada Northern Railroad between Shafter (MP18.5) and McGill Junction (MP128.4) to Class 2 and 3 standards requires the following actions, all in accordance with specifications provided in Section C. Engineering Specifications and Ratings:

1. Install connecting switch between Nevada Northern Railroad and UP interchange track at Shafter (115 pound number 10 turnout). This requires one complete switch.
2. Replace 19,800 main track defective crossties.
3. Line and surface MP18.5-MP82.8, adding two to four inches ballast, and providing for drainage as necessary.
4. Use track plow or undercutter to remove all ballast between MP82.8 and MP128.4; replace with one foot depth new ballast. Install to appropriate trackbed cross section, and line and surface. At MP123, restore and stabilize, to prevent further erosion, approximately one-quarter mile of bank between trackbed and stream.
5. Replace the four culverts listed as "replace" on Table 1.
6. Reconstruct all road crossings shown in Table 2.
7. Lay 109.9 miles of 115 pound CWR complete with all track components. This operation must be appropriately coordinated with items number 3 and 4 above, and item 8 below.
8. Remove and salvage all 60 pound rail and OTM from main line.

The estimated cost of rehabilitation to achieve FRA Class 2 and 3 Track standards, accounting for the salvage value of 60 pound rail and OTM, is $20.1 million. See Table 5.

As indicated in Table 5, an option in this alternative is that 115 pound rail may be laid only as far as expected heavy traffic is anticipated, that is, between MP18.5 and MP91.3 (proposed oil transload station). It is understood that this would include both the proposed power plant and the proposed oil transload facility. This option would reduce the cost of this alternative to $14.0 million.

D. Sources of Materials, Equipment and Contractors

REQUIREMENT

Provide recommendations for sources of materials, equipment, and contractors for the restoration required.

FINDINGS

General

It is recommended that upgrade of the Nevada Northern Railroad be performed by a contractor experienced in railroad construction. There are a number of these, and they operate all over the country.

It is recommend that a competitive bidding process be used in order to accomplish the line restoration to the required standards at a reasonable cost. The prospective bidders should be given copies of this report, in addition to the detailed specifications, so that they may more fully understand the basis for their bids.

The City of Ely should engage a competent professional experienced in railroad construction to administer this contract and to insure that the contractor performs the work in accordance with the contract specifications. It would be appropriate that this individual assist the City in preparation of the final bid package, and be a member of the selection committee.

A bid package should be prepared, and it should include either Appendix B or C, depending upon the rehabilitative effort desired.

The intent to award a contract for the upgrade of this railroad should be advertised so as to reach a number of competent and experienced railroad construction contractors.

Table 5 (Page 1 of 2)
Rehabilitation Cost Estimate
FRA Class 2 and 3 Track Standards

This table is based on the assumption that the current railroad will be improved so that it may be operated at a maximum freight train speed of 25 mph (Class 2) or 40 mph (Class 3) between Shafter (MP18.5) and McGill Junction (MP128.4). As explained elsewhere, the minimum rehabilitation deemed required elevates the FRA Track Class to 3. This table assumes no rehabilitation of sidings, pending development of an operating plan.

1. Shafter (MP18.5) connecting switch (with UP): 115 pound number 10 turnout.

Material	$ 24,936
Labor	4,736
Equipment	5,400
Total	35,072

2. Replace defective crossties on main track, MP18.5-MP128.4, 19,800 crossties

Material	$396,000
Labor	234,432
Equipment	40,000
Total	670,432

3. Line and surface/ballast MP18.5-MP82.8 (64.3 track miles).

Material	$170,294
Labor	90,576
Equipment	195,400
Total	456,270

4. Track plow/undercutter MP82.8-MP128.4 (45.6 track miles)

Material	$615,600
Labor	54,464
Equipment	104,038
Total	774,102

5. Road Crossings

Material	$ 20,150
Labor	3,256
Equipment	170
Total	23,576

6. Culverts

Material	$ 2,360
Labor	1,302
Equipment	300
Total	$ 3,962

Table 5 (Page 2 of 2)
Rehabilitation Cost Estimate
FRA Class 2 and 3 Track Standards

7. Lay 115 pound CWR on main line, 109.9 miles (MP18.5-MP128.4)	
Material	$11,854,737
Labor	4,756,217
Equipment	765,931
Total	17,376,885
Subtotal	$19,340,300
8. Contingency (ten percent)	$ 1,934,030
Total Rehab Cost – FRA Class 2	$21,274,330
Less Salvage 60 pound Rail, Switches and OTM	($1,184,536)
Net Rehab Cost – FRA Class 2	$20,089,794

Option: Install 115 pound rail only where needed to service potential power plant and oil transload facility, that is, between MP18.5 and MP91.3 (72.3 miles). Cost of 72.3 miles of 115 pound rail is $11,500,338. There is less salvage 60 pound rail, the contingency is reduced, and total net rehabilitation cost is $14,025,105.

All costs are stated in year 2002 dollars. This estimate will require escalation to relative dollar values at year in which construction is to occur.

Source: RLBA estimates.

Sources of Materials

Virtually all materials, especially in the case of Class 3 Track rehabilitation (Appendix C), with the exception of ballast, must be imported by the contractor from outside White Pine and Elko Counties. The contractor will find sources of ballast within White Pine and Elko Counties, may do this with the assistance of subcontractors, and must obtain permission of Bureau of Land Management (BLM) to use the sources of ballast, if sources are located on land administered by BLM. In the case of the Class 1 Track rehabilitation, where existing rail and other track components are to remain in place, the imported materials would be mostly crossties.

The following firms may be interested in supplying ballast:

Cooper and Sons (Mr. Shane Cooper)
P.O. Box 151683
Ely, Nevada
Phone (775) 289-2669

Doniker Crushing Company
51 McGill Highway
Ely, Nevada 89301
Phone (775) 289-3511

J&M Trucking & Red-E-Mix (Mr. Willy Locke)
800 Avenue O
Ely, Nevada 89301
Phone (775) 289-4355

JDL Construction (Mr. Jim Assuras)
P.O. Box 1240
McGill, Nevada 89318
Phone (775) 235-7678

Contractors

There are numerous contractors qualified to rehabilitate the railroad. If the Class 3 rehabilitation is performed, it is not only very strongly recommended but quite necessary that a competent railroad construction contractor, experienced in the fabrication and laying of continuous welded rail (CWR), perform the work. The City should consider prequalification of contractors, requesting in the "first round" descriptions of similar work and references.

A list of contractors appears at Appendix D. This list contains those contractors appearing under two categories--"Continuous Rail Welding" and "Southwest" United States railroad construction contractors--in the National Railroad Construction and Maintenance Association, Inc., issue of *Railway Track and Structures* (April 2002).

The National Railroad Construction and Maintenance Association, Inc., represents a number of railroad construction and maintenance contractors, and upon request will send out to its members a mass e-mail bulletin describing a bid opportunity. Following is the address, phone and website of that organization:

National Railroad Construction and Maintenance Association, Inc.
Chambers, Conlon and Hartwell
122 C Street, N.W., Suite 850
Washington, DC 20001
Attention: Jo Bauguess
Phone: (202) 638-7790 or (800) 883-1557
Website: www.nrcma.org

Bid Package

The bid package should include the appropriate appendix (B or C) of this report, depending on the degree of rehabilitation desired, plus the remainder of this report so that bidder gets a more complete understanding of the project. The bid package should also require that:

(1) the bid include a total price figure, to accomplish the entire job in accordance with the specifications,
(2) a work schedule be included, to show start and finish dates for all major job components,
(3) breakdown price components be provided, in accordance with specification requirements, and
(4) at least three references who can describe Contractor's work on similar projects.

Selection Procedure

The advertising and selection of a contractor presumably must conform with pertinent City, County and State rules and laws, and with additional requirements accompanying any federal funding. If not at variance with these rules, laws and requirements, it is recommended that:

(1) contractors be prequalified, so that only competent contractors with proven experience in the type of railroad rehabilitation work to be performed be allowed to submit bids, and
(2) award of the contract be made to the low-price responsive and qualified bidder.

By "responsive" is meant that the bidder responded adequately to all requirements in the invitation for bids. By "qualified" is meant that the bidder has a successful record of performance of similar railroad work. The Class 3 rehabilitation in particular is is specialized work, requiring specialized equipment and special skills. The Class 1 rehabilitation is less so.

E. Major Rehabilitations Required

REQUIREMENT

Provide engineering and ratings of major renovations required from McGill Junction to Shafter to meet full Class 1 and 2 operational status.

The purpose of this subtask is to determine specifically what priority items need to be done first.

FINDINGS

The determination of what priority renovations should be performed depends upon availability of funding, upon the phase-in schedule of railroad use, and upon the traffic envisioned on the railroad and on what schedule(s) that traffic will move.

For example, construction and operation of a coal-fueled power plant adjacent to the railroad would suggest the need for Class 3 rehabilitation in time for coal deliveries to the plant. Less heavy and less frequent traffic perhaps could be accommodated by a Class 1 rehabilitation. (These issues are discussed in the November 2, 2001, RLBA report to the City of Ely, "Feasibility Study/Business Plan".)

Depending upon availability of funding and planned use of the railroad, one or more of the following options may be appropriate:

(1) Immediate rehabilitation of the entire railroad (MP18.5-MP128.4) to FRA Class 3 Track Standards (Appendix C).

(2) Immediate rehabilitation of the entire railroad to FRA Class 1 Track Standards (Appendix B).

(3) Partial rehabilitation of railroad, as required by number, frequency, weight and destination of train movements:

    (a) Initially to Class 1 standards, and later to Class 3.
    (b) Initially to Class 3 standards.

For example, if a coal-fueled power plant were to be constructed at MP84.5, then Option (3)(a) might be employed, rehabilitating track only between MP18.5 and MP84.5. If a transload facility were later constructed at MP91.3, then rehabilitation could be extended to accommodate rail service to that facility.

A virtue of Option (3) is that it would reduce construction cost, especially so since the removal and replacement of ballast, shown in Appendices B and C between MP82.8 and MP128.4, would be reduced considerably. (It is emphasized that any future use of the railroad at MP123 requires restoration of ¼ mile of eroded embankment at that point.)

Another issue may be pertinent. Use of local labor and materials clearly favors rehabilitation to Class 1 Track standards (Appendix B), in that the work is less

specialized, exacting and sophisticated and in that crossties are the principal material and specialized ballast removal gear is the principal equipment which require importation from outside White Pine and Elko Counties. Rehabilitation to Class 3 track standards (Appendix C) clearly requires the bringing in, to White Pine and Elko counties, an outside contractor which is expert at fabrication, transportation and laying of continuous welded rail.

RLBA recommends that railroad rehabilitation be performed in accordance with expected usage. For example, if the power plant plan does not materialize, and if there is no other similar high-volume, heavy-rail-car railroad customer, it does not seem reasonable to invest the relatively high capital cost inherent in Class 3 Track (Appendix B). By the same token, if the requirement to carry heavy railcars and high volume traffic does not exist south of MP84.5, then it may not be economical to upgrade the track between MP84.5 and MP128.4 to FRA Class 3.

Thus RLBA's recommendation is that priority and time-phasing of the work (if not performed in one contract) should be given to a scope of work which accommodates the anticipated traffic.

Inspection Photos

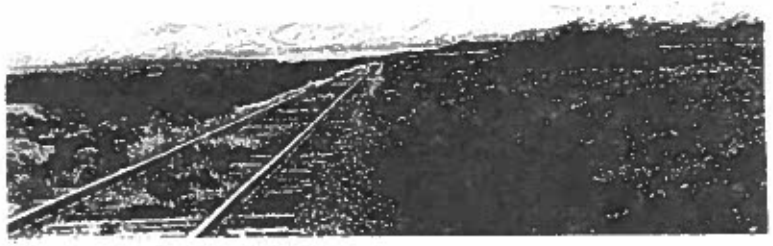
MP 31 DECOY

MP 18.5 SIDING VIEW SOUTH

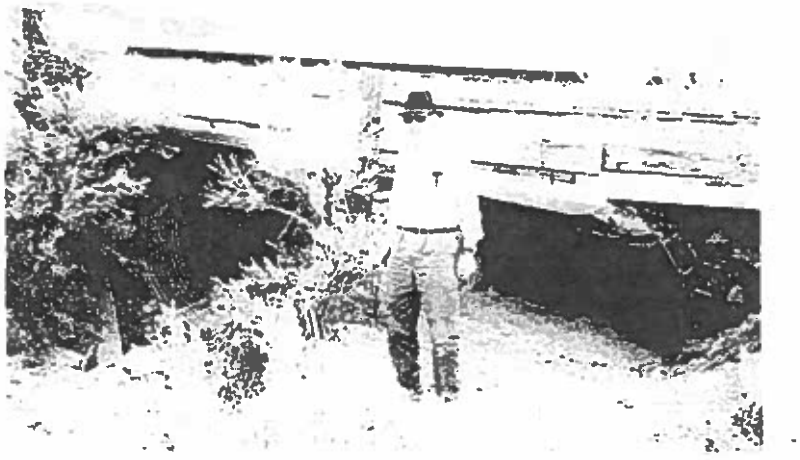
MP 49.6 VIEW SOUTH

MP 49.6 VIEW NORTH

R.L. BANKS & ASSOCIATES, INC.



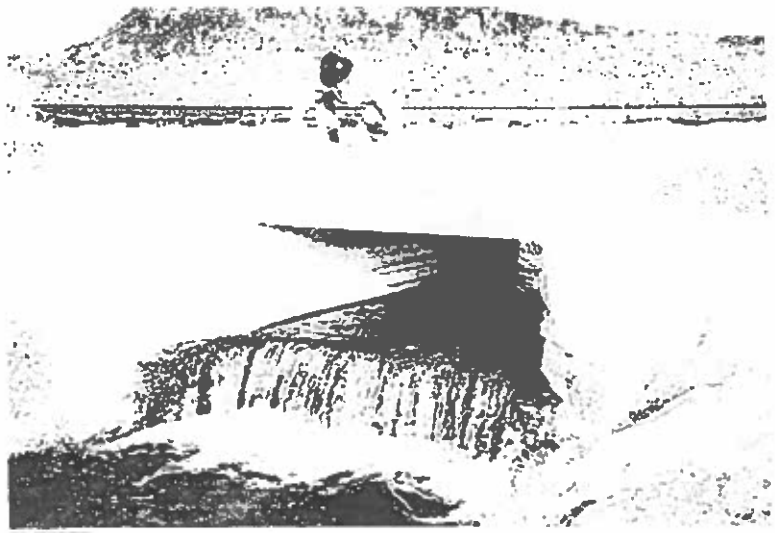
MP 50 VIEW SOUTH



MP 56.3 CULVERT

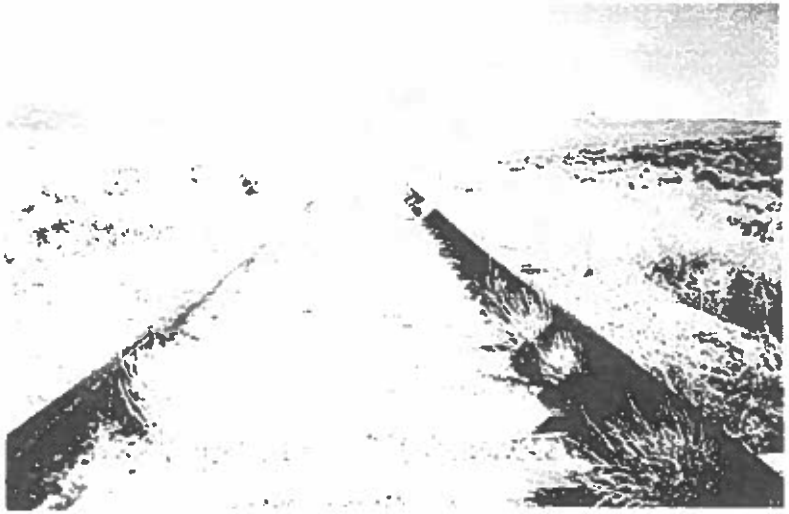
MP 58 CULVERT

MP 59.9 CULVERT

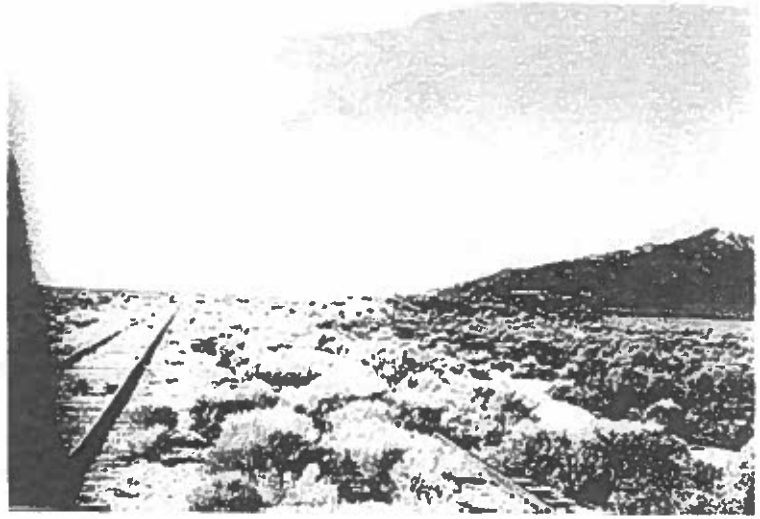


MP 64.3 CULVERT

MP 65.7 CURRIE VIEW NORTH



MP 65.7 VIEW SOUTH



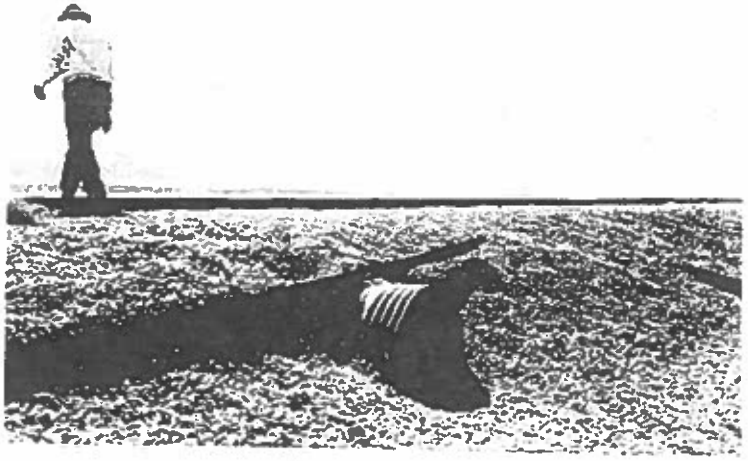
MP 67 VIEW SOUTH COAL TIPPLE

MP 67.5 CURVE

MP 73.2 CULVERT

MP 75.2 CULVERT

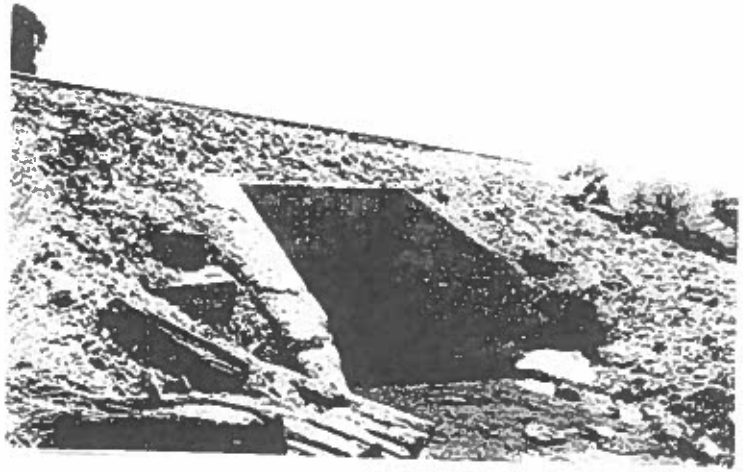
MP 75.6 GOSHUTE DRY LAKE



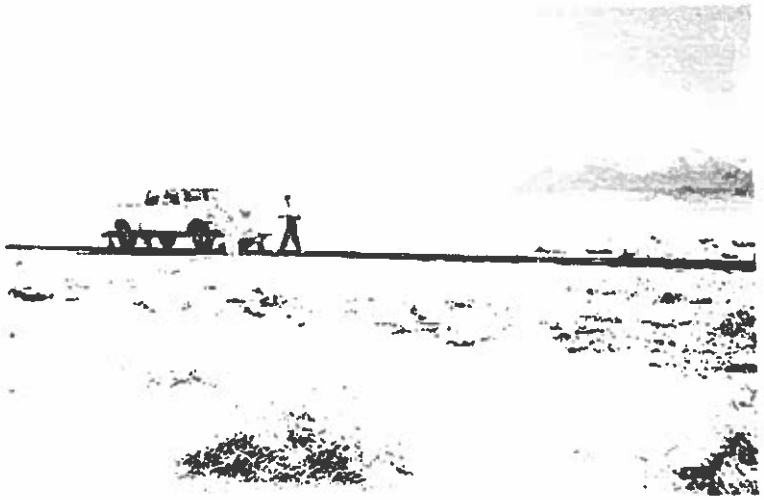
MP 76 CULVERT

MP 77.8 CULVERT

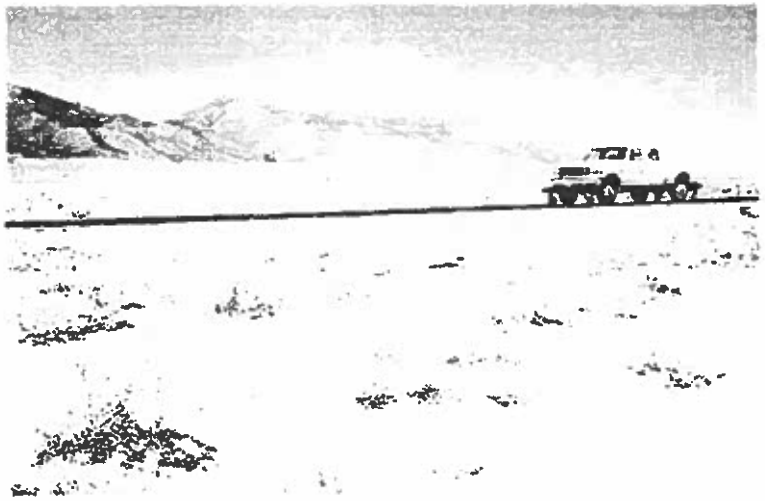
MP 82.9 CULVERT



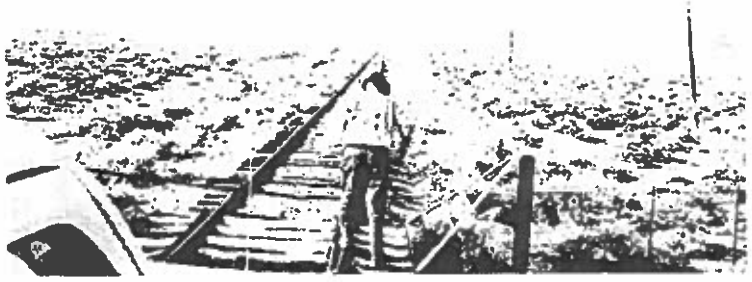
MP 83.3 CULVERT



MP 84.5 VIEW NORTHEAST



MP 84.5 VIEW NORTHWEST

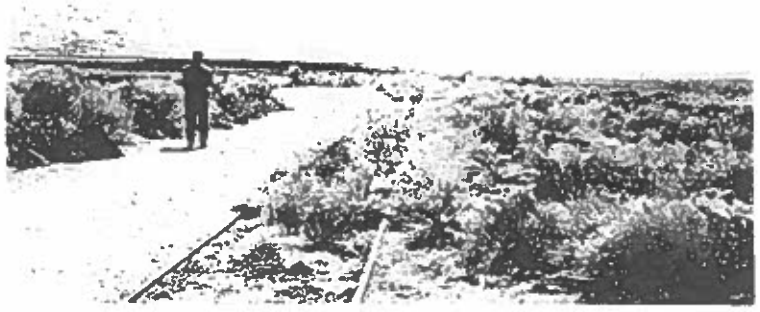


MP 111 VIEW SOUTH

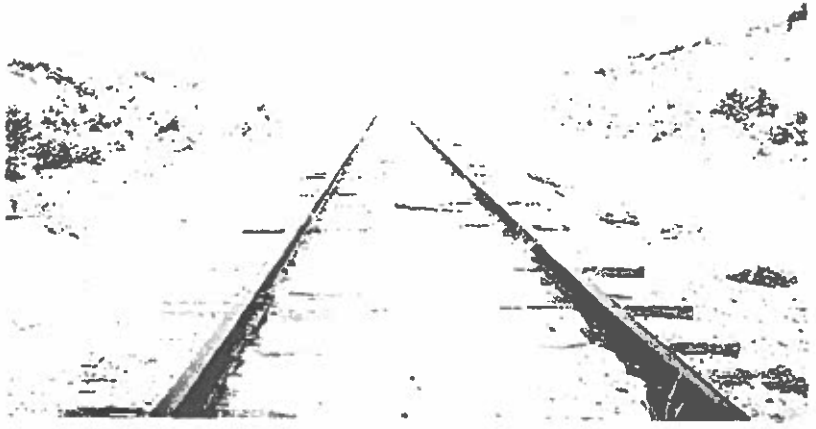
MP 114 CULVERT

MP 115 STREAM

MP 121.2 CUT

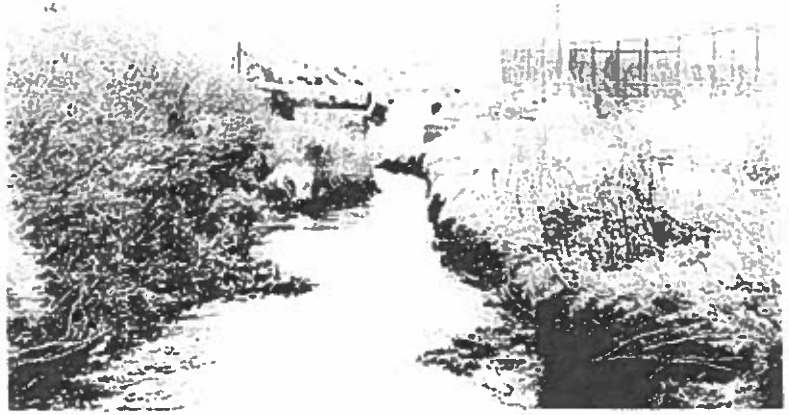


MP 121.7 BASSETT ROAD



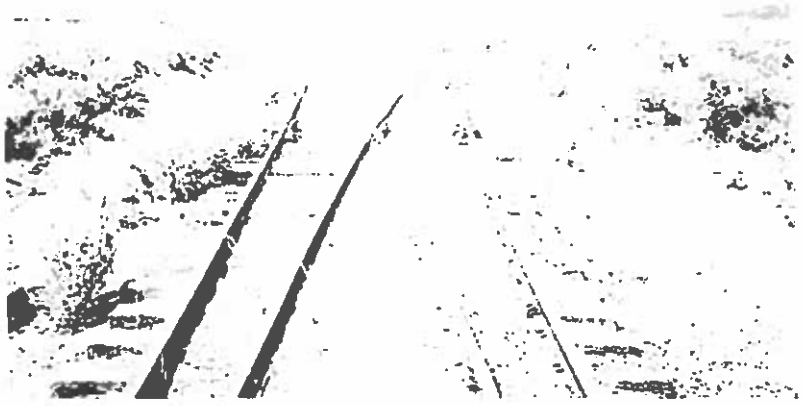
MP 121.7 VIEW NORTH

MP 121.7 VIEW SOUTH



MP 123.1 CREEK

MP 123.5 CULVERT



MP 128.371 McGILL JUNCTION - VIEW NORTH

APPENDIX B

SPECIFICATIONS TO UPGRADE NEVADA NORTHERN RAILROAD TO FEDERAL RAILROAD ADMINISTRATION (FRA) CLASS 1 TRACK STANDARDS

The contractor shall be responsible for upgrading the Nevada Northern Railroad between milepost (MP) 18.5 and MP128.4 in conformance with these specifications, cited AREMA specifications, and in accord with Federal Railroad Administration (FRA) Class 1 Track Standards. The contractor shall accomplish the following actions:

(1) Install connecting switch between Nevada Northern Railroad and UP interchange track at Shafter (85 pound, number 9 turnout).
(2) Replace 7,500 main track defective crossties.
(3) Line and surface MP18.5-MP82.8, adding two to four inches new ballast and providing for adequate drainage.
(4) Use track plow or undercutter to remove fouled ballast between MP82.8 and MP128.4; replace with one foot depth new ballast. Install to appropriate trackbed cross section, line and surface, and provide for adequate drainage. At MP123, restore and stabilize, to prevent further erosion, approximately one-quarter mile of bank between trackbed and stream.
(5) Replace all road crossings.
(6) Replace culverts at MP64.7 (the elliptical 22" high x 36" wide culvert), MP64.8 (the 30" diameter culvert), MP80.7 (36" diameter) and MP98.7 (6" diameter).

1. Rail

Existing rail may remain in place. Where replacements are required, rail may be taken from existing sidings.

2. Crosstie and Switch Tie Specifications

Treated timber railroad crossties shall be used and shall conform to specifications in AREMA 30-3-3.1 and the Railway Tie Association Specifications for Timber Crossties, Items 1.1 to 1.1.5.10.

Main track crossties shall be 6 inch Grade Ties, 6"x8"x8'-6", and crossties for sidings and industrial tracks shall be 6"x7"x8'-6" in size.

Treated timber switch ties shall conform to AREMA 30-3-3.2.

Treatment for crossties and switch ties shall be performed using Rueping full cell pressure treatment process per The American Wood-Preserver Association Standard C1-81 Preservative Treatment by Pressure Process.

Ties shall be treated with a 60/40 solution of creosote/coaltar to achieve penetration of preservative as per above specifications and retention of a minimum 7 pounds per cubic foot after treatment.

Installation of crossties may be combined with the plow or under cutter operation, where applicable. Other installations shall be performed using mechanized tie units. The size and configuration of the tie units are to be determined by the contractor. Installation of ties shall be guided by AREMA 30-3-3.1, 3.2, and 3.5. Ties need not be subject to anti-splitting devices except for selective doweling before treatment, as deemed necessary by AREMA specifications.

Switch ties shall be installed in conjunction with switch construction and renewal work units.

Bids for crosstie installations shall include a price per tie installed.

Contractor shall be responsible for all costs of materials, labor and equipment involved in crosstie installations by crosstie work units.

3. Ballast Specifications

Ballast is a selected crushed and graded aggregate material which is placed upon the railroad roadbed for the purpose of providing drainage, stability, flexibility and uniform support for the rails and ties and the distribution of track loading to the subballast and grade.

Some of the various types of ballast are feldspar and quartz, trap rock, quartzite, limestone, dolomite and slag from steel-making operations.

Specifications for ballast in general are covered by AREMA Manual Chapter 1 Part 2. In particular, Tables 1-2-1 and 1-2-2 provide, respectively, the Recommended Limiting Values of Testing for Ballast Material, and Recommended Ballast Gradations.

Physical properties important for evaluation of ballast are resistance to gradation, hardness, specific gravity, unit weight, soundness and particle size.

Resistance gradation is determined in accordance with American Society of Testing Materials (ASTM) Test C131 or C535.

Hardness limits are determined by ASTM Specification C235.

Specific Gravity and Unit Weight are comparative vales used to evaluate the density and weight of the prospective aggregate.

Soundness is determined by ASTM C-88 standard which entails using sodium or magnesium sulfate to judge the soundness of the aggregate subject to weathering action.

Ballast size is determined using ASTM C117 which involves screening of a ballast sample and measuring the amount of washed material passing through pre-establish screens.

Ballast samples can be evaluated based on the above specifications and tests but the ultimate selection of an aggregate to be used is based on availability and cost.

Ballast consisting of graded crushed mine waste material or other hard, sound and graded crushed rock shall be deemed acceptable. Size No. 3 as shown in AREMA Table 1-2-2, page 1-2-13, AREMA *Manual for Railway Engineering 2002*, shall be used.

Bids for ballast for the proposed work shall be on a per ton basis and include the cost of material, transportation, unloading, labor and work trains as the responsibility of the contractor.

4. Other Track Material (OTM)

A number of joint bars must be replaced and/or bolted. The Contractor is responsible to inspect the railroad and make necessary repairs so that all defective joint bars and missing or loose bolts are replaced and tightened in accordance with AREMA standards.

5. Highway-Railway Crossings

All highway-railway and farm crossings must conform to requirements of the State of Nevada and, depending on their locations, of White Pine and Elko Counties, and construction must be coordinated with the State of Nevada and with the appropriate county prior to start of construction. Absent conflicting guidance from these public jurisdictions, the following requirements apply:

At each crossing, place a railroad T-rail on the gage side of the running rails of a crossing and fill in the voids in the center and at the highway approaches. The height of the emplaced T-rail must not exceed that of the running rail. The T-rail must be securely affixed to the crossties, so as to be resistant to displacement by highway traffic and provide a minimum flange way of 1- 7/8" inches.

Asphalt on the field side of the approaches and in the center of the track shall be tamped and rolled level with the top of the running rail.

On the railroad approaches the asphalt shall be placed and tamped to a 1 (vertical): 2 (horizontal) slope to deflect any dragging equipment running on the track.

6. Farm Crossings

As stated under "5. Highway-Railway Crossings", above, all highway-railway and farm crossings must conform to requirements of the State of Nevada and, depending on their locations, of White Pine and Elko Counties, and construction must be coordinated with the State of Nevada and with the appropriate county prior to start of construction.

Absent conflicting guidance from these public jurisdictions, the following requirements apply:

Farm crossings are to be constructed using 8" inch wide treated timber, with a height that when placed on the field side of the rail on the crossties, will be flush with the top of the rail. Said timber shall be spiked down to the crossties using a 12"x3/4" screw drive spikes.

Once the timber is in place, a fine grade of ballast is to be placed on the approaches and in the center of the track.

The Contractor shall coordinate work with farmers and ranchers which use these crossings to eliminate conflict regarding farming or ranching activities.

7. Track Structure Cross Section/Drainage

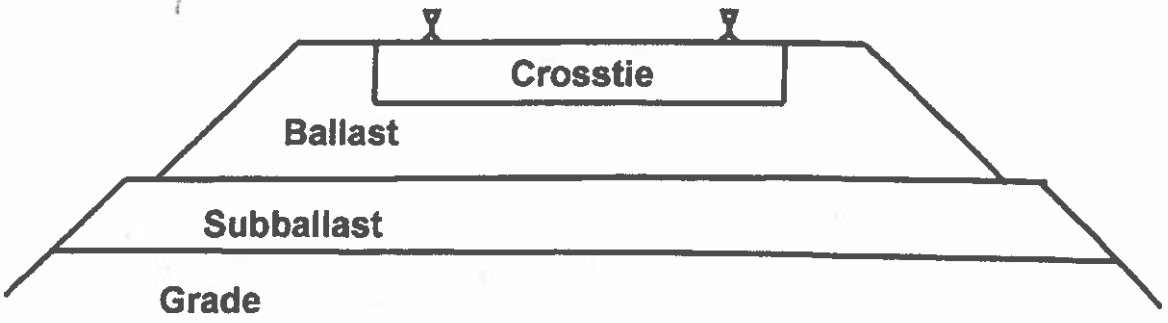
In that segment of the Nevada Northern Railroad between MP82.8 and MP128.4, the Contractor shall remove all ballast, replace it with new ballast, restore the track substructure and provide for drainage ditches in accord with the AREMA *Manual for Railway Engineering 2002*, Chapter 1, Part 2, Section 2.1. Between MP18.5 and MP82.8, Contractor shall emplace two to four inches new ballast, line and surface, and provide adequate drainage.

One of two methods may be used to accomplish removal of all ballast between MP 82.8 and MP128.4. One method is use of a track plow; the other involves use of an undercutter. Either method is acceptable.

The ballast existing in the track structure between MP82.8 and MP128.4 is not re-usable.

Off track equipment such as bulldozer or road grader may be used to shape the track structure cross section. The contractor is to take appropriate measures to divert water away from the track structure, and to provide drainage ditching to

accomplish this purpose. The following diagram shows the typical section of track structure.



Typical Section Track Structure

Bids for this work shall include prices for the following, all of which are required of the Contractor in rehabilitation of this railroad:

Between MP82.8 and MP128.4: Removal of all ballast to a minimum depth of 8 inches, grading and drainage ditches, ballast dumping and line and surface operation, and grading right-of-way to conform to the AREMA Manual for Railway Engineering, Chapter 1, Part 2, Section 2.1.

Between MP18.5 and MP82.8: Emplace two to four inches of ballast, line and surface, and provide adequate drainage.

Between MP82.8 and MP128.4, lining and surfacing will require at least 3 separate lifts dependent upon the type of surfacing unit used, but regardless, both elements of final line and surface must conform to the AREMA Manual for Railway Engineering Chapter 5, Part 3, with regard to Curves, and Part 5 with regard to Track Maintenance.

8. Switches (Turnouts)

One switch shall be installed: to join the Nevada Northern Railroad with the Union Pacific siding at MP18.5. It is estimated that this will require installation of 52 switch ties. Contractor is to coordinate switch installation with Union Pacific Railroad.

Switch ties will be treated mixed hardwood ties according to switch tie specification previously stated.

Ballast to be furnished and applied per ballast specifications previously stated.

All joint bars, bolts, and spikes required shall be according to specifications previously stated.

Turnout work is to include dumping ballast, lining and surfacing.

9. Track Construction, Track Maintenance, Line and Surface

The contractor shall construct, maintain, rehabilitate, and line and surface the Nevada Northern Railroad between MP18.5 and MP128.4 so as to comply with these specifications, cited AREMA specifications, and meet or exceed requirements stated in Federal Railroad Administration (FRA) Track Standards as published in the Code of Federal Regulations (CFR) Title 49 Transportation Part 213 Track Safety Standards (49CFR213) for FRA Class 1 Track. See 49CFR213 Parts 213.51 through 213.63 (Scope, Gage, Curves, Elevation of curved track, and Track Surface).

The contractor shall comply with AREMA Specifications for Track Construction, Track Maintenance and Line and Surface work, found in AREMA 5-3 (Curves), 5-4 (Track Construction), and 5-5 (Track Maintenance).

The contractor is to rehabilitate this railroad, between MP18.5 and MP128.4, so as to result in a completely usable railroad.

Surfacing. The portion of the line between MP18.5 and MP82.8 is to be lined and surfaced out of face. This includes dumping sufficient ballast to make predetermined raise (2" to 4") over an extended segment of the railroad. This work is to be performed using tamping and lining equipment.

The contractor's bid shall include all costs involved to perform the work outlined above, including acquisition of ballast, unloading same, transportation costs, all labor, equipment costs and other related expenses required to perform the work.

10. Culverts

Culvert replacement is to be in accordance with principles in AREMA Chapter 1, Part 4.

11. General Requirements

The Contractor must perform all work so as to comply with these specifications, cited AREMA specifications, and meet or exceed Federal Railroad Administration (FRA) Track Standards for Class 1 Track.

In addition to total price, bids shall include breakdown of prices for the following:

MP82.8-MP128.4 (Replace Ballast)

Plow or undercutter
Cost per track foot _____

Grade and Configure Roadbed,
Cost per track foot _____

Renew Crossties,
Number of crossties_____
Cost per installed tie _____

Emplace New Ballast
Tons_____
Cost per ton in place _____
Surface and Line
Cost per track foot _____

MP 18.5 to MP 82.8

Emplace New Ballast
Cost per ton in place _____
Renew Crossties,
Number of crossties_____
Cost per installed tie _____

Line and Surface Out of Face 64.3 miles
Cost per track-foot _____

Cost per Turnout Installed _____

Contractor's overall bid shall include the complete price to perform a completed rehabilitation job of the Nevada Northern Railroad between MP18.5 (and including the connection with Union Pacific at that location) and MP128.4, resulting in a usable railroad meeting these specifications, cited AREMA specifications, and meeting or exceeding FRA Class 1 Track standards. The effort shall include all work outlined above, including materials, transportation costs, labor, equipment, work trains and other related costs.

Prior to final payment, the Contractor is required to provide a certificate of compliance with specifications with regard to new materials: ties and ballast.

Any work not performed to these specifications will be corrected at the expense of the contractor.

APPENDIX C

SPECIFICATIONS
TO UPGRADE NEVADA NORTHERN RAILROAD
TO FEDERAL RAILROAD ADMINISTRATION (FRA)
CLASS 3 TRACK STANDARDS

The contractor shall be responsible for upgrading the Nevada Northern Railroad between milepost (MP) 18.5 and MP128.4 to Federal Railroad Administration (FRA) Class 3 Track Standards and in conformance with these specifications. The contractor shall accomplish the following actions:

(1) Install connecting switch between Nevada Northern Railroad and UP interchange track at Shafter (115 pound number 10 turnout). This requires one complete switch.
(2) Replace 19,800 main track defective crossties.
(3) Line and surface MP18.5-MP82.8 out of face, adding ballast as required (two to four inches).
(4) Use track plow or undercutter to remove all ballast between MP82.8 and MP128.4; replace with one foot depth new ballast. Install to appropriate trackbed cross section, and line and surface. At MP123, restore and stabilize, to prevent further erosion, approximately one-quarter mile of bank between trackbed and stream.
(5) Reconstruct all road crossings.
(6) Replace culverts at MP64.7 (the elliptical 22" high x 36" wide culvert), MP64.8 (the 30" diameter culvert), MP80.7 (36" diameter) and MP98.7 (6" diameter).
(7) Lay 109.9 miles of 115 pound CWR complete with all track components. This operation must be appropriately coordinated with items number 3 and 4 above, and item 8 below.
(8) Remove and salvage all 60, 85 and 90 pound rail and OTM from main line.

1. Rail

115 pound RE rail will be used to upgrade the line, replacing all existing 60, 85 and 90 pound rail on the main line.

A good quality secondhand rail, suitable for welding to the specifications described herein, will be adequate.

The 115 pound RE rail to be used shall conform to (1) the dimensions shown and described in the American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering 2002 Chapter 4 Part 1 Section 1.1 (hereafter AREMA 4-1-1.1), and Figure 4-1-1, 115 RE Rail Section, (2) the chemical composition described in AREMA 4-2-2.1.3 and Table 4.2.1, Product/Chemical Analysis, (3) the mechanical properties described in AREMA

4-2-2.1.4, (4) the branding and stamping requirements of AREMA 4-2-2.1.6, and (5) ultrasonic testing requirements of AREMA 4-2-2.1.8. With regard to AREMA 4-2-2.1.4, all rail selected for this project shall have a Brinell Hardness of 285 or greater, and during the rolling process shall have been exposed to a Standard Controlled Cooling process and shall have been rolled after 1938.

The 115 pound RE rail to be used on this project must be suitable for fabrication into continuous welded rail (CWR). Specifications for fabrication of CWR must be followed and are found in AREMA 4-2-2.2. Tolerances for inspection of secondhand rail (relay rail) are mandatory and can be found in AREMA 4-2-2.4, including Table 4-2-9, Recommended Rail Grading Classification. In Table 4-2-9, Class II (Branch Lines) is the requirement for this Nevada Northern Railroad project. In no instances may any of these parameters be exceeded. The pertinent portion of Table 4-2-9, for 115 RE rail, is extracted and shown as follows:

Rail Weight	Maximum Rail Wear in Inches		General Rail Use and Rail Condition
	Top	Gage	Branch Lines – Small engine burns and corrugation.
115 RE	5/16"	¾"	

39' rail lengths are preferable if they meet the tolerances for welding per pages 4-2-6.2 and 6.3. If the 39' rails do not comply with these and other specifications, they may be cropped to 36' lengths to meet rail end alignment tolerances. Bolt holes in relay rail shall be cropped off prior to welding. In no case shall rails to be welded be less than 36'.

2. Rail Welding Specifications

The Electric Flash Butt Welding process is acceptable for fabricating CWR. Both fixed and portable plants may be used provided they produce CWR that complies with the following specifications.

Inspection and classification of the secondhand rail to be welded is the first element of the operation. Those 39' rails that satisfy recommended rail grading specifications in AREMA 4-2-2.4 are to be assembled and moved to a storage area for welding. Those with end defects not acceptable for welding will be assembled at a rail cropping station where 18 inches will be cropped off with a friction cropping saw and the resultant 36' weldable rail stored for future welding. Dependent upon the configuration of the rail welding plant, sorting and piling of weldable rail is not mandatory. It is acceptable to move the rail directly from the inspection and classification station to the welder provided that cropping saw is available to crop those rail ends not meeting specifications.

Prior to entering the welding line, the head and base of the rails must be polished with an abrasive grinder to enhance conductivity. After polishing the rail ends the rail is fed along the welding line to a moveable hydraulic/electric platan which clamps and aligns the rails. A vertical crown of 0.125 inches, as measured at the end of a 18-inch straight edge, shall be present at each welded joint and horizontal alignment shall be flush on both the field and gage sides of the joint, using the 18" straight edge as the measurement tool.

Following the alignment, the rail will be preheated using a high amperage current not to exceed 10,000 amps and 10 volts, several cycles of preheat may be used to bring the heat of the rail end to approximately 2000 degrees Fahrenheit (F).

Next, while the rail ends are in a molten state, they are forced together using a 65 ton hydraulic for a period of approximately 10 seconds and each rail end should experience at least 0.50" inches of shortening. The upset cycle may vary according to the ambient temperature and weight of rail.

The platan and electrodes on the welder are next released and removed and a hydraulic shear removes the upset metal from the base, sides and top of the welded joint. This operation must be performed while the upset is still in the 1000 to 1500 degree range.

After the upset is removed, the rail will be moved to a moveable hydraulic straightening station where variance in horizontal alignment is corrected to zero tolerances (the vertical camber, preset in the joint, remains at the weld and gradually levels out as the weld cools).

From the straightening station, the welded rail will be moved to an inspection station where it is inspected for surface and internal defects using a magnetic coil or an ultrasonic unit designed for detecting joint defects. The ultrasonic method is preferable but the magnetic method is acceptable.

Should any surface or internal defects be detected, the weld must be returned to the rail cropping station, where it will be cut out and scrapped, and a new weld made.

After the inspection station each joint will be painted for a distance of 18 inches with a rust preventative compound prior to welding. Used motor oil or other waste oils are acceptable.

The strings of welded rail will next be fed into special rack cars equipped with racks containing roller bearing spacers to permit the CWR to move from the welder and inspection stations into and through the transport train.

Each string of CWR should be at least 1440' in length. Each train should contain 40 strings for a total capacity of approximately 5.5 track miles of CWR

(exceptions may be made to the length of each string and the total capacity of the train, but those recommended are considered minimum).

The contractor shall be responsible for the cost of purchasing and shipping all rail to the welding plant and storage site, including handling, classification, inspection, and all welding costs.

3. Transporting and Unloading CWR

If the welding facility is a fixed plant at a remote location, the loaded CWR train must be moved from the plant to the laying location. Such arrangements will be the responsibility of the contractor including providing the special rack cars, motive power to move the train and all labor associated with transporting and unloading the rail.

Unloading may be performed using a specially designed pusher/puller cars or by pulling the strings of CWR out upon the roadbed using a locomotive and work train. The CWR should be unloaded on the shoulder of the track in order to expedite the removal of the existing rail and allow for the distribution of other track materials (OTM). OTM consists of tie plates, rail anchors, angle bars, bolts and spikes. The contractor shall be responsible for all of the costs related to work trains, pusher/puller cars, rail rack cars, handling, classification, inspection, welding and all equipment and labor associated with these operations.

4. Laying CWR

Prior to unloading and laying the CWR the crossties shall be renewed to comply with Federal Railroad Administration (FRA) Track Standards as published in the Code of Federal Regulations (CFR) Title 49 Transportation Part 213 Track Safety Standards (49CFR213) for FRA Class 3 Track. Also, ballast shall be unloaded to permit a ballast section to the top to the ties and level beyond the tie ends for a distance of 8" to 10" inches. The track shall be lined and surfaced to result in full conformance to FRA Class 3 Track Standards .

CWR shall be laid according to AREMA 5-4-4.1.2.

CWR shall be unloaded and placed with the head up, without dropping and with sufficient support under the base where long spans exist. Unloading may be accomplished using a crane, specially designed pusher/pull rail mounted car or by using a locomotive to drag the CWR to the ground. A pusher/puller car is preferable as it allows greater precision in the placement of the rail onto the roadbed.

Before laying the rail, OTM corresponding to 115 pound CWR must be unloaded along the track in such a fashion as to create a minimum of interference with the removal of the existing rail and existing OTM and the placement of CWR.

Replace all tie plates in accordance with section 7.a of these specifications. Based on 19" inch center to center average tie spacing currently on the Nevada Northern Railroad, the existing tie population is approximately 3335 ties per mile, requiring 6670 tie plates per mile.

Apply rail anchors as specified in section 7.f of these specifications. Box every other tie, resulting in 6670 anchors per mile.

Joint bars and bolts are used to join the strings of CWR until thermit field welds can be made. Joint bars shall conform to section 7.b of these specifications. There are 8 pair of bars and 48 1"x5 1/2" bolts per mile (1/2 keg of bolts per mile). Bolts shall conform to section 7.c of these specifications.

Track spikes shall be 5/8" x6" and conform to section 7.e of these specifications. Based on the majority of the track in this line being tangent alignment, 54.1 kegs of spikes per mile will be required.

Spikes driven either manually or mechanically shall be driven so that there is approximately 1/8 inch space left between the top of the spike and the base of the rail. Rails shall be spiked to true gage of 4'-8 ½" and may not vary 1/8" from the true gage.

When the CWR and OTM are distributed, the laying may begin. The existing rail is to be disjointed and removed from the track. OTM shall be thrown clear of the track surface. Crossties shall be adzed to provide a level, uniform level bearing area for the CWR. Hot oil shall be sprayed onto the adzed area of those ties so cut.

CWR is to be laid one side at a time. The new tie plates are preset on the field side and the CWR moved into them. CWR shall be laid per AREMA 5-5-5.2.

Once the trackbed is completed, ballast will be unloaded. The track bed will be surfaced and lined to within 1 ½" of final grade. The ballasted and surfaced track will then be ready for rail adjustment. The Contractor shall start heating with specially designed rail heaters on one end of a 1,440' string of rail. The opposite end of the 1,440' string will be disconnected and mismatched at the joint. The rail will be heated to 110° Fahrenheit. It will be vibrated and pulled to the opposite end to ensure proper stretch. Immediately behind the rail heater, the rail will be boxed-anchored every tie. The unheated 1,440' rail will be marked in quarters with a mark coming across the base to a tie plate to ensure that the rail is being properly stretched and pulled during the heating process. AREMA Table 5-5-3, page 5-5-12, Continuous Welded Rail Expansion Segment (Inches), applies. The Contractor shall subtract the ambient temperatures of the rail when laid from the desired temperature of 110°F. The difference in degrees can be converted to inches by using Table 5-5-3. The total amount of stretch and rail

removed at the end will be recorded so that each individual rail is properly tensioned. All welds shall be made as soon after the stretching process as possible. No rail will be added after rail is stretched. Rail must be welded before removing slow orders.

Rail anchors shall be applied immediately after the normalized temperature of 70 degrees has been attained.

Rail joints, unless to be thermit welded as the rail is laid, shall be fully bolted and tightened before allowing traffic to pass over the newly laid CWR. Since joints are to be welded later, Contractor shall not drill inside holes, but shall drill and bolt outer two holes only. Before welding, the portion of the rail containing the bolt hole must be cut off.

The strings of welded rail shall be joined together at the ends by 36" angle bars (joint bars) which conform to the weight and profile of the rail being installed. One hole in each end of the rail will be drilled to conform to the outside hold of each end of the 36" angle bar. A bolt shall be installed en each end of the angle bar to hold the two adjoining ends of rail in alignment and to allow welding at a later date.

If traffic is permitted over the line while CWR is installed on one side and joined rails is on the other, a slow order of 10 mph shall be placed on the track until both rails are CWR.

Spiking and anchoring of rail shall be in accordance with section 7 of these specifications.

Old rail and OTM may be picked up and shipped for resale or scrap using cranes with tongs and buckets or with magnets. The contractor must remove all scrap or reusable rail and OTM from the right-of-way as soon as possible after the CWR is laid.

It is the contractor's responsibility to inspect and evaluate the rail and OTM to be released as a result of the CWR laying project and adjust its bid accordingly to account for the salvage value which may be realized.

All costs involved with the CWR laying operation are the responsibility of the contractor. This includes materials, labor and equipment and should be in the bid for this rehabilitation.

5. Crosstie and Switch Tie Specifications

Treated timber railroad crossties shall be used and shall conform to specifications in AREMA 30-3-3.1 and the Railway Tie Association Specifications for Timber Crossties Items 1.1 to 1.1.5.10.

Main track crossties shall be 6 inch Grade Ties, 6"x8"x8'-6", and crossties for sidings and industrial tracks shall be 6"x7"x8'-6" in size.

Treated timber switch ties shall conform to AREMA 30-3-3.2.

Treatment for crossties and switch ties shall be performed using Rueping full cell pressure treatment process per The American Wood-Preserver Association Standard C1-81 Preservative Treatment by Pressure Process.

Ties shall be treated with a 60/40 solution of creosote/coaltar to achieve penetration of preservative as per above specifications and retention of a minimum 7 pounds per cubic foot after treatment.

Installation of crossties may be combined with the plow or under cutter operation, where applicable. Other installations shall be performed using mechanized tie units. The size and configuration of the tie units are to be determined by the contractor. Installation of ties shall be guided by AREMA 30-3-3.1, 3.2, and 3.5. Ties need not be subject to anti-splitting devices except for selective doweling before treatment, as deemed necessary by AREMA specifications.

Switch ties shall be installed in conjunction with switch construction and renewal work units.

Bids for crosstie installations shall include a cost per tie price installed.

Contractor shall be responsible for all costs of materials, labor and equipment involved in crosstie installations by crosstie work units.

6. Ballast Specifications

Ballast is a selected crushed and graded aggregate material which is placed upon the railroad roadbed for the purpose of providing drainage, stability, flexibility and uniform support for the rails and ties and the distribution of track loading to the subballast and grade.

Some of the various types of ballast are feldspar and quartz, trap rock, quartzite, limestone, dolomite and slag from steel-making operations.

Specifications for ballast in general are covered by AREMA Manual Chapter 1 Part 2. In particular, Tables 1-2-1 and 1-2-2 provide, respectively, the Recommended Limiting Values of Testing for Ballast Material, and Recommended Ballast Gradations.

Physical properties important for evaluation of ballast are resistance to gradation, hardness, specific gravity, unit weight, soundness and particle size.

Resistance gradation is determined in accordance with American Society of Testing Materials (ASTM) Test C131 or C535.

Hardness limits are determined by ASTM Specification C235.

Specific Gravity and Unit Weight are comparative vales used to evaluate the density and weight of the prospective aggregate.

Soundness is determined by ASTM C-88 standard which entails using sodium or magnesium sulfate to judge the soundness of the aggregate subject to weathering action.

Ballast size is determined using ASTM C117 which involves screening of a ballast sample and measuring the amount of washed material passing through pre-establish screens.

Ballast samples can be evaluated based on the above specifications and tests but the ultimate selection of an aggregate to be used is based on availability and cost.

Ballast consisting of graded crushed mine waste material or other hard, sound and graded crushed rock shall be deemed acceptable. Size No. 3 as shown in AREMA Table 1-2-2, page 1-2-13, 2002 AREMA Manual for Railway Engineering shall be used.

Bids for ballast for the proposed work shall be on a per ton basis and include the cost of material, transportation, unloading, labor and work trains as the responsibility of the contractor.

7. Other Track Material (OTM)

a. Tie plates: 115 RE Rail (5 ½' base)

Tie plates are to conform to specifications for Tie Plates in the AREMA Manual for Railway Engineering, Chapter 5, Part 1. Plan No. 6 shows the AREMA 12 inch Tie Plate for 5-1/2 inch Rail Base Width (Figure 5-1-4, page 5-1-9).

Tie plates may be new, or good grade secondhand plates conforming to the AREMA specifications.

To be considered acceptable, secondhand plates shall meet the following minimum standards based on Plan No. 6 for 12" double shoulder plates with inclined ends:

(1) Overall length not to vary more than ¼" inch.
(2) Rail base seat width variance less than 1/8" inch.
(3) Shoulder wear less than 1/16" inch.
(4) Spike hole wear: total less than 1/8" inch in either direction.
(5) Thickness at ends: variance less than 1/16" inch.
(6) Flat or ribbed base acceptable: must be separated for laying.
(7) All plates to be 8 hole punched.
(8) Allowable weight loss: 3% per plate.
(9) No bent tie plates are to be used.

Contractor shall be responsible for all costs associated with the inspection, purchase, material, transportation, unloading (at storage site or along the track for laying), labor, work trains and equipment involved.

b. Joint Bars – 115 RE 36" 6 holes

Joint Bars are to conform to specifications for Joint Bars in the AREMA Manual for Railway Engineering, Chapter 4, Part 1, Section 1.2, Figure 1-4-8 (115 RE), Section 1.3 (86"-6 hole bar), and Part 2, Section 2.8.

The above specifications are for new bars. A good quality secondhand joint is acceptable.

Secondhand joint bars must comply with the following minimum standards based on using 36" joints with 6 holes per joint.

(1) Head Contact Wear less than 1/8" inch (under the head of the rail).
(2) Base Contact Wear less than 1/8" inch (along the base of the rail).
(3) Circular Hole wear less than 1/8" inch in diameter of hole.
(4) Weight Loss less than 5%, approx. 1 lb. per bar.

Contractor shall be responsible for all costs in connection with the inspection, purchase, material, transportation, unloading (at storage site or along the track for laying), labor, work trains and equipment involved.

c. Track Bolts and Nuts are to conform to specifications for Track Bolts and Nuts in the AREMA Manual for Railway Engineering, Chapter 4, Part 1, Section 1.4 (1"x6" bolt) and Part 2, Section 2.9. New bolts and nuts shall be used.

d. Spring Washers are to conform to specifications for Spring Washers in the AREMA Manual for Railway Engineering, Chapter 4, Part 2, Section 2.10. New spring washers to fit 1" inch bolts will be used.

e. Track Spikes are to conform to specifications for Track Spikes in the AREMA Manual for Railway Engineering, Chapter 5, Part 2, Sections 2.2 and 2.3. Spikes for rail laying, crosstie and switch toe activities shall be new spikes. Secondhand spikes are not acceptable. Spikes shall be 5/8" x 6" in size and manufactured per cited specifications. Rails shall be spiked to every tie. On tangent track, Contractor shall install two rail-holding spikes per rail, one inside each rail and one outside each rail (total of four spikes per tie). On curves, Contractor shall install three rail holding spikes per rail, two inside each rail and one outside each rail (total of six spikes per tie).

f. Rail Anchors are to conform to specifications for Rail Anchors in the AREMA Manual for Railway Engineering, Chapter 5, Part 7. New rail anchors shall be used. If the anchors are to be applied manually, then drive on type anchors shall be used. If the application is to be performed mechanically, than drive on or spring anchors are acceptable. Contractor shall fully box-anchor all ties (1) on curves over four degrees, and (2) within 200 feet of switches and road crossings.

8. Highway-Railway Crossings

All highway-railway and farm crossings must conform to requirements of the State of Nevada and, depending on their locations, of White Pine and Elko Counties, and construction must be coordinated with the State of Nevada and with the appropriate county prior to start of construction. Absent conflicting guidance from these public jurisdictions, the following requirements apply:

At each crossing, place a railroad T-rail on the gage side of the running rails of a crossing and fill in the voids in the center and at the highway approaches. The height of the emplaced T-rail must not exceed that of the running rail. The T-rail must be securely affixed to the crossties, so as to be resistant to displacement by highway traffic and provide a minimum flange way of 1- 7/8" inches.

Asphalt on the field side of the approaches and in the center of the track shall be tamped and rolled level with the top of the running rail.

On the railroad approaches the asphalt shall be placed and tamped to a 1 vertical: 2 horizontal slope to deflect any dragging equipment running on the track.

9. Farm Crossings

As stated under "8. Highway-Railway Crossings", above, all highway-railway and farm crossings must conform to requirements of the State of Nevada and, depending on their locations, of White Pine and Elko Counties, and construction must be coordinated with the State of Nevada and with the appropriate county prior to start of construction.

Absent conflicting guidance from these public jurisdictions, the following requirements apply:

Farm crossings are to be constructed using 8" inch wide treated timber, with a height that when placed on the field side of the rail on the crossties, will be flush with the top of the rail. (For 115 RE rail the treated timber is 8"x7 ¾".) Said timber shall be spiked down to the crossties using a 12"x3/4" screw drive spikes.

Once the timber is in place, a fine grade of ballast is to be placed on the approaches and in the center of the track.

The Contractor shall coordinate work with farmers and ranchers which use these crossings to eliminate conflict regarding farming or ranching activities.

10. Track Structure Cross Section/Drainage

In that segment of the Nevada Northern Railroad between MP82.8 and MP128.4, the Contractor shall remove all existing ballast, replace it with new ballast one foot in depth, restore the track substructure and provide for drainage ditches in accord with the AREMA Manual for Railway Engineering, Chapter 1, Part 2, Section 2.1. Between MP18.5 and MP82.8, Contractor shall apply 2-4 inches of ballast, line and surface out of face, and provide for appropriate drainage.

One of two methods may be used to accomplish removal of all ballast between MP 82.8 and MP128.4, all of which shall be considered fouled. One method is use of a track plow; the other involves use of an undercutter. Either method is acceptable.

The ballast existing in the track structure between MP82.8 and MP128.4 is not re-usable.

Waste material resulting from operation of the plow or undercutter may be used as subballast material. Off track equipment such as bulldozer or road grader may be used to shape the track structure cross section. The contractor is to assure that all work performed leaves the roadbed section, at the conclusion of the job, so that water diverts away from the track structure. Where water would not be diverted away, the Contractor shall provide drainage ditching to accomplish this purpose. The following diagram shows the typical section of track structure.

Bids for this work shall include prices for the following, all of which are required of the Contractor in rehabilitation of this railroad:

Between MP82.8 and MP128.4: Ballast removal to a minimum depth of 8 inches, roadbed section grading and drainage ditches, ballast dumping and line and surface operation, and grading right-of-way to conform to the AREMA Manual for Railway Engineering, Chapter 1, Part 2, Section 2.1.

Between MP18.5 and MP82.8: Add 2-4 inches of ballast, line and surface out of face, assure appropriate drainage, diverting water away from track structure.

Between MP82.8 and MP128.4, lining and surfacing will require at least 3 separate lifts dependent upon the type of surfacing unit used, but regardless, both elements of final line and surface must conform to the AREMA Manual for Railway Engineering Chapter 5, Part 3, with regard to Curves, and Part 5 with regard to Track Maintenance.

11. Switches (Turnouts)

One switch shall be installed: to join the Nevada Northern Railroad with the Union Pacific siding at MP18.5. (Other switches will be installed as required for future operations.)

This switch shall be installed in accordance with specifications for railroad switches (turnouts) are covered in the AREMA 2002 Portfolio of Trackwork Plans, Plan Number 911-41 (Location of Joints for Turnouts with Straight Split Switches), Plan Number 912-58 (Bills of Switch Ties for Turnouts and Crossovers), Plan Number 112-00 (16'-6" Straight Split Switch with Graduated Risers), Plan Number 613-01 (Number 10 Rail Bound Manganese Steel Frogs), Plan number 251-01 (Switch Stands and Appurtenances) and in accordance with Federal Railroad Administration (FRA) Track Standards as published in the Code of Federal Regulations (CFR) Title 49 Transportation Part 213 Track Safety Standards (49CFR213), specifically, Sections 213.133 Turnouts and Track

Crossings, 213.135 Switches, 213.137 Frogs, and 213.143 Frog Guard Rails and Guard Faces; Gage.

Rail will be secondhand 115 RE.

115 RE switches will have 16'6" straight points with graduated risers.

Frogs will be 115 RE number 10 hard center manganese.

One-piece 115 RE manganese guard rail 9'5" in length will be used.

Switch ties will be treated mixed hardwood ties according to switch tie specification previously stated.

Ballast to be furnished and applied per ballast specifications previously stated.

All joint bars, bolts, and spikes required shall be according to specifications previously stated.

Turnout work is to include dumping ballast, lining and surfacing.

Track Work Involved: One 115 RE number 10 turnout.

Contractor will coordinate switch installation with Union Pacific Railroad.

12. Track Construction, Track Maintenance, Line and Surface

The contractor shall construct, maintain, and line and surface the Nevada Northern Railroad between MP18.5 and MP128.4 so as to comply with these specifications, cited AREMA specifications, and requirements stated in Federal Railroad Administration (FRA) Track Standards as published in the Code of Federal Regulations (CFR) Title 49 Transportation Part 213 Track Safety Standards (49CFR213) for FRA Class 3 Track. See 49CFR213 Parts 213.51 through 213.63 (Scope, Gage, Curves, Elevation of curved track, and Track Surface).

The contractor shall comply with AREMA Specifications for Track Construction, Track Maintenance and Line and Surface work, found in AREMA 5-3 (Curves), 5-4 (Track Construction), and 5-5 (Track Maintenance). With regard to AREMA 5-4 (Track Construction), AREMA 5-4.1.1 (Scope) and AREMA 5-4.1.2 (Appendix I – Where Track Is Constructed with Continuous Welded Rail (CWR) shall apply. With regard to AREMA 5-5 (Track Maintenance), AREMA 5-5.1 (Specifications for Laying Rail), 5-5.2 (Laying and Maintenance of Continuous Welded Rail), 5-5.3 (Temperature Expansion for Laying Rails), 5-5.4 (Rail Anchor Patterns Number of Rail Anchors to Resist Rail Creepage), 5-5.5 (Track Bolt Tension

Practice), 5-5.6 (Gage), 5-5.7 (Tamping) and 5-5.8 (Preservation of Track Fixtures) shall apply.

AREMA 5-5-5.2.7.3 describes Surfacing requirements with regard to Continuous Welded Rail (CWR).

The portion of the line between MP18.5 and MP82.8 is to be lined and surfaced out of face using either the plow or under cutter or a line and surface gang. This entails dumping sufficient ballast to make predetermined raise (2" to 4") over an extended segment of the railroad. This work is to be performed using tamping and lining equipment.

Contractors bid shall include all costs involved to perform the work outlined above, including acquisition of ballast, unloading same, transportation costs, all labor, equipment costs and other related expenses required to perform the work.

13. Culverts

Culvert replacement is to be in accordance with principles in AREMA Chapter 1, Part 4.

14. General Requirements

The Contractor must perform all work so as to comply with these specifications and referenced section of AREMA *Manual for Railway Engineering 2002*. All work must meet or exceed the minimum requirements for Federal Railroad Administration (FRA) Track Standards for Class 3 Track.

In addition to total price, bids shall include breakdown of prices for the following:

MP82.8-MP128.4 (Replace Ballast)

Plow or undercutter
Cost per track foot _____

Grade and Configure Roadbed,
Cost per track foot _____

Renew Crossties,
Number of crossties_____
Cost per installed tie _____

Dump Ballast
Tons_____
Cost per track foot _____
Surface and Line

Cost per track foot _____

MP 18.5 to MP 82.8

Unload Ballast
Cost per ton in place _____
Renew Crossties,
Number of crossties_____
Cost per installed tie _____

Line and Surface Out of Face 64.3 miles
Cost per track-foot _____

Cost per Turnout Installed _____

Contractor's overall bid shall include the complete price to perform a completed rehabilitation of the Nevada Northern Railroad between MP18.5 (and including the connection with Union Pacific at that location) and MP128.4, resulting in a usable railroad meeting these specifications, cited AREMA specifications, and at a minumum the FRA Class 3 Track standards. The effort shall include all work outlined above, including materials, transportation costs, labor, equipment, work trains and other related costs.

At the conclusion of this rehabilitation work and prior to final payment, Contractor is required to provide certification of compliance with specifications with regard to new materials: ties and ballast.

Any work not performed to these specifications will be corrected at the expense of the contractor.

Cost per track foot _____

MP 18.5 to MP 82.8

Unload Ballast
Cost per ton in place _____
Renew Crossties,
Number of crossties _____
Cost per installed tie _____

Line and Surface Out of Face 64.3 miles
Cost per track-foot _____

Cost per Turnout Installed _____

Contractor's overall bid shall include the complete price to perform a complete rehabilitation of the Nevada Northern Railroad between MP18.5 (and includin the connection with Union Pacific at that location) and MP128.4, resulting in usable railroad meeting these specifications, cited AREMA specifications, and a minumum the FRA Class 3 Track standards. The effort shall include all wo outlined above, including materials, transportation costs, labor, equipment, wo trains and other related costs.

At the conclusion of this rehabilitation work and prior to final payment, Contract is required to provide certification of compliance with specifications with regard t new materials: ties and ballast.

Any work not performed to these specifications will be corrected at the expens of the contractor.

APPENDIX D

RAILROAD CONSTRUCTION/CONTINUOUS RAIL WELDING CONTRACTORS

Atlas Railroad Construction Co.
William Stout
724.228.4500

Crafton Railroad Company, Inc.
Dan Crafton
309.798.2050

Delta Railroad Construction, Inc.
Larry Laurello
440.992.2997

G.W. Peoples Contracting Co., Inc.
Jenice McDowell
724.223.7807

Holland Company LP
Gary Bevills
706.672.2300

Industrial Railways Co
Chris Stotka
510.724.1117

Kelly-Hill Company
Greg Wright
816.741.7727

Lone Star Railroad Contractors, Inc.
Paul Newman
972.878.9500

Marta Track Contractors, Inc.
Thomas Stout
724.225.6155

888.638.7679

Mountain States Contracting
Vern Van De Loo
800.827.0743

Queen City Railroad Construction, Inc.
Doug Steier
865.675.8400

Railroad Construction Co. of South Jersey Inc.
James Daloisio
856.423.2220

Railroad Constructors, Inc.
Jamie Daloisio
856.423.9385

Railroad Salvage & Restoration, Inc.
Lee Jackson
417.781.3748

RailWorks Track Systems
Scott Brace
612.469.4907

Sharp & Fellows Inc.
David Swift
310.323.7784

Slattery/Skanska
Scott Silverman
718.553.1800

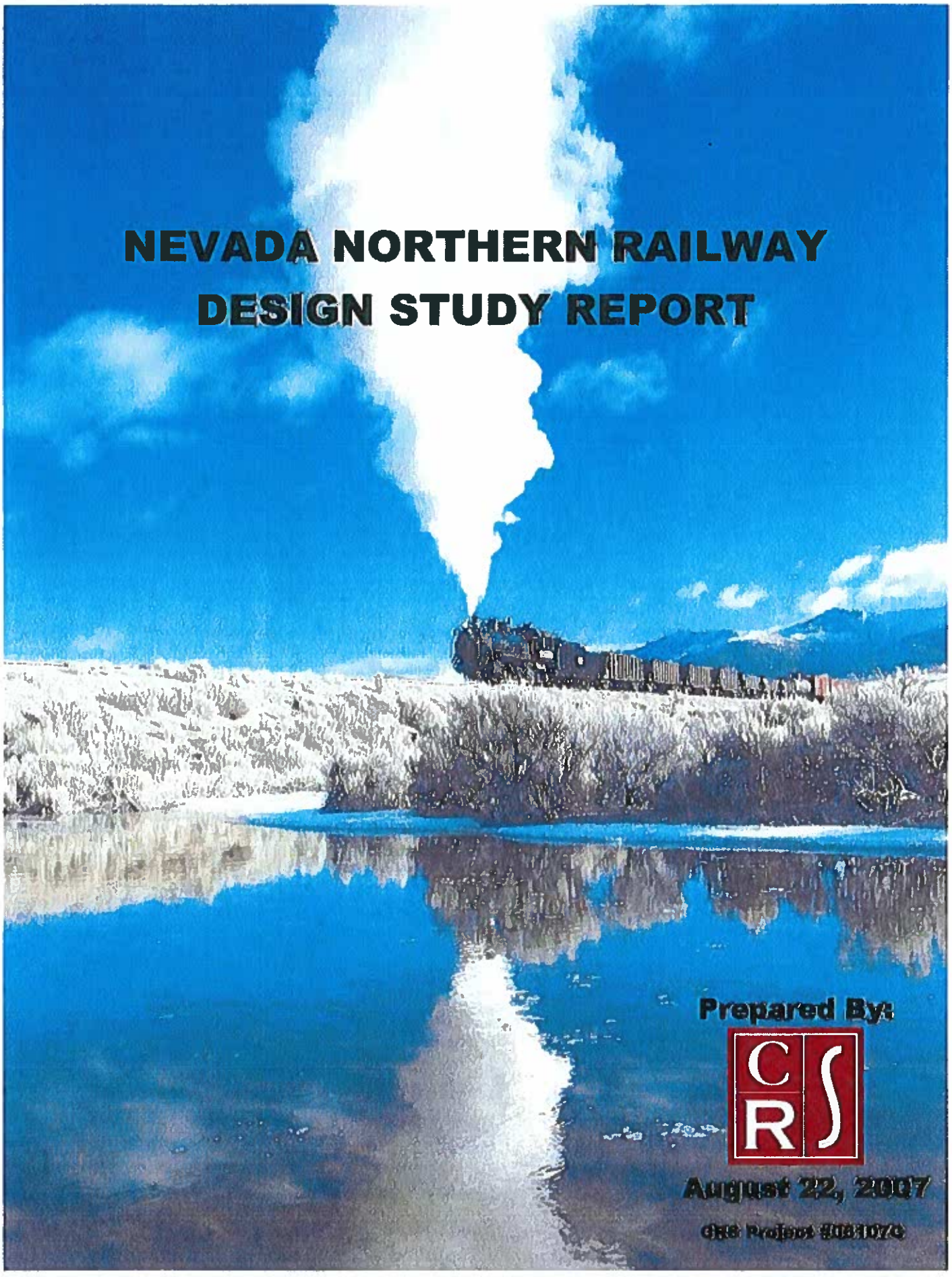
Source: *Railway Track and Structures*, April 2002

Metroplex Corporation, Inc.
Melvin Clark

APPENDIX D:

"NEVADA NORTHERN RAIL DESIGN STUDY REPORT"

Completed by: Caldwell Richards Sorensen, August 22, 2007


NEVADA NORTHERN RAILWAY
DESIGN STUDY REPORT
Prepared By:
C
R
S
August 22, 2007
CRS Project 2061070

NEVADA NORTHERN RAIL DESIGN STUDY REPORT

White Pine Energy Association, L.L.C.

Nevada Power Company

August 22, 2007

Prepared by Caldwell Richards Sorensen
2060 E. 2100 S. Salt Lake City, UT 84109
(801) 359-5565

TABLE OF CONTENTS

APPENDIX

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

This report has been prepared to assess existing conditions and to describe a recommended design approach for the rehabilitation of the Nevada Northern Railway (NNR), a century-old railroad north of Ely, Nevada that is currently unused and has fallen into disrepair. Two power companies, White Pine Energy Associates, L.L.C. (WPEA) and Nevada Power Company (NPC) are each developing coal-fired electric generating stations in White Pine County, Nevada, along the alignment of the NNR, and plan to rehabilitate the track to facilitate delivery of coal. Under the direction of the City of Ely, which owns most of the infrastructure and right-of-way along the NNR, WPEA contracted with CRS in August of 2006 to perform permitting level design services, including the preparation of this report. Through an amended agreement signed in January 2007, NPC became an equal party to the contract.

Field work to assess existing conditions of the NNR from MP 18.5 to 120 was completed in the fall of 2006. Observations included inspections of rail, ties, ballast, and rail bed cross sections on a mile by mile basis. Other items inspected were culverts (where visible), utilities, drainage paths, sidings, and road crossings. In order to document existing conditions of the NNR, photographs and field notes were taken on a mile by mile basis as well as other select locations. In addition to this inspection, survey crews took measurements and shots on the top of rail and the rail bed cross section at one mile intervals. Existing wetlands were located and documented by Frontier Corporation USA, an environmental sub-consultant to CRS, and a geotechnical investigation was performed by GeoCon Consultants.

During field investigations, it was discovered that the weight of the rail on the NNR is considerably lighter than current industry standards permit. The ties ranged widely in condition, from some that were split and broken, clearly unfit for use, to others that had been replaced relatively recently and appeared to be in reasonably sound condition. The ballast materials were generally found to consist of smooth, rounded gravel or cinder material rather than the accepted standard of crushed angular rock. In some areas, native soils filled the ballast section and light to moderate vegetation was found growing between the ties and rails. In general, the rail-bed cross section was found to be in fair condition, but lacking in width and structural material. In some places, the side slopes were undesirably steep. Conversely, there was a section of track that appeared to be at the same elevation as the surrounding topography, and appeared as though native materials had washed over the track during storm events. Many culverts were found along the alignment, and while most were basically functional, they were in various states of disrepair that would not support proposed train loading. Several sidings were encountered during the field reconnaissance work, and all were found to be inadequate by today's railroad standards. The road crossings, both dirt and asphalt, were found to be lacking advance warning devices, signage, and crossing materials.

It was initially intended by WPEA when they contracted with CRS in 2006 that the NNR would be upgraded and rehabilitated in place to meet Federal Railroad Administration (FRA) Class 3 (40 MPH) standards However, with the addition of a second power plant and NPC's operational requirements, it has been determined that a Class 4 (60 MPH) designation better suits the proposed use of the track, which is for an average of three round-trip 150-car units trains per day traveling at speeds of 40-60 mph.

As possible users of the NNR, UPRR stated during preliminary design meetings that they would normally require use of mainline design standards for rehabilitation of the NNR. Based on the potential for UPRR to be users of the NNR, CRS recommends the following minimum design standards:

- Follow the recommendations of the geotechnical engineer regarding subgrade, subballast and ballast materials and placement. These recommendations may include adding to or replacing the subgrade and subballast materials, installing geotextile fabric over the subgrade, full depth rail bed replacement in "soft" spots along the alignment, and a minimum 10"-12" lift of imported ballast underneath the ties.
- Widen the track section by extending the ballast at least 18" beyond the end of the new ties, with a maximum ballast slope of 3:1.
- Full tie replacement with 9-foot wood ties or 8.5-foot concrete ties, whichever is more economical.
- Complete replacement of rail with minimum 136-lb continuous welded rail.
- Install fencing along the right-of-way of the entire alignment to keep cattle and other animals off the rail.
- Full replacement of all culverts along the NNR. If further geotechnical testing reveals that the native soils tend to be corrosive, corrosion-resistant culvert materials should be used.
- Further hydrologic analysis should be made to determine if additional culverts are necessary, especially from MP 93 to 108. The top of rail should be raised a minimum of 24" above the historic high water elevation.
- Public road crossings should be redesigned to comply with applicable NDOT, county and UPRR requirements. Private road crossing should be eliminated where possible. If it is necessary that they remain, they should be upgraded to meet current UPRR specifications.
- Maintenance sidings should be placed every 5-10 miles. Locations of existing sidings are ideal for rehabilitation because the site is already impacted, although full replacement will be necessary.
- A unit train passing siding should be constructed south of the UPRR/Shafter interchange. In addition, four other passing sidings should be constructed along the NNR. The recommended locations for these are near Cherry Creek (MP 91), Curry (MP 63) and one at each power plant location.

INTRODUCTION

PROJECT OVERVIEW

Caldwell Richards Sorensen (CRS) has been retained by White Pine Energy Associates, L.L.C. (WPEA) and Nevada Power Company (NPC) to prepare this Design Study Report regarding the rehabilitation of approximately 100 miles of the Nevada Northern Railway (NNR) near Ely, Nevada. The section of NNR track included in this report, from MP 18.5 to MP 120, is shown in Figure 1. This Design Study Report documents the existing condition of the NNR track and facilities as observed by CRS during inspections held periodically between August 22, 2006 and December 6, 2006. It also describes the general design approach CRS recommends to bring the NNR into compliance with current railroad specifications.

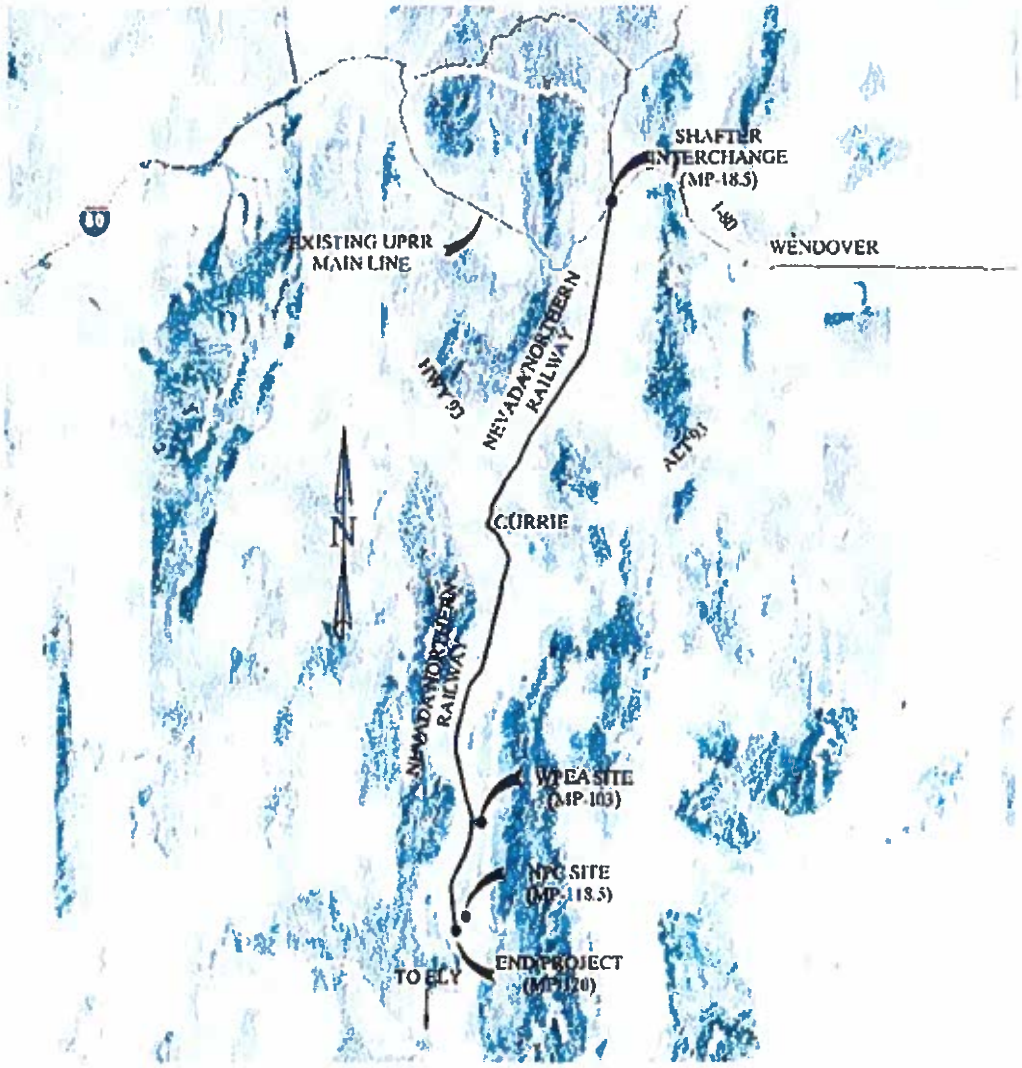


Figure 1 – Location Map

WPEA and NPC are each developing coal-fired electric generating stations to be located approximately 15-30 miles north of Ely in Steptoe Valley, White Pine County, Nevada. WPEA is wholly owned by LS Power Associates, L.P., which is managed by LS Power Development, LLC. NPC is owned by Sierra Pacific Power. WPEA and NPC are currently in the siting and permitting phase of their power plant projects.

Both power plants will be pulverized coal-fired electric generating facilities with maximum nominal electrical outputs of 1,600 MW and 1,500 MW, respectively. Primary fuel for each plant is anticipated to be Powder River Basin coal, which will be delivered using unit trains. Union Pacific Railroad (UPRR) or Burlington Northern Santa Fe Railway (BNSF) will transport the coal from Wyoming to an interchange point with the Nevada Northern Railway (NNR) at Shafter, Nevada. Each power plant will require the delivery of approximately one to two unit trains of coal per day depending on the size of unit trains that UPRR or BNSF can support. The coal will then be transported on the NNR from Shafter, at Milepost (MP) 18.5 to the WPEA and NPC power plants at MP 103 and MP 118.5, respectively. Even though the NPC power plant will be located near MP 118.5, CRS has been asked to provide information about the NNR up to MP 120. In order to efficiently accommodate unit coal trains, the 100 year old NNR infrastructure will require substantial upgrading and rehabilitation to meet current railroad standards.

NEVADA NORTHERN RAILWAY HISTORY

The NNR was constructed in the early 1900s, providing a means to transport copper ore from the Robinson Mining District near Ely, Nevada. The railroad was operated as a common carrier of copper ore. Additionally, the railroad hauled wool from area ranches to market, brought supplies to the area, and provided passenger service. The copper mine was originally closed in 1978 and has operated sporadically since that time. Most recently, BHP Nevada Mining Company transported copper concentrate from the mine in Ruth to the UPRR line at Shafter. The NNR has not been used for the transport of ore or other materials since BHP ceased operations in 1999. Prior to the involvement of WPEA and NPC with the NNR, the railroad infrastructure was owned by the Los Angeles Department of Water and Power (LADWP) while much of the right of way was owned by the United States Department of the Interior, Bureau of Land Management (BLM). Currently, both the railroad infrastructure and much of the right of way are owned by the City of Ely.

PREVIOUS NNR REHABILITATION ENGINEERING STUDIES

Prior to 2005, two engineering studies[1] were conducted that identified the condition of the track at the time and provided general actions necessary to restore the track to Class 1 (10 MPH) status and/or attain Class 2 (20 MPH) or Class 3 (40 MPH) status.

In the summer of 2005, WPEA retained CRS to complete an updated preliminary condition assessment and rehabilitation plan[2] for approximately 115 miles of the NNR to obtain Class 3 status. The 2005 condition assessment and rehabilitation plan was prepared based upon the

[1]- R.L. Banks & Associates, Inc., "Nevada Northern Railroad Project Engineering Study and Cost Estimate", July 15, 2002
- Railroad Industries Incorporated, "Nevada Northern Railroad Track Evaluation", April 19, 2004
[2] -CRS Consulting Engineers, "115 Mile Rehabilitation Study of the NNR / Rehabilitation Plan", August 25, 2005

two engineering studies prior to 2005 in addition to field observations completed in a one day helicopter flight of the project corridor.

EXISTING CONDITIONS

GENERAL APPROACH

The initial field work to assess existing conditions of the NNR was done for WPEA from MP 18.5 to 103. Representatives from CRS, Mountain States Contracting (MSC), and Via Rail Logistics performed field reconnaissance of the NNR via 4-wheelers periodically between August 22, 2006 and October 4, 2006. Attendees included Darren Eyre and Gary Leatham (CRS), Al Spurlin (MSC), and Ben Guido (Via Rail Logistics)[4]. Observations included inspections of rail, ties, ballast, and rail bed cross sections on a mile by mile basis. Other items inspected were culverts (where visible), utilities, drainage paths, sidings, and road crossings. To document existing conditions of the NNR, photographs and field notes were taken on a mile by mile basis as well as other select locations such as culverts, sidings and road crossings. In addition to this inspection, survey crews took measurements and shots on the top of rail and the rail bed cross section at approximately every mile.

When NPC became involved in the project, the same level of field reconnaissance and survey work was completed for the section of rail from MP 103 to 120, which is the additional length of track from the proposed WPEA power plant to a point slightly beyond the location of the proposed NPC power plant at MP 118.5. This work was completed by December 6, 2006.

The findings of the field reconnaissance work are described in the following section of this report. A complete listing of visible utilities, sidings, road crossings, fences and culverts from MP 18.5 to MP 120 is found in Appendix C. For further understanding of existing conditions, USGS maps of the project corridor were compiled with the data above shown as overlays and are included in Appendix A. The information depicted on the maps is a compilation of data observed from field inspections and covers the area from MP 18.5 to MP 120. These maps depict the track alignment; approximate stationing (+/- 0.2 miles), existing culvert crossings, rail sidings, and existing public and private road crossings. Information shown beyond MP 120 was taken from previous engineering studies and has not been verified.

RAIL, TIES, BALLAST, RAIL BED CROSS SECTION AND SOILS

Rail

As was stated in the 2005 Rehabilitation Study prepared by CRS, the rail found on the NNR consists of a mixture of 60 to 90 pound rail. This rail weight is insufficient to support unit coal train operations under current UPRR specifications and will require full replacement.

Ties

Tie inspections consisted of measuring the length of ties, visually inspecting the outer appearance of ties and taking photographs on a mile by mile basis. In most locations along the

[4] Darren Eyre, CRS Project Engineer
Gary Leatham, CRS Project Engineer
Al Spurlin, MSC Regional Manager
Ben Guido, Via Rail Logistics President

project corridor, 80-90 percent of the ties observed were 8 feet long and 10-20 percent were 8.5-feet long. The 8-foot ties appear to be older than 20 years. The 8.5-foot ties appeared to have been part of a tie replacement program that occurred sometime over the last 10-20 years.

Material quality of the ties has been divided into three main categories derived from visual determination; scrap, marginal, or sound tie condition. Scrap ties are easily identifiable by embedded plates, missing or loose spikes, and large cracks or breaks. Ties that fall within this category are clearly unfit for use. Marginal ties can range in age from 20 to 50 years and are typically 8 feet in length. Sound ties appear to have been recently replaced, and are typically 8.5-feet in length. They are characterized by the new type of processing, and have secure spikes.

It is important to consider that the outer appearance of the ties may not be an accurate indicator as to the internal integrity of the ties, and ties that appear to be marginal or even sound may not actually be able to support track operations. Without knowing what the condition is inside of the ties, their true integrity is unknown. Table 1 estimates the inventoried tie conditions. Figures 2 through 4 depict these tie conditions.

Table 1 – Inventory of Tie Conditions

TIE QUALITY	MP 18.5 - MP 68	MP 68 - MP 120
Scrap	30%	40%
Marginal	50%	50%
Sound	20%	10%

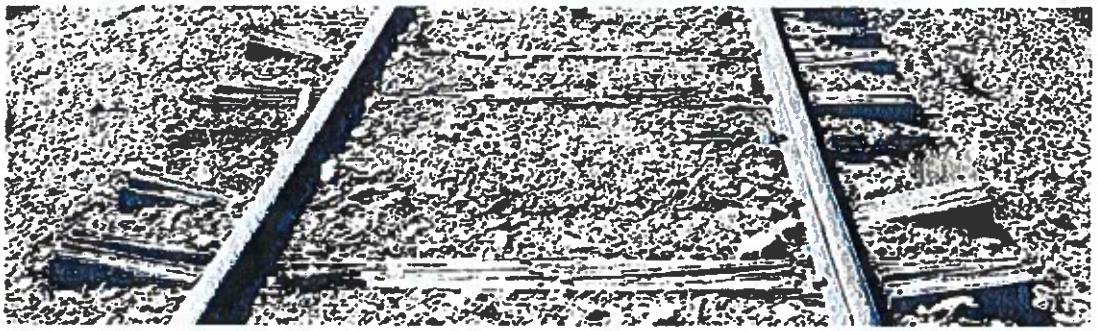


Figure 2 – Scrap Ties on the NNR

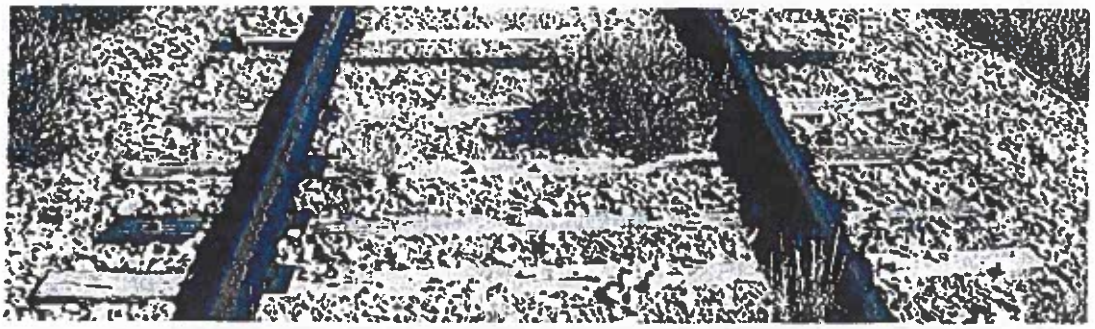


Figure 3 – Mixture of Ties that Appear to Be Marginal and Sound on the NNR

Figure 4 – Example of Relatively New, Good Quality Ties on the UPRR Main Line

Ballast

Ballast inspections by CRS consisted of digging test pits and taking photographs on a mile by mile basis to determine the size, shape, and depth of ballast between the ties. With the exception of a few miles of the alignment, all ballast on the NNR consists of smooth / rounded gravel or old cinder material rather than a processed angular rock as would normally be used on UPRR rail lines. The existing ballast material on the NNR does not meet modern standards. Table 2 estimates the size, shape, and depth of ballast between the ties. Figures 5 through 10 depict these ballast conditions. Refer to the geotechnical report found in Appendix E for the results of GeoCon's investigation of existing ballast conditions. References in this report to "ballast" along the NNR should not be considered as true crushed angular stone that meets current UPRR specifications.

Table 2 – Existing Ballast Conditions

MP	SIZE	SHAPE	DEPTH	GENERAL NOTES
18.5 - 45	1" minus	rounded gravel	2"-3"	-
45 - 71	1" minus	rounded gravel	0"	sparse gravel between ties
71 - 72	4" minus	rounded gravel	4"-8"	road base / pit run material
72 - 73	1" minus	mix of rounded & angular gravel	0"-1"	-
73 - 74	3" minus	mix of rounded & angular gravel	7"	road base / pit run material
74 - 75	2"-3" minus	rounded gravel	0"	sparse gravel between ties
75 - 76	2" minus	mix of rounded & angular gravel	12"	-
76 - 79	2"-4" minus	mix of rounded & angular gravel	4"-6"	some rock may contain metals that promote rust on rail lines
79 - 82	1"-2" minus	rounded gravel	0"	sparse gravel between ties
82 - 97	2"-4" minus	rounded gravel	1"-6"	-
97 - 120	< 1"	cinders / native soil	N/A	-

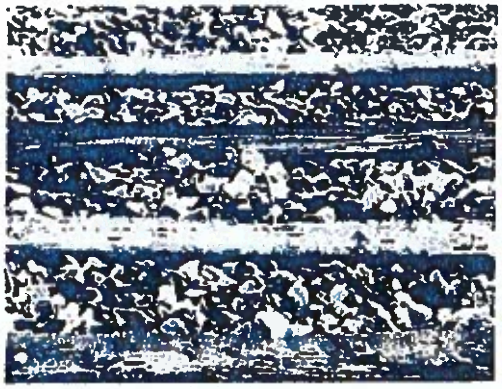


Figure 5 – Good Quality Ballast at UPRR Shafter Siding

Figure 6 – One Inch Minus Rounded Gravel

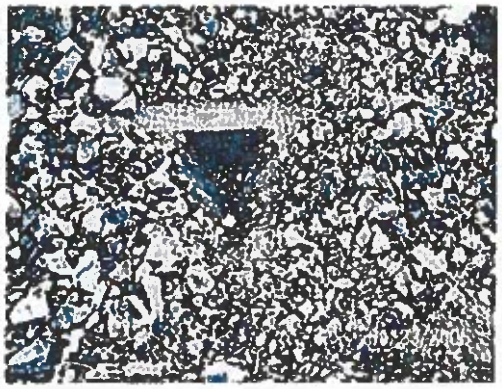


Figure 7 – 3" - 4" Minus Angular Gravel

Figure 8 – Native Soil In Ballast Section

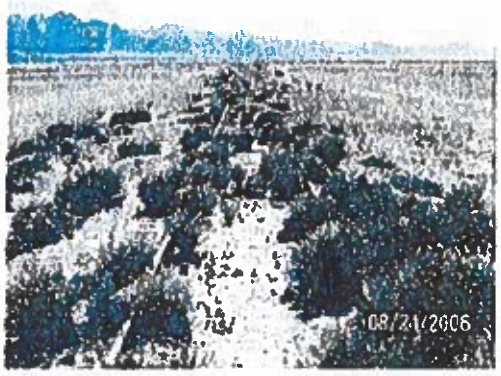


Figure 9 and Figure 10 – Native Silt Material In Rail Bed

North of MP 61, vegetation in the ballast is generally non-existent to scattered in most locations, as shown in Figures 11 and 12. South of MP 61, vegetation in the ballast is generally moderate to heavy in most locations and native soils are frequently found in the ballast section, as seen in Figures 13 and 14. All vegetation will need to be eliminated before unit trains commence operating on the NNR.

Figure 11 – No Vegetation

Figure 12 – Scattered Vegetation

Figure 13 – Moderate Vegetation

Figure 14 – Heavy Vegetation

Rail Bed Cross Section

Rail bed cross section inspections consisted of a visual inspection and taking photographs on a mile by mile basis. This was done to help determine if the rail bed is wide enough to support proposed track operations similar to the desirable cross sections shown in Figures 15 and 16. Figure 15 depicts a cross section with concrete ties. Wood ties may also be used with a similar cross section.

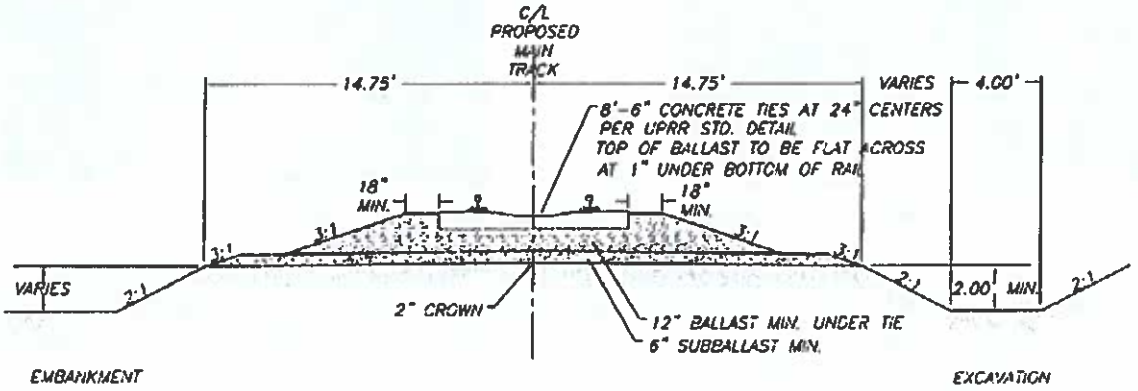


Figure 15 – Desirable Rail Bed Cross Section

Figure 16 – Good Cross Section on the UPRR Main Line

The existing cross section from approximately MP 18.5 to MP 61 is depicted in Figures 17 and 18 below, and shows approximately one foot of ballast extending beyond the edge of rail on both sides before sloping down to existing ground at a 2:1 to 3:1 slope. It is fairly similar to the desirable rail bed cross section as shown in Figures 15 and 16.

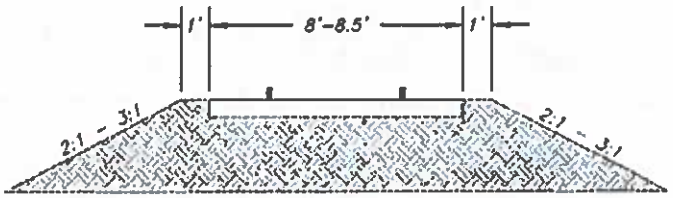


Figure 17 – Typical Rail Bed Cross Section from MP 18.5 to MP 61

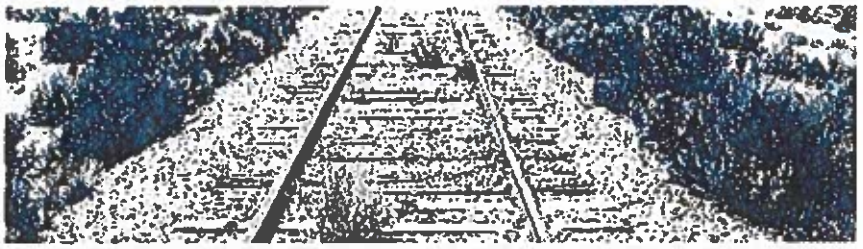


Figure 18 – Typical Rail Bed Cross Section from MP 18.5 to MP 61

From approximately MP 61 to MP 120, the rail bed cross section is similar to that from MP 18.5 to MP 61 in some locations. However, there are other portions of the alignment where the rail section appears to be inadequate to support proposed track operations. The cross section in these other areas is generally depicted in Figures 19 and 20.

Figure 19 – Commonly Occurring Rail Bed Cross Section from MP 61 to MP 120

Figure 20 – Commonly Occurring Rail Bed Cross Section from MP 61 to MP 120

An additional concern in this area is that sections from MP 93 to 108 appears to lack necessary drainage facilities crossing the rail Native silt from the surrounding areas is present in the rail bed and between the rail lines. It looked as if this material has periodically been washed over the rail during large storm events in the past. CRS has not been able to locate any definitive data that confirms if water has risen above the rail, but it appears this may have occurred. During a meeting with Vic Crumley[5], Nevada Public Utilities Commission (PUC) Rail Inspector, it was discovered that the NNR has a history of water surfacing near the top of rail bed in various locations south of MP 93. This gave CRS further reason to believe that water elevations have reached or exceeded the height of the rail bed in the past.

Soils

As stated by GeoCon in the GeoCon Phase I Geotechnical Investigation[6] that is included in Appendix E, the native soils are considered to be structurally weak and compressible. They may be susceptible to frost heaving as well. They are further characterized by GeoCon as being unlikely to be aggressive to concrete, but likely to be aggressive to uncoated steel. For further information about soils, refer to Appendix E.

CULVERTS AND DRAINAGE PATHS

Culverts

Culvert inspections consisted of noting the type, size and condition at each location where culverts were visible to CRS field crews. Field crews found approximately 30% more culverts than were originally noted in prior NNR assessment reports. With few exceptions, most culverts were dry and did not have any flowing water. A complete listing of the culverts and their condition is found in Appendix C.

Most culverts appear to be functional in the sense of allowing water to pass under the rail but all will need to be replaced to meet current railroad standards. Some culverts have silted up over time and may not be able to adequately handle storm flows. Other culverts are not long enough to extend beyond the toe of the rail bed cross section and have consequently been plugged with debris. A few culverts are made of wood and have deteriorated or partially collapsed over time.

[5] Meeting held on September 19, 2006 at CRS's Salt Lake City, Utah office

[6] GeoCon Consultants Inc., "Phase I Geotechnical Investigation," September 29, 2006.

Various corrugated metal pipes (CMPs) have rusted out and are structurally inadequate while others do not have enough cover to support the weight of unit trains. Many of the concrete box culverts / bridges have visible cracks and appear to be structurally unsound.

Some culverts appear to be in fair condition from the inside. However, it is unknown if these culverts are decaying from the outside due to "hot" acidic soils or other factors. Some of the CMPs appear to have rust creeping from the outside in and are located in areas that do not appear to have standing water. This may be due to hot soils in those areas. Figures 21-29 depict typical culvert conditions.

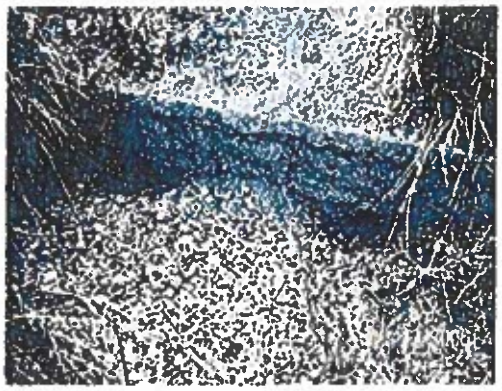


Figure 21 – Silted Triangular Culverts

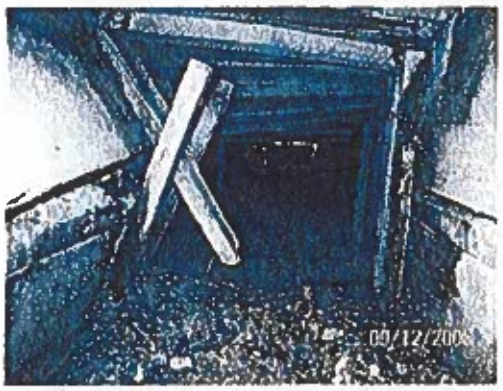


Figure 22 – Collapsed Wood Culvert

Figure 23 and Figure 24 – Culvert with Shallow Cover/ Hole in the Top

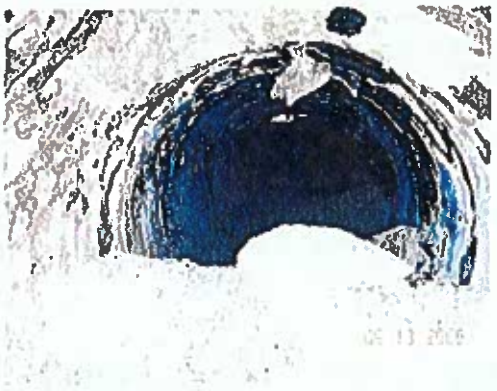


Figure 25 and Figure 26 – Rusted Culvert with Shallow Cover

Figure 27 and Figure 28 – Cracked Concrete Box Culvert / Bridge

Figure 29 – CMP that Appears to be in Fair Condition from the Inside

Drainage Paths

There are several natural drainage paths that cross NNR's alignment. Some areas, particularly on the south end of the alignment, appear to have an inadequate number of culverts to convey water under the railway, thus creating potential areas for stormwater to pond. A few drainage paths traversing perpendicular to the rail alignment are found to be lacking culverts. In some other locations, the flow lines of the existing culverts are much higher than the natural ground surface, also creating areas for stormwater to pond. Figures 30 and 31 depict these conditions.

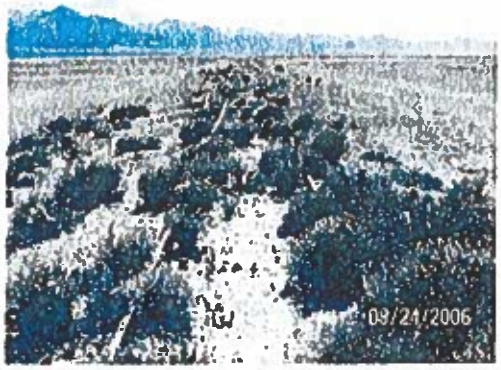


Figure 30 – MP 93-108 Needs Culverts

Figure 31 – Culvert with Flow Line that Is 2-3' Too High

ROAD CROSSINGS

Asphalt Road Crossings

All road crossings along the NNR from MP 18.5 to MP 120 are at-grade crossings. Two of the crossings are asphalt highway crossings at Currie and Cherry Creek (MP 63 and MP 91, respectively). These crossings appear to have fair advanced warning signs and paint markings but inadequate signage or signaling for an active rail line. Neither crossing has concrete or timber crossings between or around the rail per current UPRR specifications. Figures 32 and 33 show these road crossings. As seen in Figure 32, the Currie crossing has been completely asphalted over.

Figure 32 – Currie (MP 63) Road Crossing

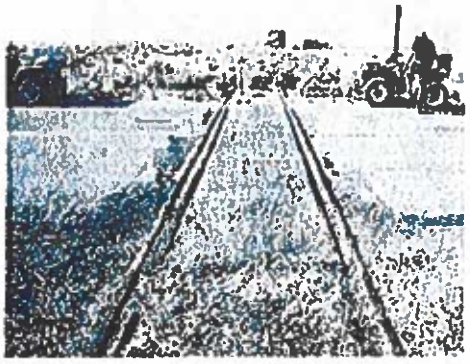


Figure 33 – Cherry Creek (MP 91) Road Crossing

Dirt / Gravel Road Crossings

Most of the dirt / gravel road crossings observed lack the necessary advanced warning devices and / or signage. None of the crossings have concrete, timber or asphalt between or around the rail per current UPRR specifications. Many of the crossings have been covered with soil, debris, wood, rail, or other materials. Figures 34-40 depict typical dirt / gravel road crossing conditions.

Figure 34 – Good Timber Crossing on the UPPR Main Line

Figure 35 – Dirt Crossing with Old Signage

Figure 36 – Gravel Crossing

Figure 37 – Dirt Crossing without Signage

Figure 38 – Crossing with Ties between Rails

Figure 39 – Crossing with Sections of Rail Lines

Figure 40 – Improved Gravel Road Crossing

SIDINGS

Several existing sidings were found along the alignment of the NNR. These were determined to be in poor condition. A complete list of the findings is included in Appendix C.

WETLANDS

The alignment of the NNR is located near several wetland areas. CRS's subconsultant, Frontier Corporation USA, has assessed these wetland areas and prepared a wetland report[7] that has been submitted to the United States Army Corps of Engineers.

[7] Frontier Corporation USA, "Wetland Delineation Technical Report," May 17, 2007.

DESIGN APPROACH

GENERAL APPROACH

It was initially intended by WPEA when they contracted with CRS in 2005 that the NNR would be rehabilitated in place. However, it has become clear since that time that a more extensive rehabilitation effort will be required due to the changes in proposed use of the track and the discovery of the conditions of the existing railroad infrastructure and substructure.

WPEA originally intended to design the NNR with UPRR requirements that would accommodate Class 3 (up to 40 mph speeds) standards. CRS contacted the FRA on September 29, 2006 to determine what requirements need to be satisfied to obtain Class 3 requirements on existing rail lines. The FRA stated that they have minimum track standards but do not separate standards for different classes of railroads. Rather, they default to the local operating railroad's standards which, in this case, are UPRR standards. Since the time that NPC became involved with the project, it was determined that a Class 4 designation (up to 60 mph speeds for freight trains) would better suit the proposed use of the track, which is for an average of three round-trip 150-car units trains per day traveling at speeds of 40-60 mph. CRS recommends designing new rail and other related items such as culverts, road crossings, sidings and fence / cattle guard crossings to UPRR standards. Some typical UPRR standards have been included in Appendix B for reference. For a more complete set of standards, see *Union Pacific Railroad Track Standard Drawings 2005.*

Plan and profile drawings will be required for approval of the project. Survey of the entire alignment has already been completed by CRS for this purpose. In addition to the plan and profile drawings, CRS recommends that the approach be to produce construction plans that address items requiring design attention such as proposed sidings, existing sidings that will no longer be used, culvert repairs and replacements, road crossing upgrades, fence / cattle guard crossings, etc. Within this section of the report, minimum design criteria are presented for each of these features, based upon the proposed future use of the NNR by WPEA and NPC.

CURVATURE AND GRADE

Generally, the existing curvature and grade of the NNR are acceptable and do not require major modifications. The NNR should be slightly redesigned through existing curves and incorporate appropriate spiral curves and super elevation transition zones. The grades should be slightly redesigned through grade changes to incorporate appropriate lengths of vertical curves

RAIL, TIES, BALLAST, AND RAIL BED CROSS SECTION

CRS recommends replacement of all rails on the NNR. CRS recommends using a minimum of 136-pound rail for rehabilitation of the Nevada Northern Railway, however, UPRR will ultimately dictate what minimum rail weight will be allowed. It is also recommended to use continuous welded rail (CWR). CWR will provide added strength and weight distribution along the rail line which will support unit train operations for a longer time period than will 39-foot rail sections.

CRS recommends a full tie replacement along the entire NNR with 9-foot wood ties or 8.5-foot concrete ties. While some of the existing ties appear to be in marginal to sound condition on the outside, the condition of these ties underneath the surface is unknown. They may be rotted out or unsound to support unit coal train operations. This option will provide a longer service life for the NNR and reduce on-track maintenance during unit train operations. CRS recommends that bids should be obtained to install both wood and concrete ties, and to then select the most cost-effective alternative.

CRS recommends a minimum 10-12" ballast lift underneath the ties along the entire NNR with current UPRR specified ballast material. This will prevent ties from failing as shown in Figure 41 and help prevent ties from settling into the subgrade. As mentioned in the GeoCon Phase I Geotechnical Report, the ballast and subballast sections may need to be relatively thick due to the low strength of the native soils in the subgrade.

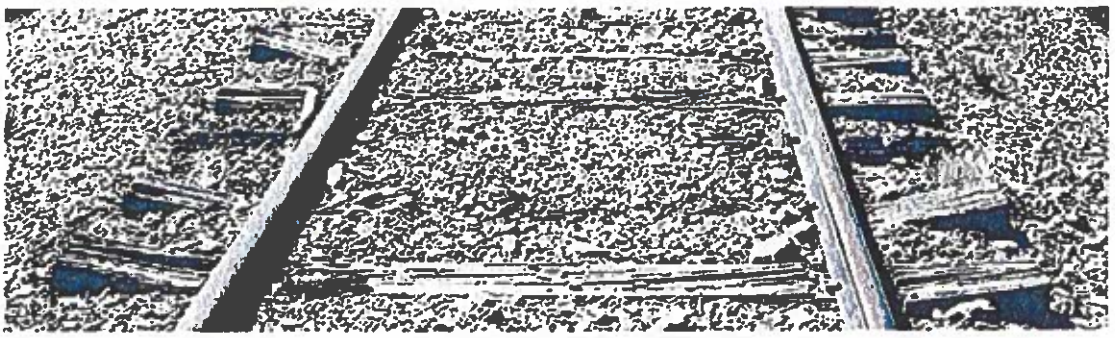


Figure 41 – Failed Ties

CRS will rely on the geotechnical engineer's recommendations about the rail bed cross section such as adding and / or replacing subballast or subgrade materials. In the GeoCon Phase I Geotechnical Report, found in Appendix E, it is suggested that the existing ballast materials may be rototilled into the subgrade to produce a higher strength subgrade. Sub-ballast and/or filter fabric may be required over the subgrade, and the ballast material will likely be imported. There may be "soft" spots along the NNR which will require full depth rail bed replacement with new material that can support unit coal train operations.

CRS recommends minimum rail bed cross sections as shown in Figures 42 to 45. These figures depict a cross section with concrete ties. Wood ties may also be used with a similar cross section. UPRR main line standards are also shown in Appendix C. This will provide adequate support to keep the rail and ties in place during unit train operations. These cross sections are presented as minimum design standards; if UPRR enforces their current mainline standards, the NNR should be rehabilitated to these standards.

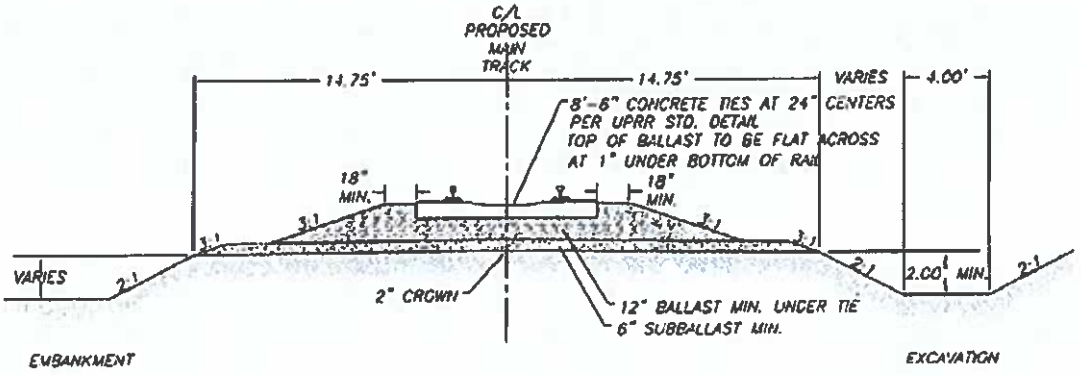


Figure 42 – Desirable Rail Bed Cross Section for Single Tangent Track

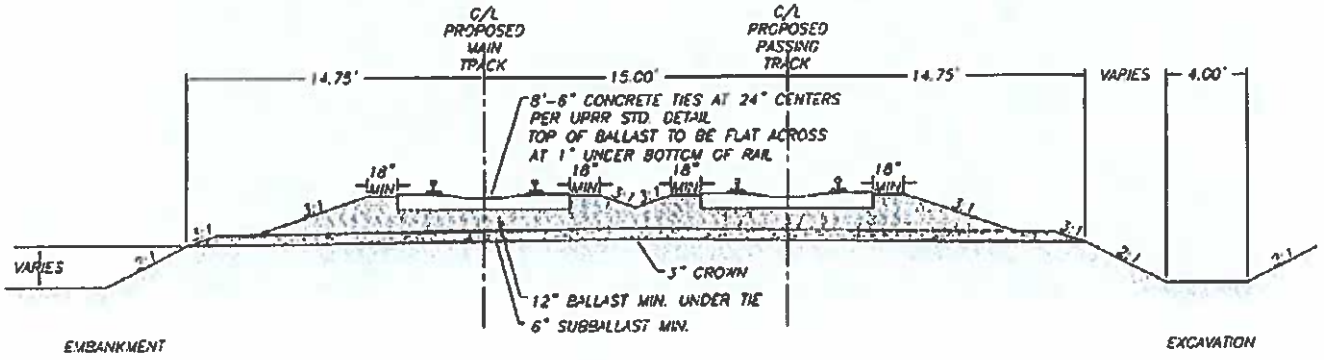


Figure 43 – Desirable Cross Section for Two Tangent Tracks

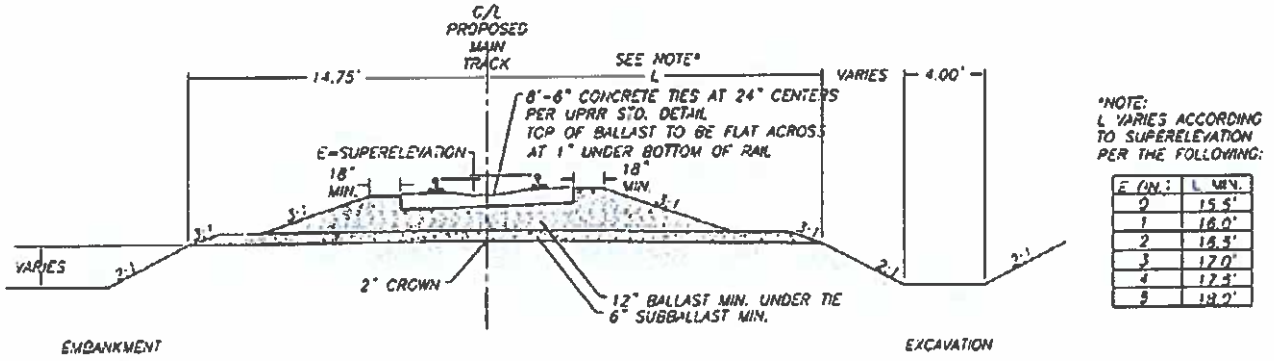


Figure 44 – Desirable Cross Section for Single Curved Track

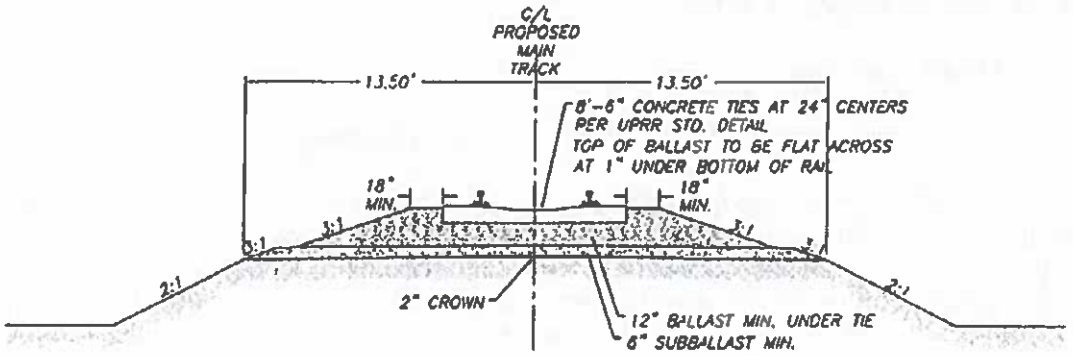


Figure 45 – Desirable Cross Section for Single Tangent Track in Restricted Wetland Area

ALTERNATIVES FOR TIES, BALLAST, AND RAIL BED CROSS SECTION

After commencing design studies for WPEA and NPC, CRS has been made aware of different opinions as to what level of effort should be put in place to rehabilitate the NNR. These opinions have been voiced by the geotechnical engineers, rail contractors, FRA and PUC inspectors, and rail designers; all of which are experienced in the field of railroad construction. The following opinions of how to rehabilitate the NNR have been voiced:

Opinion 1: Remove approximately 1-foot of material below the bottom of the existing ties, replace the void with good subballast and ballast material, widen the shoulders, institute a partial tie replacement and completely rebuild the rail bed and cross section in soft areas.

Opinion 2: Remove everything from the bottom of tie up, provide an 8-inch lift with good ballast material, widen the shoulders, remove all vegetation, institute a partial to full tie replacement and completely rebuild the rail bed and cross section in soft areas.

Opinion 3: Provide a 3 to 6-inch lift with good ballast material, widen the shoulders, remove all vegetation, institute a partial tie replacement and completely rebuild the rail bed and cross section in soft areas.

All of the above referenced rehabilitation methods may provide the desired outcome of supporting unit coal train operations but at different levels of quality and / or service life. Each of these approaches will require ongoing inspection and maintenance after the NNR is rehabilitated. The level of maintenance required with each approach may vary. The ultimate selection of one approach over another must balance competing factors such as:

1. Capital cost for rehabilitation
2. Service life of the project
3. Ongoing inspection and maintenance costs
4. Risk of service disruption during repair work
5. Safety

CULVERTS AND DRAINAGE PATHS

Culverts and Drainage Paths

CRS recommends replacement of all culverts along the NNR for the following reasons:

1. Many culverts appeared to lack adequate cover between the top of pipe and top of tie. Pipes will fail under unit train loadings if enough cover is not provided.
2. Different levels of rust were observed in nearly all metal culverts inspected. These pipes could collapse and stop unit train deliveries to the power plant. Some CMPs appeared to be in fair condition during inspections. However, it is unknown if rust is present between the pipe and existing soil where inspection was not possible. Additionally, it is unknown if soils have "hot" acidic properties that would eat away at the pipes and cause future failure.
3. Wooden structures were originally constructed that have since failed.
4. All concrete box culverts had visible cracks on the inside of the culvert which signify high loading and potential failure. Additionally, it is unknown if any steel reinforcement was originally installed in these concrete structures to support unit coal trail loadings.

If it is determined through further soils testing that the native soils may tend to corrode concrete, it is recommended that all culvert pipes be replaced with acid resistant reinforced concrete, steel, ductile iron, or coated CMP pipes. In that case, concrete box culverts should also be replaced with acid resistant reinforced concrete box culverts. Debris should be removed from all pipe entrances and exits. If there will be no adverse effects on wetlands, culverts should be installed in locations where water ponds up against the rail. This will allow free draining conditions on both sides of the NNR and help protect the structural integrity of the rail bed. Drainage culverts should be designed in accordance with current UPRR specifications. It is also recommended that further hydrologic analysis be made to determine if more culverts are necessary from MP 93 to 108. If possible, the historic high water elevation for this segment of the project should be determined, and the top of rail should be raised a minimum of 24-inches above this elevation.

ROAD CROSSINGS

Road crossings will have to be designed to comply with applicable NDOT, county and UPRR requirements and specifications. NDOT held meetings from September 20 – 22, 2005 to determine public crossing standards for the NNR. NDOT's recommendations for each of these crossings are given in the table below. CRS recommends that private crossings be eliminated where possible. Dirt or gravel crossings can be upgraded with timber, full-depth asphalt or, native soils depending on direction from the appropriate regulatory agency such as NDOT, Elko County, White Pine County or the Public Utilities Commission. Advanced warning devices, lights and gates, and other signage will be designed based upon direction from the appropriate regulatory agency. Refer to Appendix D for NDOT's complete road crossing review.

Table 3: NDOT Recommendations for Road Crossings

Crossing	Roadway Classification	Track Description	Sight Distance Concerns	Collisions	Existing Warning Devices	NDOT Recommendations
U.S. 93 at Currie, U.S. DOT #855-866Y, RRMP 63.07	Other Principal Arterial (two lane, paved) AADT of 950 55 mph speed limit	One mainline track and one industry lead track (with no current rail traffic)	The sight distance is impaired in one quadrant and standing boxcars can block the view.	Two property-damage-only collisions	The track was removed and the road was paved, so flashing lights and crossbucks were also removed. The signal cabinet is still in place.	Flashing lights, double-faced retroreflective crossbucks, multiple track signs, W10-1 advance warning signs, railroad pavement markings with a No Passing Zone and an emergency notification sign on the signal cabinet, standard concrete crossing surface
Cordano Ranch Road (previously County Road), U.S. DOT #855-868M, RRMP 65.75	Local Roadway (two graded dirt travel lanes) AADT of 10 35 mph speed limit	One mainline track with a train speed of 10 mph and no current train service.	No issues.	0	Double-faced retroreflective crossbucks, one W10-1 advance warning sign and one humpback word sign (all in very poor condition)	Double-faced retroreflective crossbucks with retroreflective post tape, YIELD signs, emergency notification signs, W10-1 advance warning signs, W10-5 humpback signs, and detour signs to direct low clearance vehicles to the Cherry Creek Crossing.
Cherry Creek Highway, U.S. DOT #855-871V, RRMP 91.20	Major Collector (two lane, paved) AADT of 50 55 mph speed limit	One mainline track with a train speed of 10 mph and no current train service.	No issues.	0	Double-faced retroreflective crossbucks, W10-1 advance warning signs and fading RxR and No Passing Zone pavement markings.	RxR pavement markings at the existing advance warning signs, a stop bar and a no passing zone, retroreflective tap and emergency notification signs for the crossbuck posts, YIELD signs if there is sporadic rail traffic and STOP signs if there are more than two trains daily
Schellbourne Road (Old Cherry Creek Road), U.S. DOT #855-872C, RRMP 96.30	Two-lane dirt road AADT of 10 25 mph speed limit	Mainline with no current train service.	The sight distance is acceptable, although the 50° skew limits perception at the crossing.	0	Double-faced retroreflective crossbucks, W10-1 advance warning signs and word-type humpback signs, all in poor condition.	Install YIELD signs, W10-1 humpback signs and emergency signs, detour signage to direct low clearance vehicles to the Cherry Creek Highway or Warm Springs Road, and replace existing signage
Warm Springs Road (Monte Neva) Road, U.S. DOT #855-873J, RRMP 108.04	Two-lane dirt road AADT of 20 XX mph speed limit	Mainline with no routine train traffic.	No issues.	0	Double-faced retroreflective crossbucks, W10-1 advance warning signs and word-type humpback signs, all in poor condition.	Install YIELD signs, W10-1 advance warning signs and emergency signs, remove the humpback sign.

EXISTING AND PROPOSED SIDINGS

Existing Sidings

Many sidings currently exist along the NNR. They range in length from approximately 700 to 3000 feet. CRS anticipates showing these sidings to be removed on future construction plans. CRS recommends rehabilitation of some of these sidings to allow staging room for future NNR maintenance crews when unit train operations are in service and said crews need to clear the track for the unit train. Though they will need to be fully replaced, existing siding locations are ideal for rehabilitation because the site is already impacted. A preferred distance between these maintenance sidings is approximately every 5-10 miles. The ultimate decision on the spacing and number of maintenance sidings will need to balance capital costs with safety and operation and maintenance costs.

Proposed Sidings

Siding requirements will be a function of the volume of traffic on the NNR. Traffic projections provided by WPEA and NPC at the time of this report are for an average of 3 unit trains per day (1.5 unit trains per power plant per day) with up to 150 cars per unit train. While less frequent, there would also be traffic from manifest trains for the power plants as well as future industry traffic along the NNR. Based on this current understanding and without the results of an operational analysis, it is recommended that passing sidings be constructed at a total of five locations to accommodate the storage of a unit train with locomotives including sufficient clearance from the switches. It is also recommended that setout and maintenance sidings be constructed approximately every 5-10 miles along the NNR.

The five passing siding locations would include one at each of the proposed power plants (MP 103 and 118.5-not included as part of this study), one near the Highway 93 Currie crossing (MP 63), one near the Cherrie Creek Road crossing (MP 91) and, one near the Shafter Interchange (MP 18.5). The exact locations, layout and distances of the sidings have yet to be determined. UPRR will likely require that the siding near the Shafter Interchange be upgraded and enlarged to approximately 10,000 feet. Concepts for the Shafter Interchange siding have been proposed to UPRR, but as of this date, a final determination of siding requirements has not been made. Since the siding requirements are tied to the traffic loading and use patterns, an operational analysis has been recommended to WPEA and NPC along with close coordination with UPRR.

FENCES AND GATES

It is recommended that fencing or other cattle and animal controls be installed along sections of the NNR right-of-way where deemed necessary. Fencing or other animal control improvements will need approval from the BLM. Existing fence and cattle guard crossings along the alignment of the NNR are listed in Appendix C.

FUTURE SIGNALING / TRACK WARRANTS

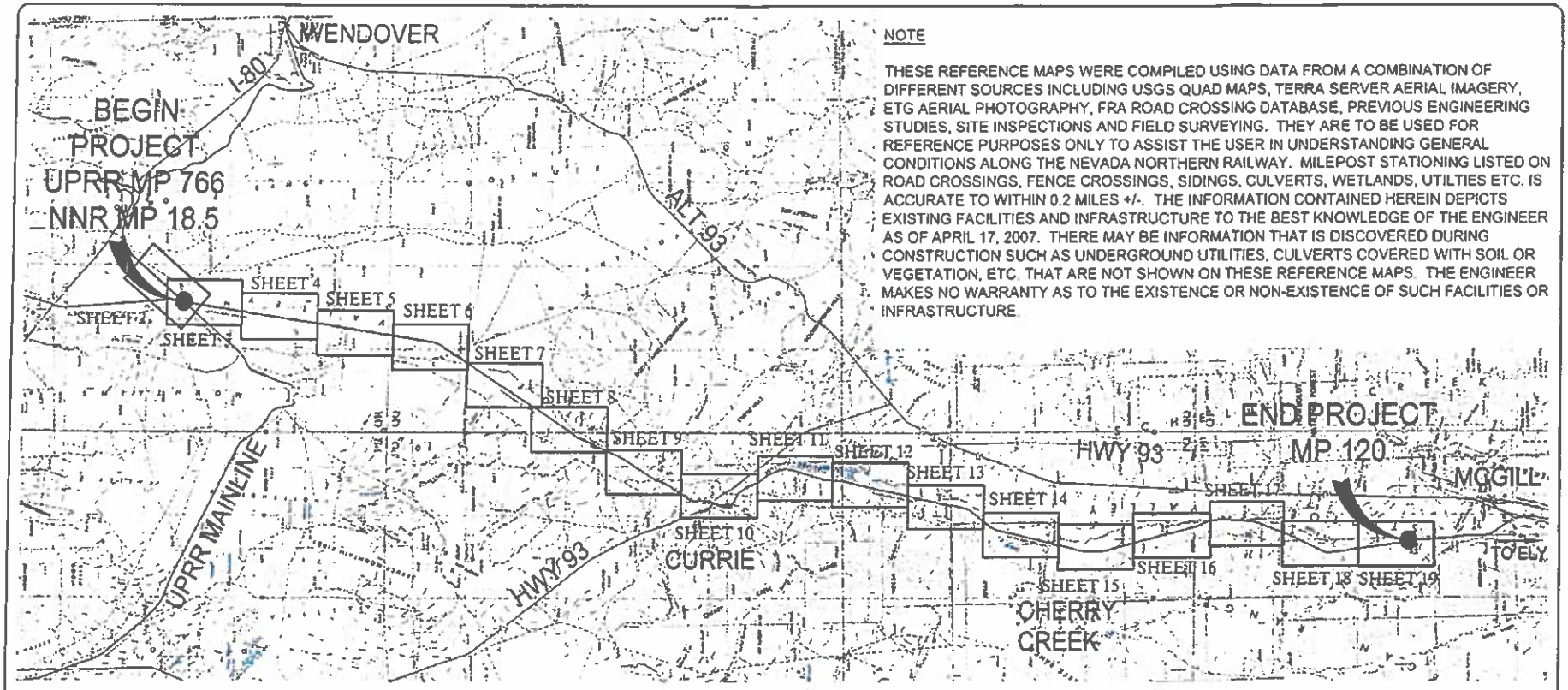
UPRR has stated they will re-design the signaling for the Shafter Interchange in-house after construction plans for the interchange are completed. UPRR will not regulate signaling or track

warrants on the NNR if they are not the company operating the NNR. The future NNR operator will determine if signaling or track warrants are used. Signaling and track warrants will need to comply with FRA regulations. WPEA and NPC should coordinate with the UPRR Coal Group to determine if the NNR will be operated by UPRR or a separate company.

Note:
Photographs shown on the cover and spine of this report were obtained from
http://www.steamrailroadphotos.com/photopost/showphoto.php?photo=1024
and http://www.nevadatravel.net/travelcram/06-03.html

APPENDIX A

NNR Alignment Maps



NOTE

THESE REFERENCE MAPS WERE COMPILED USING DATA FROM A COMBINATION OF DIFFERENT SOURCES INCLUDING USGS QUAD MAPS, TERRA SERVER AERIAL IMAGERY, ETG AERIAL PHOTOGRAPHY, FRA ROAD CROSSING DATABASE, PREVIOUS ENGINEERING STUDIES, SITE INSPECTIONS AND FIELD SURVEYING. THEY ARE TO BE USED FOR REFERENCE PURPOSES ONLY TO ASSIST THE USER IN UNDERSTANDING GENERAL CONDITIONS ALONG THE NEVADA NORTHERN RAILWAY. MILEPOST STATIONING LISTED ON ROAD CROSSINGS, FENCE CROSSINGS, SIDINGS, CULVERTS, WETLANDS, UTILTIES ETC. IS ACCURATE TO WITHIN 0.2 MILES +/-. THE INFORMATION CONTAINED HEREIN DEPICTS EXISTING FACILITIES AND INFRASTRUCTURE TO THE BEST KNOWLEDGE OF THE ENGINEER AS OF APRIL 17, 2007. THERE MAY BE INFORMATION THAT IS DISCOVERED DURING CONSTRUCTION SUCH AS UNDERGROUND UTILITIES, CULVERTS COVERED WITH SOIL OR VEGETATION, ETC. THAT ARE NOT SHOWN ON THESE REFERENCE MAPS. THE ENGINEER MAKES NO WARRANTY AS TO THE EXISTENCE OR NON-EXISTENCE OF SUCH FACILITIES OR INFRASTRUCTURE.

GRAPHIC SCALE

40000 0 20000 40000 80000

(IN FEET)
1 inch = 40000ft.

SHEET INDEX

PRELIMINARY NOT FOR CONSTRUCTION

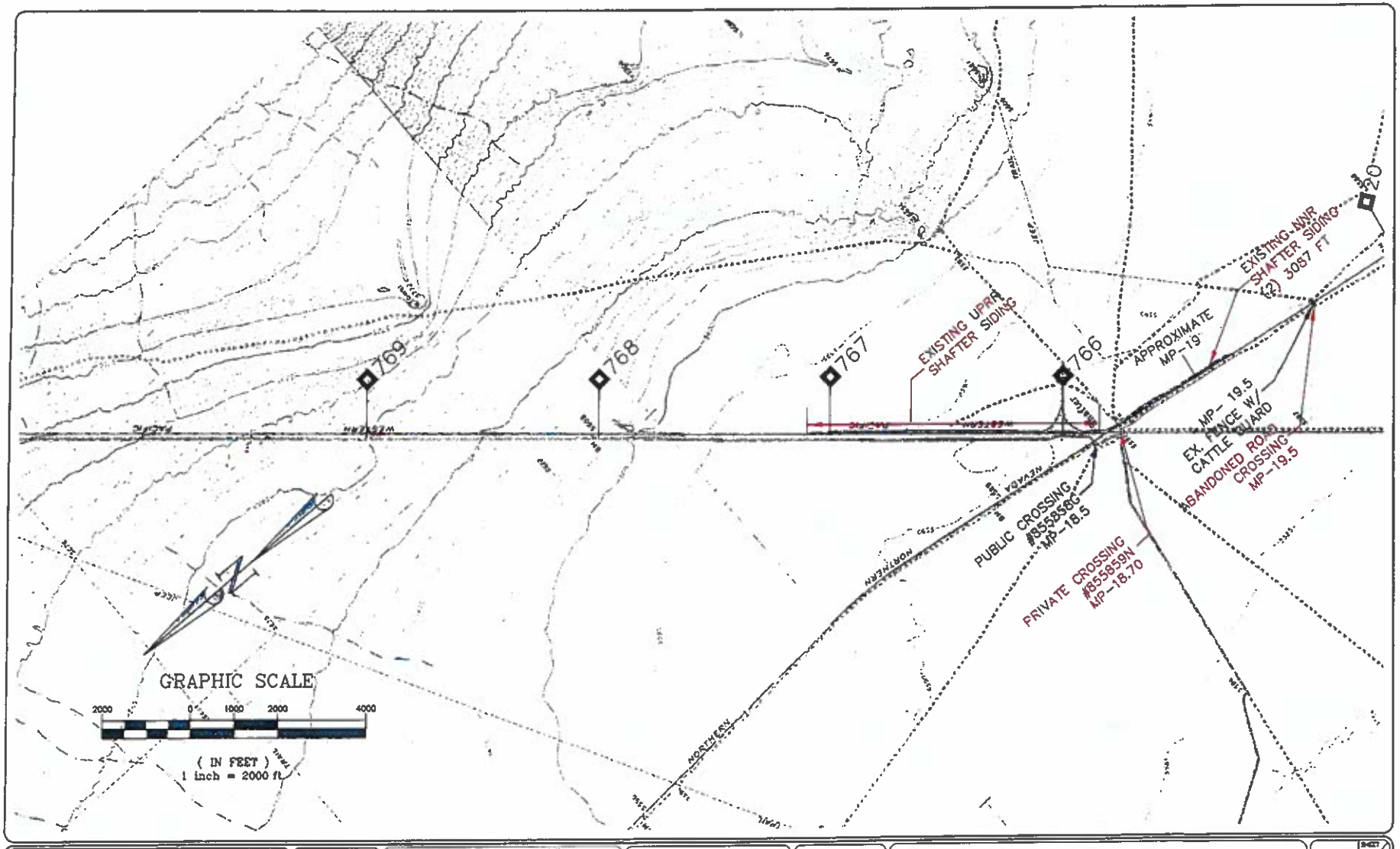
CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 1 OF

06107C
PROJECT NUMBER

F:\2006\06107C\10 - NNR Design Plans Specs\dwg\OVERVIEW SHEETS.dwg, EC-C, 4/17/2007 11:44:53 AM, ...



REV.	BY	DATE	DESCRIPTION

PRELIMINARY NOT FOR CONSTRUCTION

PRINCIPAL: PAUL HEST
PROJECT MANAGER: BOB RAMSEY
DESIGNED: DARRIN FINK
DRAWN BY: DAVID WILLSON
SCALE: AS SHOWN
DATE ISSUED: APRIL 17, 2007

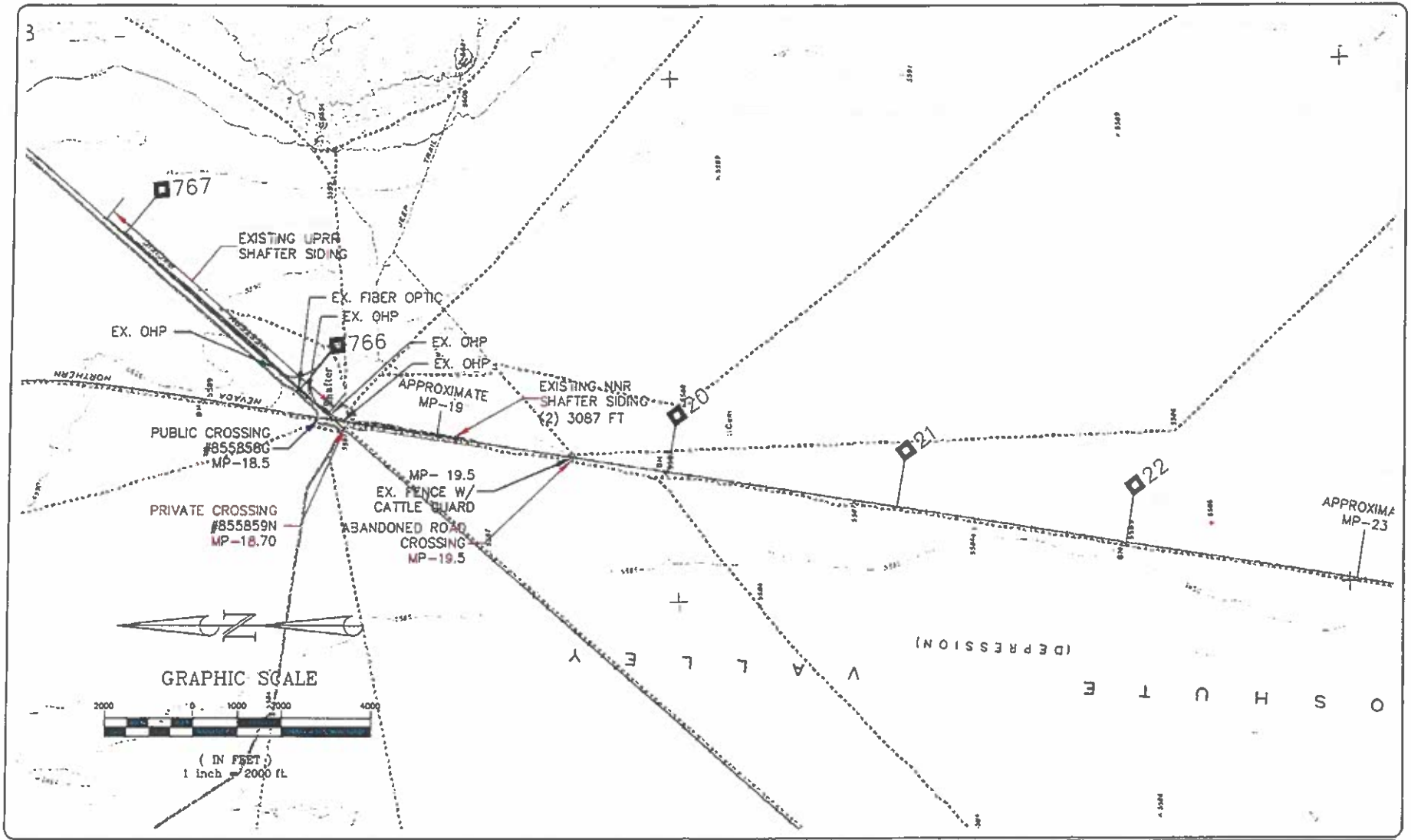
CALDWELL RICHARDS SORENSEN
ENGINEERS TO ENTREPRENEURS

3290 East 2100 South
Salt Lake City, UT 84109
Phone: (801) 328-3283
Fax: (801) 328-4272
www.crsengineers.com

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 2 of

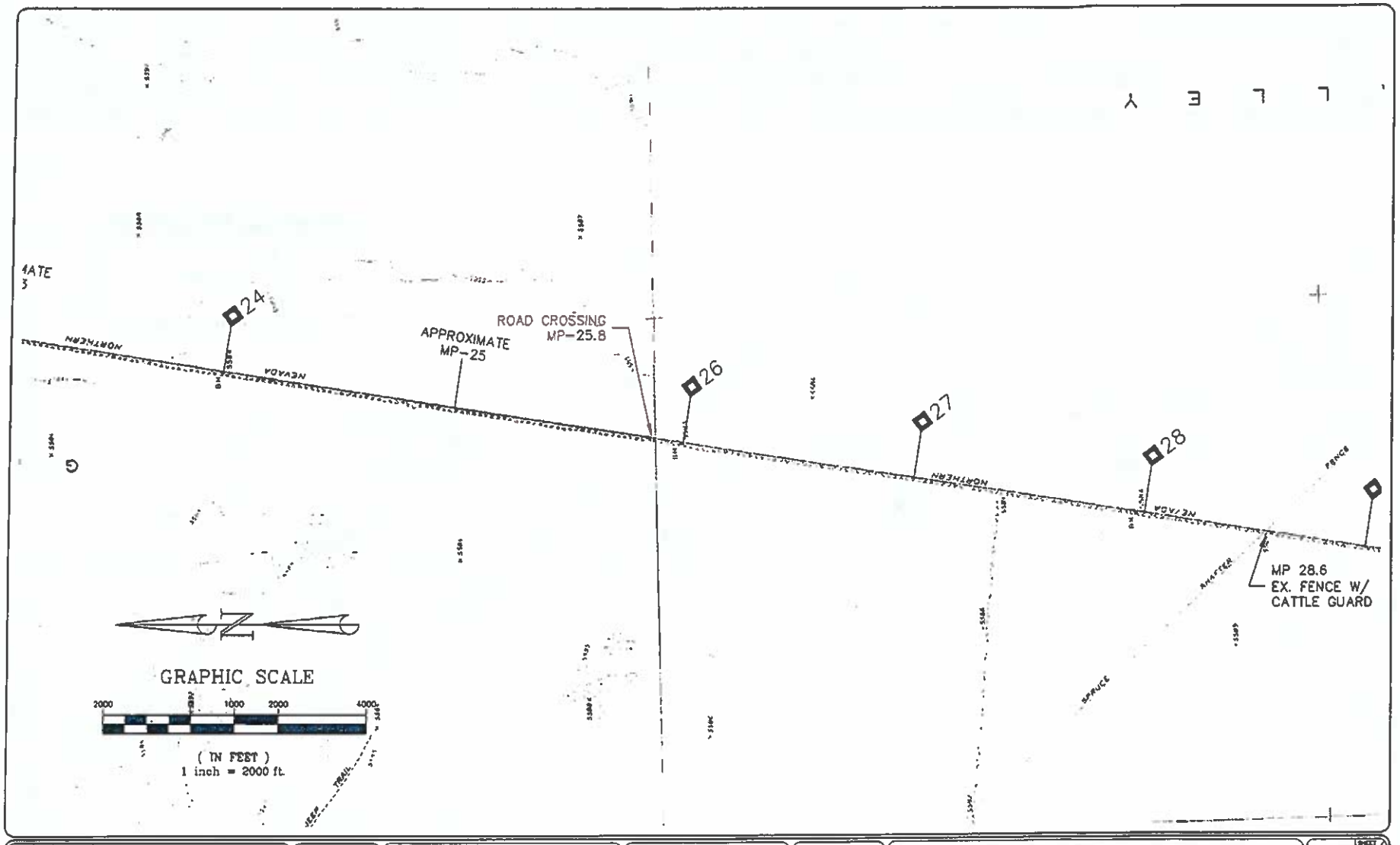
06107C
PROJECT NUMBER



REV. BY DATE DESCRIPTION	PRELIMINARY NOT FOR CONSTRUCTION	PRINCIPAL PAUL HIRST; PROJECT MANAGER BOB RAMSEY; DESIGNED BARRON KYNIC; DRAWN BY DANIEL WILSON; SCALE AS SHOWN; DATE APRIL 17, 2007	CALDWELL RICHARDS SORENSEN	3060 East 2100 South Salt Lake City, UT 84109 Phone: (801) 359-3553 Fax: (801) 359-4272	NEVADA NORTHERN RAILWAY REFERENCE MAPS MP 18.5 - MP 120

SHEET 3 of

06107C PROJECT NUMBER



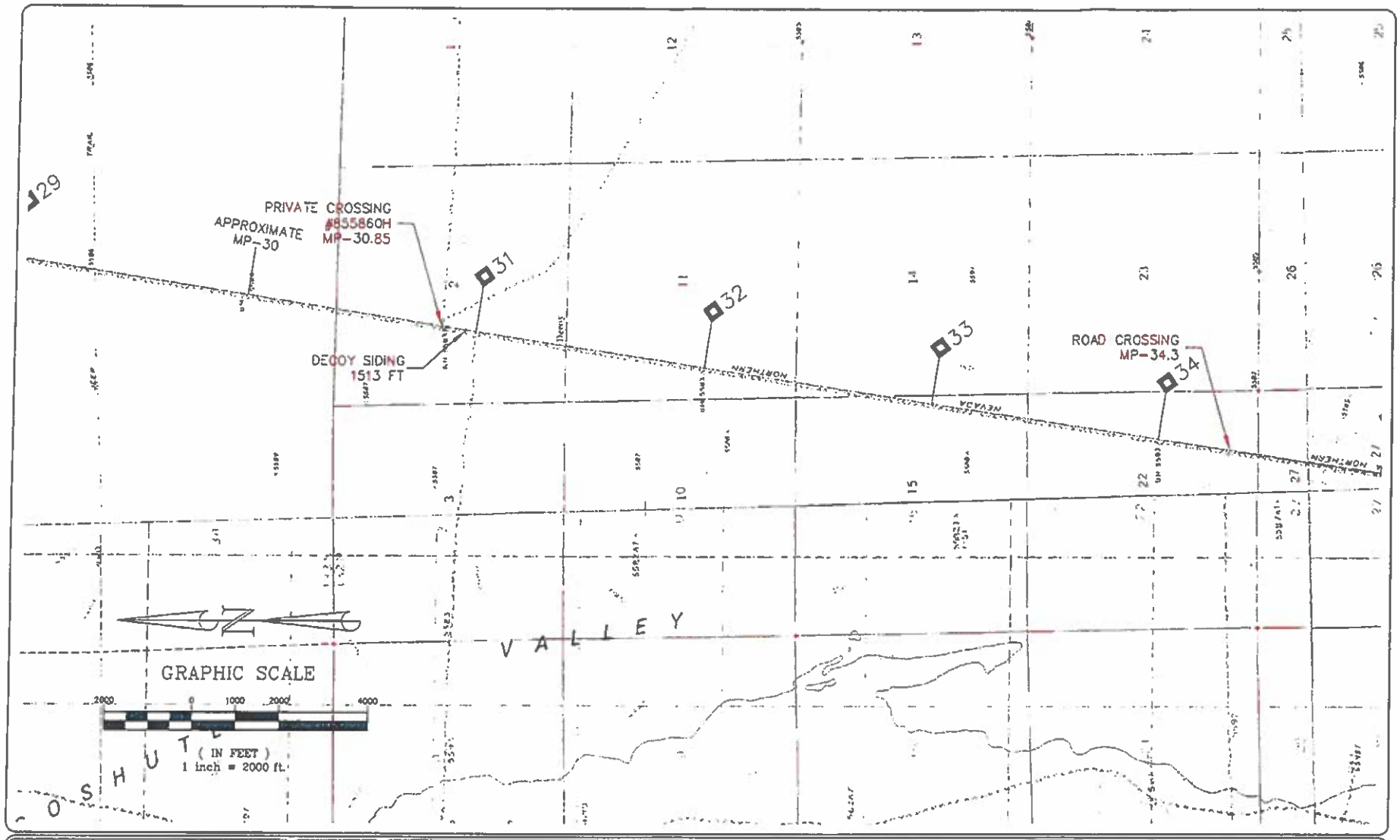
PRELIMINARY NOT FOR CONSTRUCTION

CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 4 OF

06107C
PROJECT NUMBER



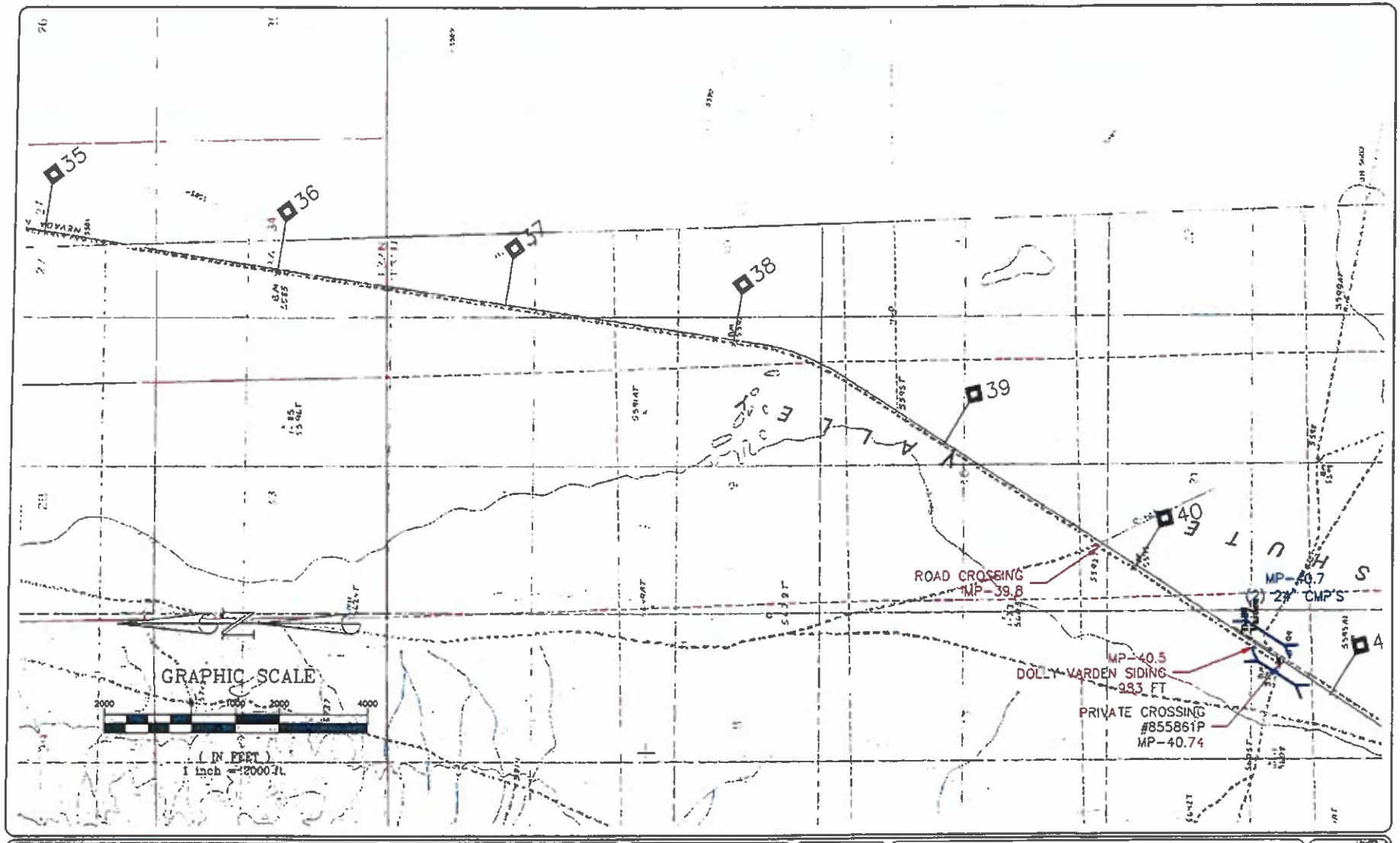
PRELIMINARY
NOT FOR
CONSTRUCTION

CALDWELL
RICHARDS
SORENSEN

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

5

06107C



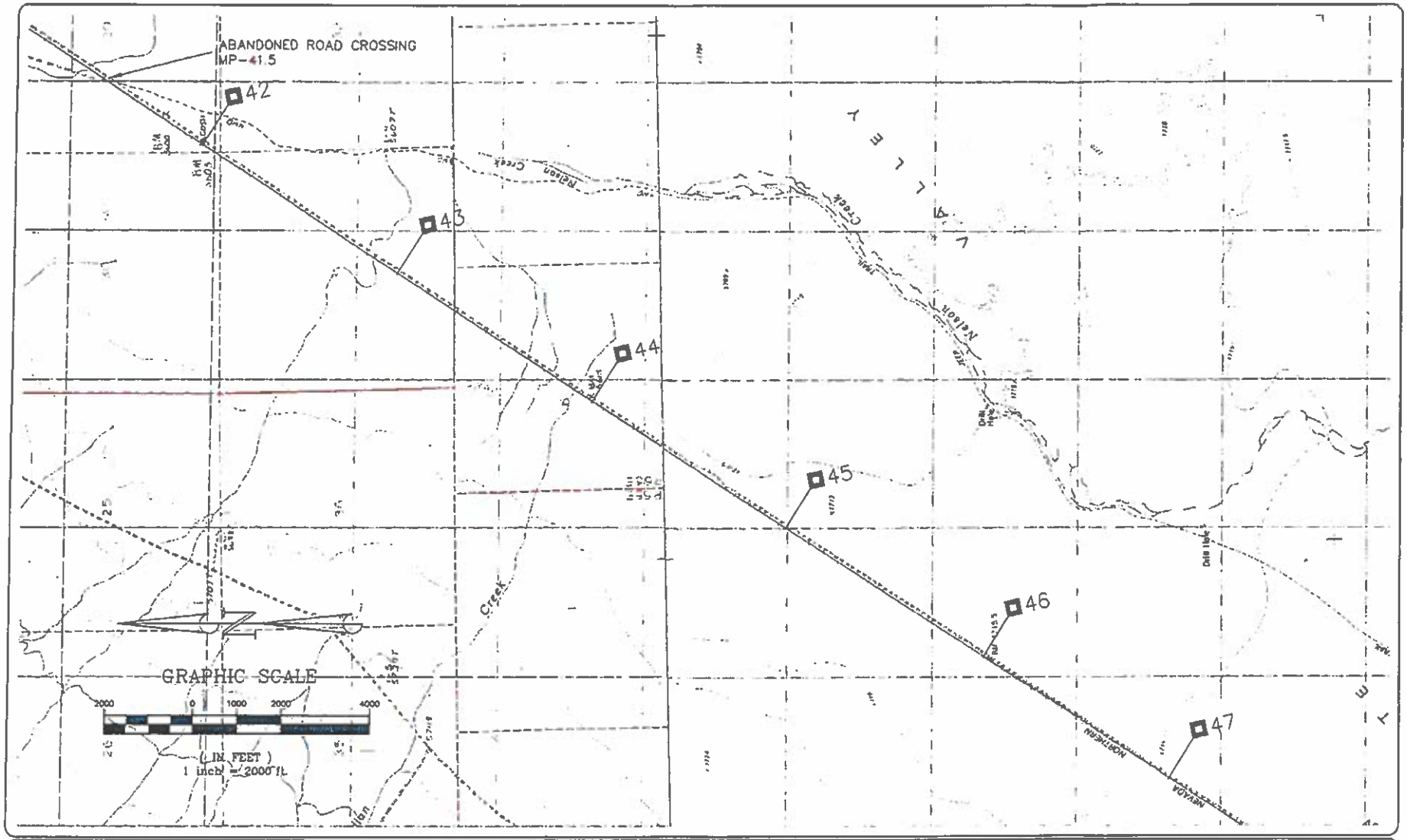
PRELIMINARY
NOT FOR
CONSTRUCTION

CALDWELL
RICHARDS
SORENSEN

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

6

06107C



REV	BY	DATE	DESCRIPTION

PRELIMINARY
NOT FOR
CONSTRUCTION

PAUL WEST
BOB RAMSEY
GARRON CYRK
DANIEL WILKINSON
APRIL 17, 2007

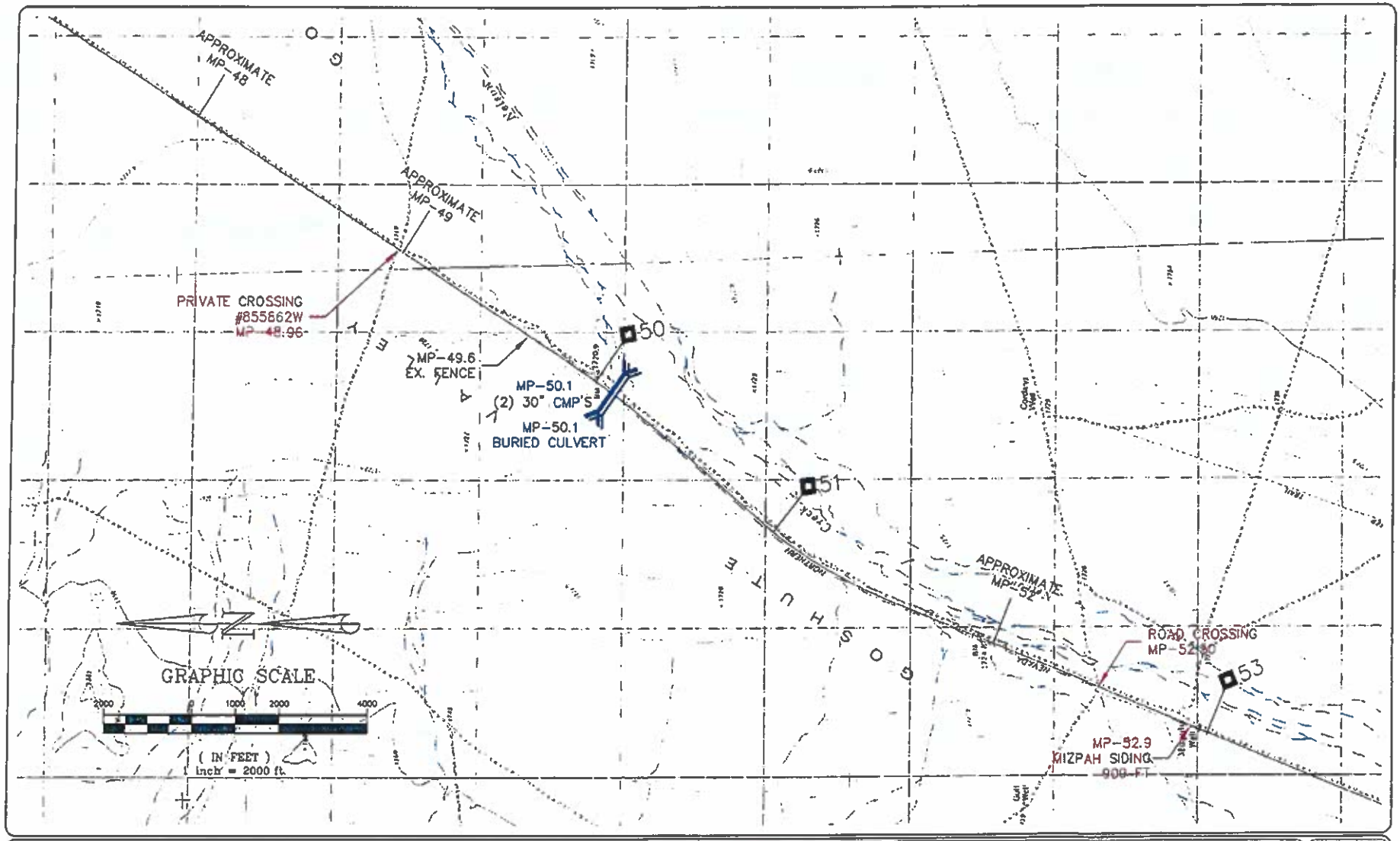
CALDWELL
RICHARDS
SORENSEN
ENGINEERS TO INFRASTRUCTURE

3040 East 2100 South
Salt Lake City, UT 84109
Phone (801) 328-5383
Fax (801) 328-4272
www.crsengineers.com

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 7 of

06107C
PROJECT NUMBER



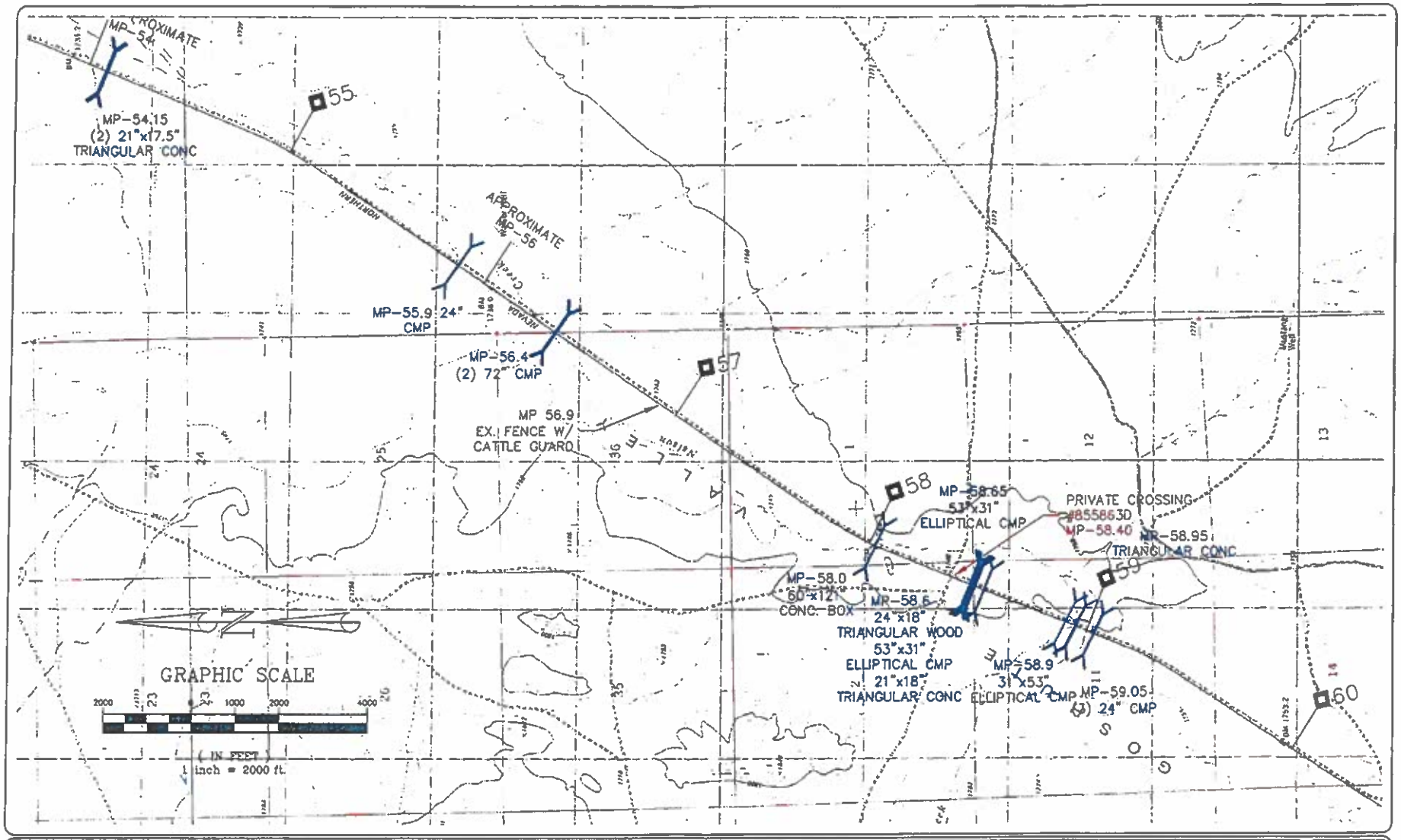
PRELIMINARY NOT FOR CONSTRUCTION

CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

8

06107C



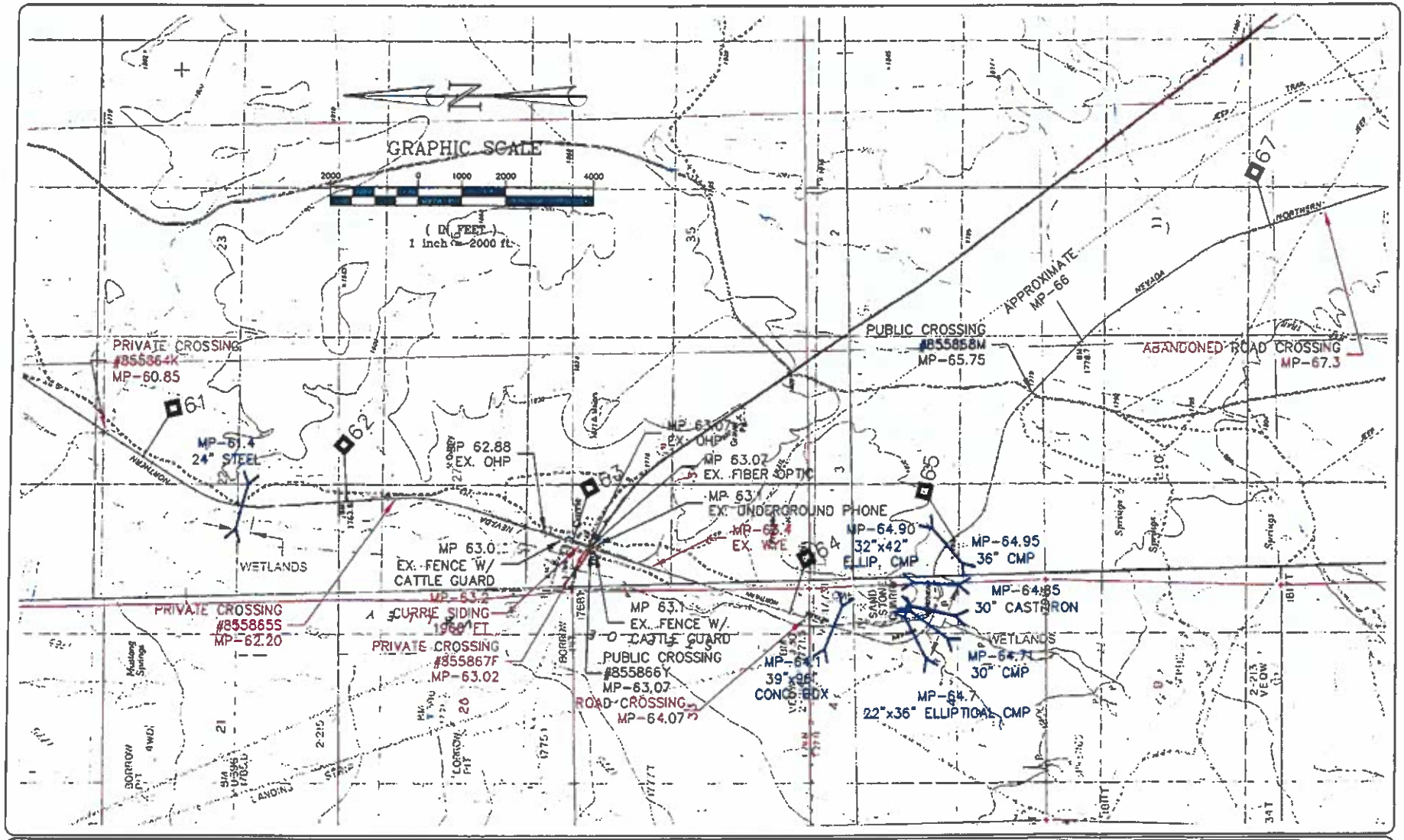
PRELIMINARY
NOT FOR
CONSTRUCTION

CALDWELL
RICHARDS
SORENSEN
ENGINEERS TO TRANSPORTATION

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

9 / SHEET OF

06107C
PROJECT NUMBER



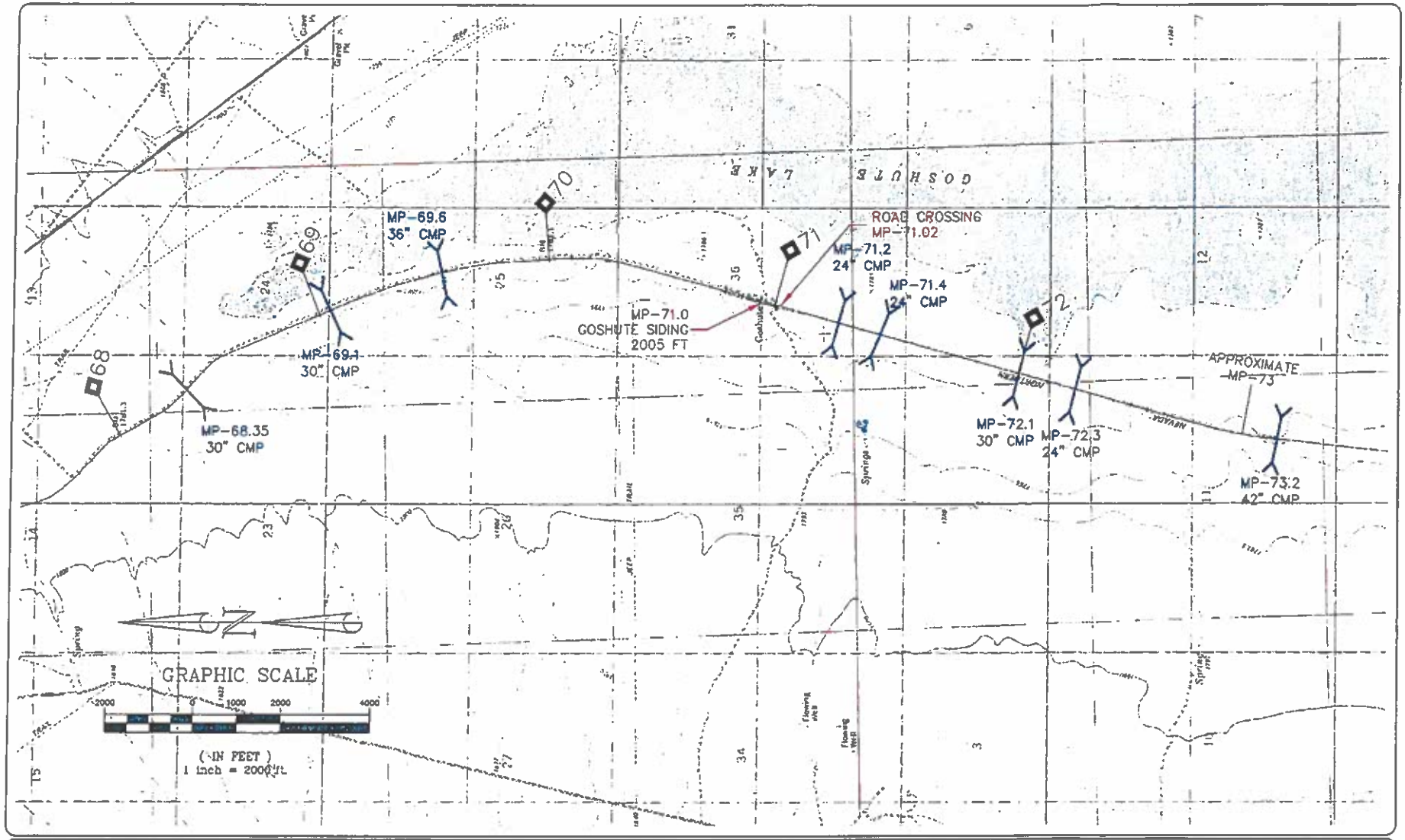
PRELIMINARY
NOT FOR
CONSTRUCTION

CALDWELL
RICHARDS
SORENSEN

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

10

06107C



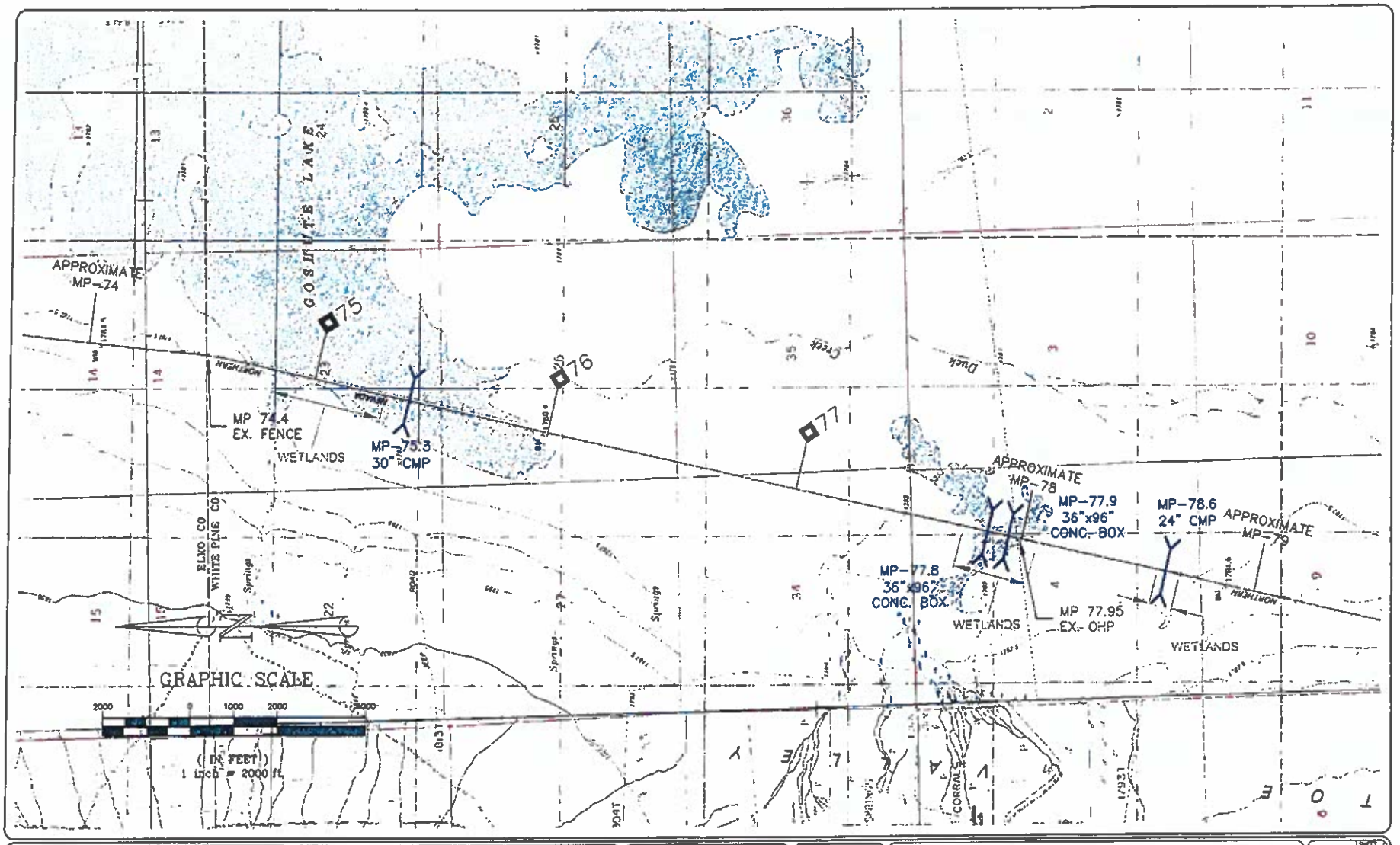
PRELIMINARY
NOT FOR
CONSTRUCTION

CALDWELL
RICHARDS
SORENSEN

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 11 of

06107C
PROJECT NUMBER



REV.	BY	DATE	DESCRIPTION

PRELIMINARY NOT FOR CONSTRUCTION

PRINCIPAL: PAUL HIRST
PROJECT MANAGER: BOB RAMSEY
CHECKED: DARREN TIRE
DRAWN BY: DANIEL WELSCH
SCALE: AS SHOWN
DATE ISSUED: APRIL 17, 2017

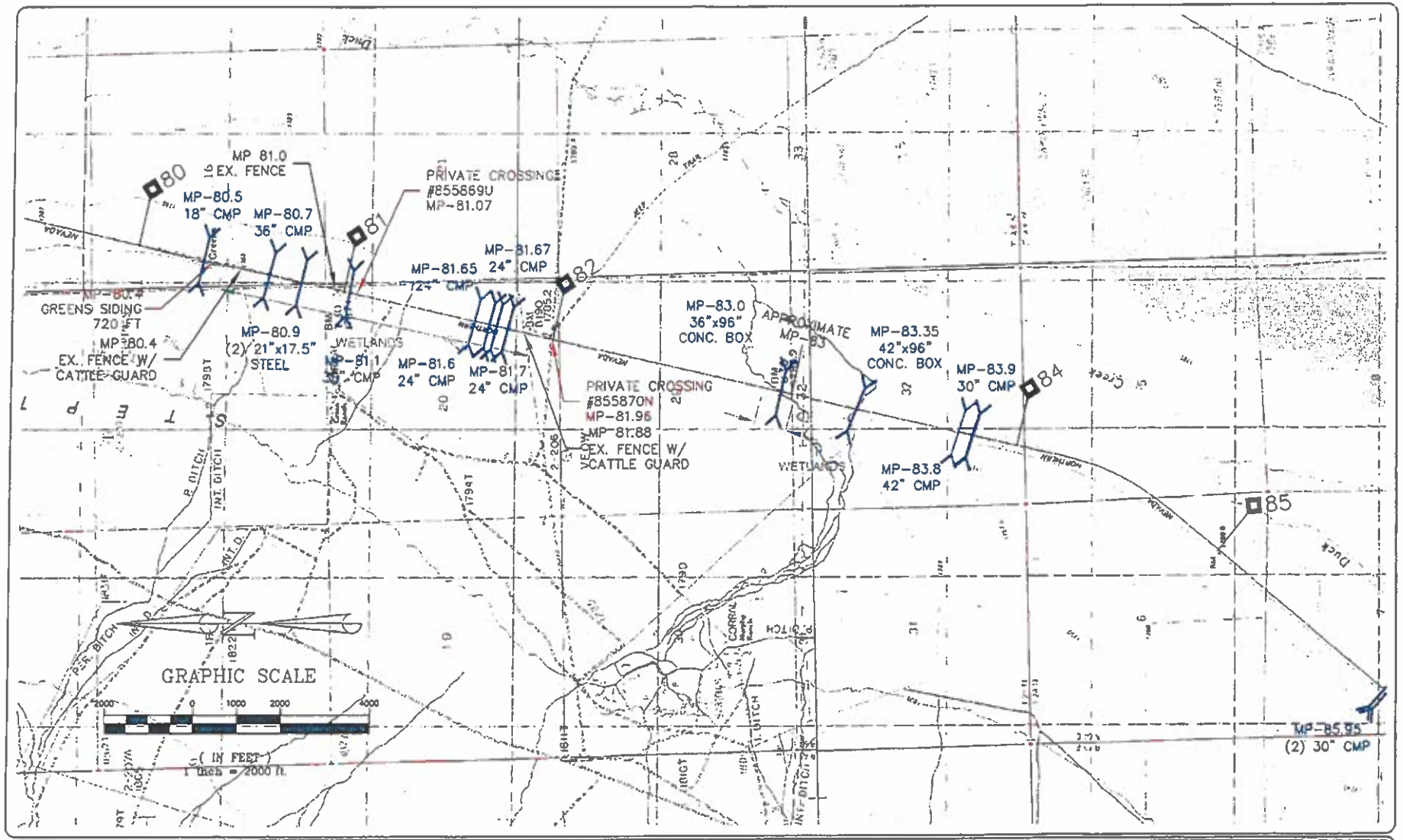
CALDWELL RICHARDS SORENSEN
CONSULTANTS IN INFRASTRUCTURE

3266 East 3400 South
Salt Lake City, UT 84109
Phone: (801) 320-3363
Fax: (801) 388-4272
www.crsengineers.com

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 12 OF

06107C
PROJECT NUMBER



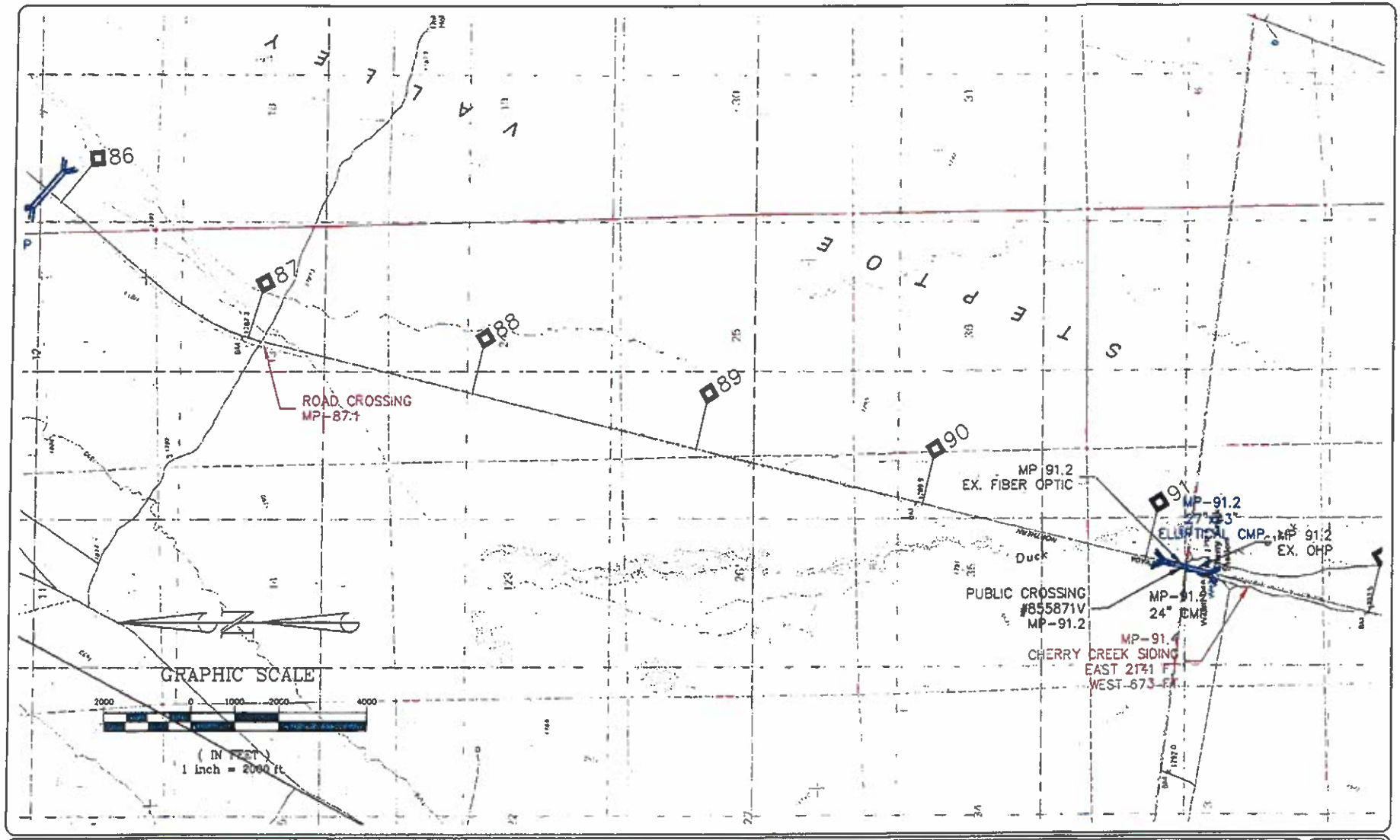
PRELIMINARY
NOT FOR
CONSTRUCTION

CALDWELL
RICHARDS
SORENSEN
ENGINEERS TO EXPEDITE CONSTRUCTION

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 13 OF

06107C
PROJECT NUMBER



REV.	BY	DATE	DESCRIPTION

PRELIMINARY
NOT FOR
CONSTRUCTION

PRINCIPAL: PAUL HIRST
PROJECT MANAGER: BOB RAMSEY
DRAWN BY: DARREN EVANS
CHECKED BY: DANIEL WELLICH
SCALE: AS SHOWN
DATE ISSUED: APRIL 17, 2007

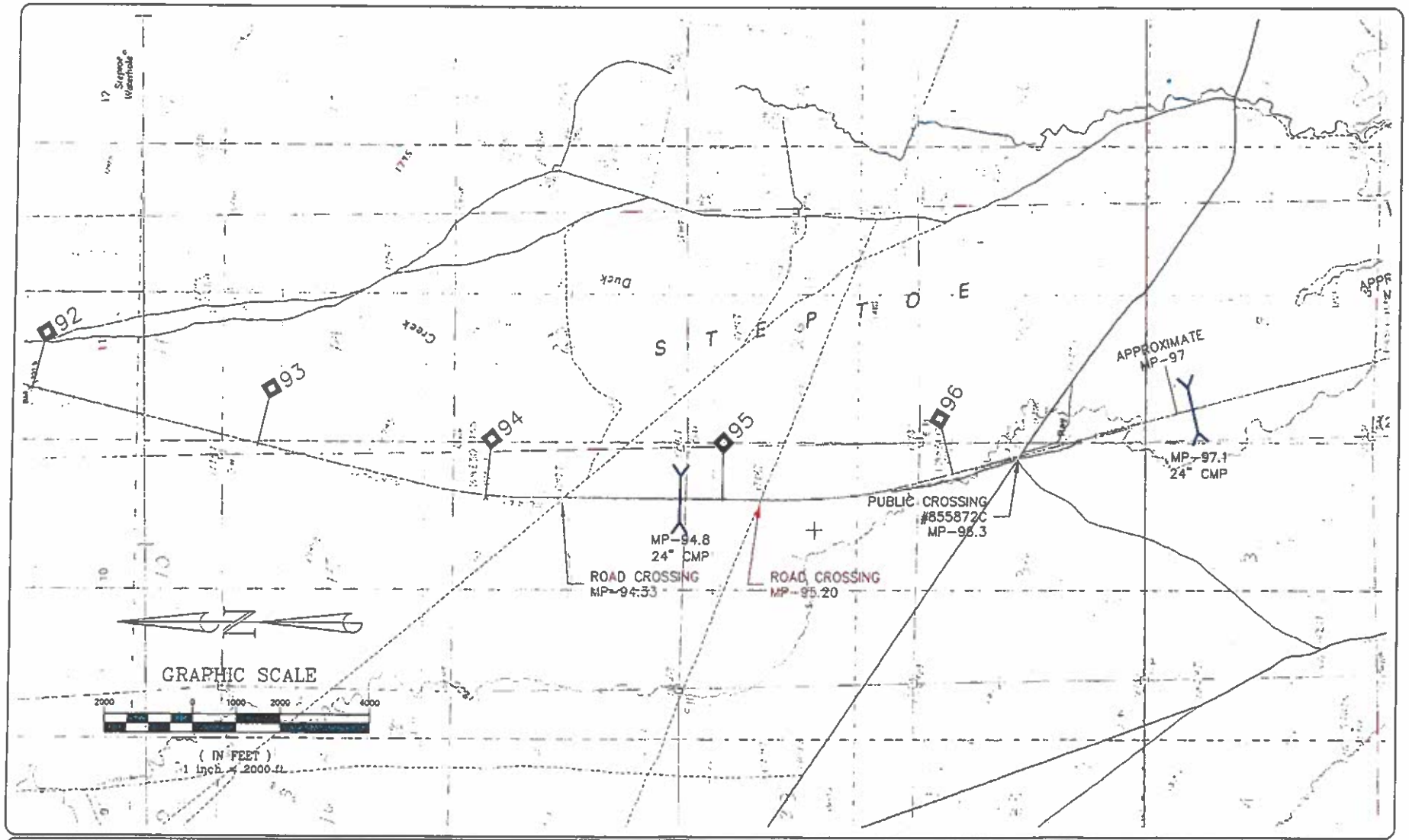
CALDWELL
RICHARDS
SORENSEN

2098 East 2900 South
Salt Lake City, UT 84109
Phone: (801) 359-5565
Fax: (801) 359-4272
www.crsengineers.com

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 14 OF

PROJECT NUMBER 06107C



PRELIMINARY
NOT FOR
CONSTRUCTION

PAUL HIRST
BOB RAMSEY
DARREN CYRE
DANIEL NELSON
AS SHOWN
APRIL 17, 2007

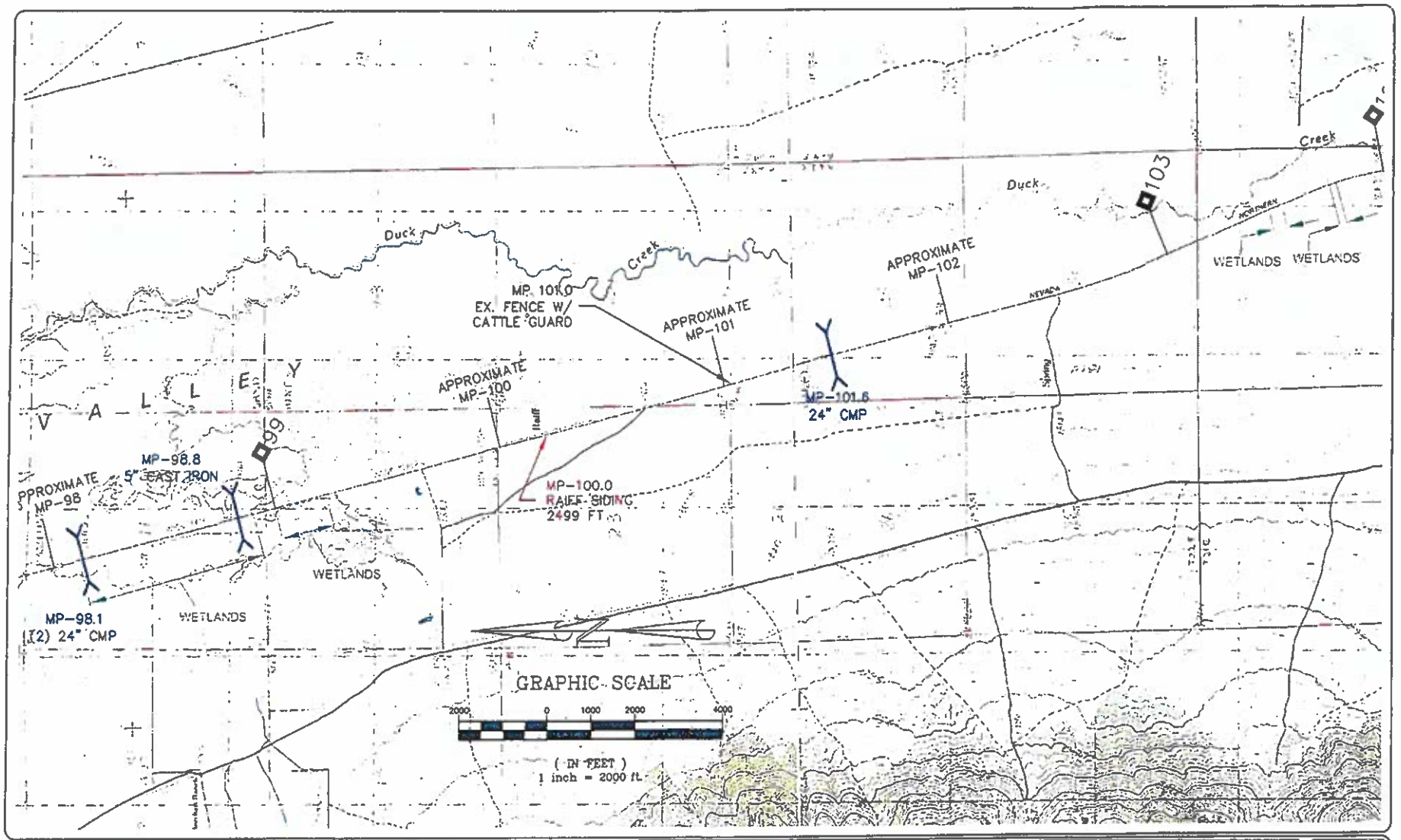
CALDWELL
RICHARDS
SORENSEN

3986 East 3100 South
Salt Lake City, UT 84109
Phone (801) 338-3365
Fax (801) 364-4272

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 15 OF

06107C
PROJECT NUMBER



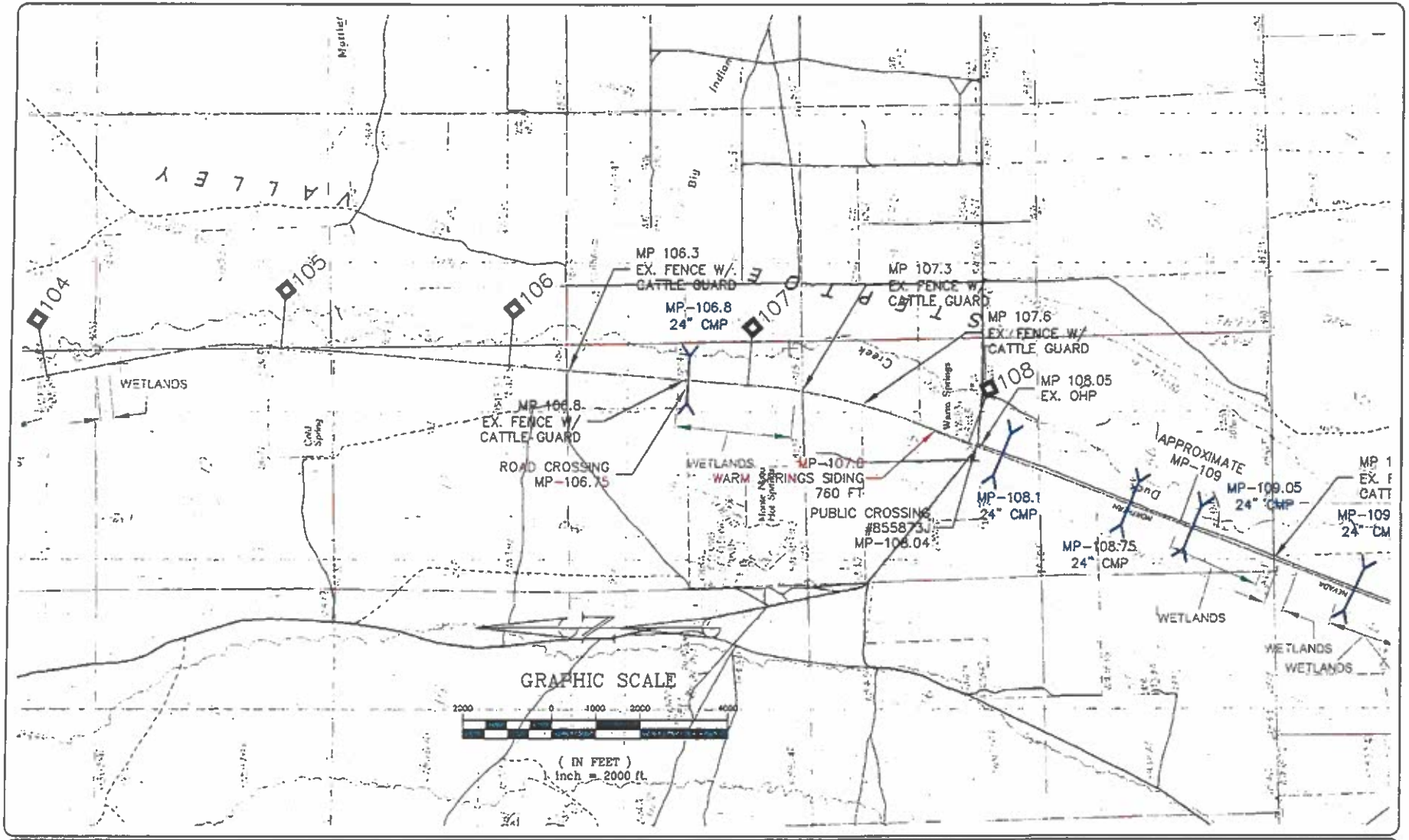
PRELIMINARY
NOT FOR
CONSTRUCTION

CALDWELL
RICHARDS
SORENSEN

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 16 OF

06107C
PROJECT NUMBER



REV	BY	DATE	DESCRIPTION

PRELIMINARY
NOT FOR
CONSTRUCTION

FINAL, FIRST — DATE/INITIALS
PROJECT MANAGER — DATE/INITIALS
QA/QC — DATE/INITIALS
CHECKED BY — DATE/INITIALS
APPROVED BY — DATE/INITIALS
SCALE: AS SHOWN — DATE ISSUED: APRIL 17, 2007

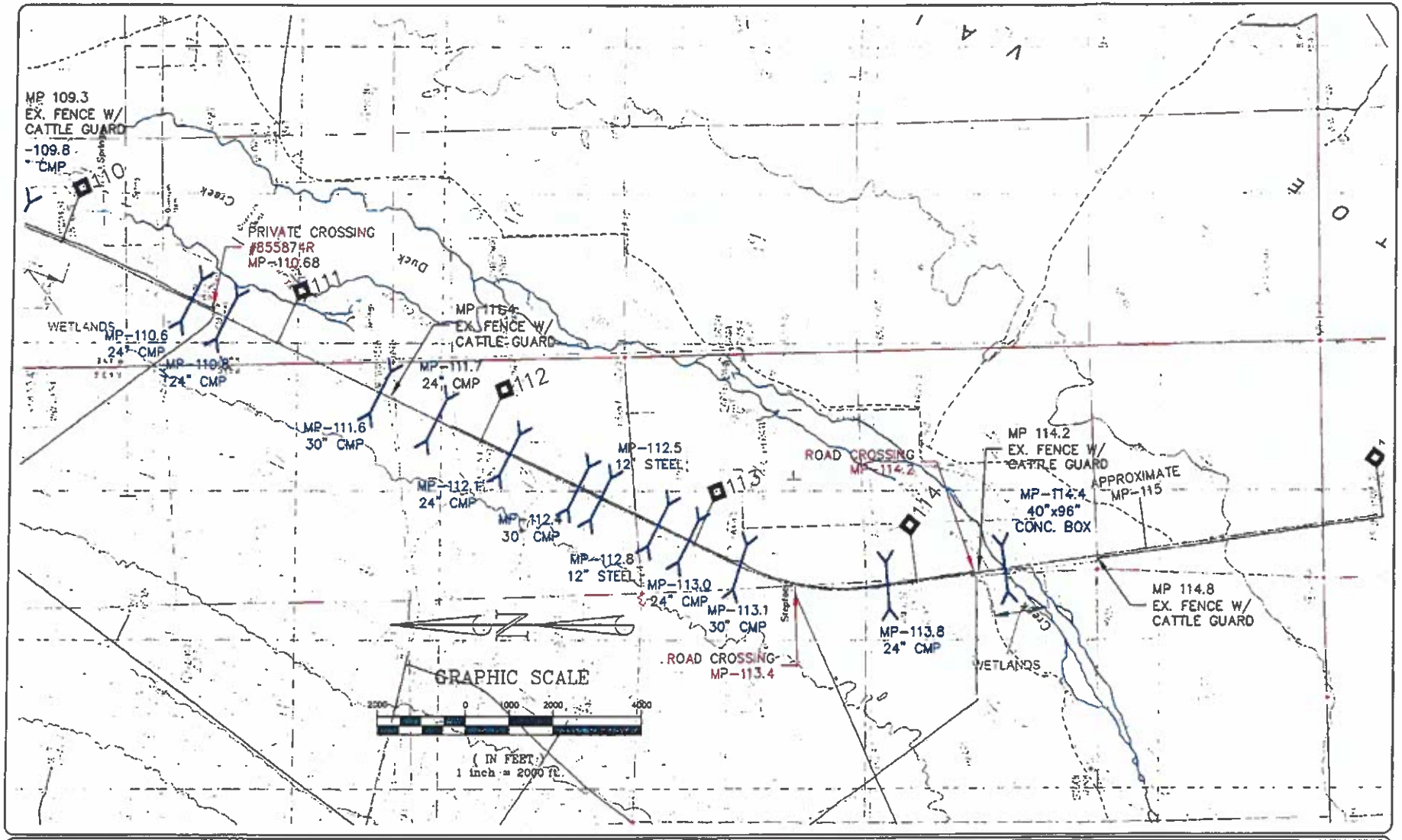
CALDWELL
RICHARDS
SORENSEN
ENGINEERS TO ENHANCE PROGRESS

2050 East 2100 South
Salt Lake City, UT 84109
Phone (801) 328-3361
Fax (801) 328-1273
www.crsengineers.com

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 17 OF

06107C
PROJECT NUMBER



REV.	BY	DATE	DESCRIPTION

PRELIMINARY
NOT FOR
CONSTRUCTION

PRINCIPAL PAUL WEST
PROJECT MANAGER BOB SANDEY
CHECKED DARRIN CYRK
DRAWN BY DANIEL NELLSON
SCALE AS SHOWN
DATE ISSUED APRIL 17, 2007

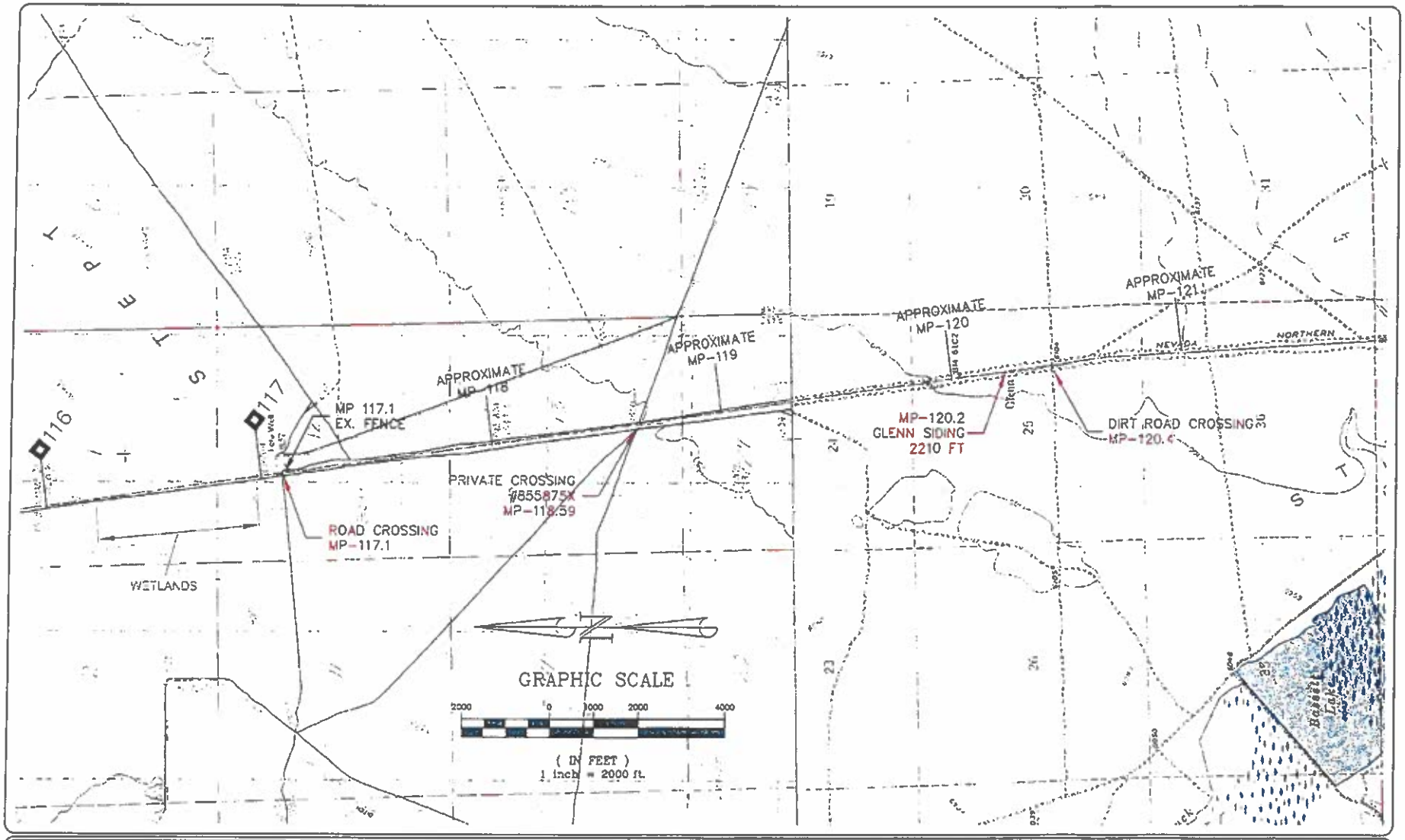
CALDWELL
RICHARDS
SORENSEN
ENGINEERS TO INFRASTRUCTURE

2000 East 3100 South
Salt Lake City, UT 84109
Phone: (801) 328-5363
Fax: (801) 328-4373
www.crsengineers.com

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

SHEET 18 OF

06107C
PROJECT NUMBER



PRELIMINARY
NOT FOR
CONSTRUCTION

CALDWELL
RICHARDS
SORENSEN

NEVADA NORTHERN RAILWAY
REFERENCE MAPS
MP 18.5 - MP 120

19

06107C

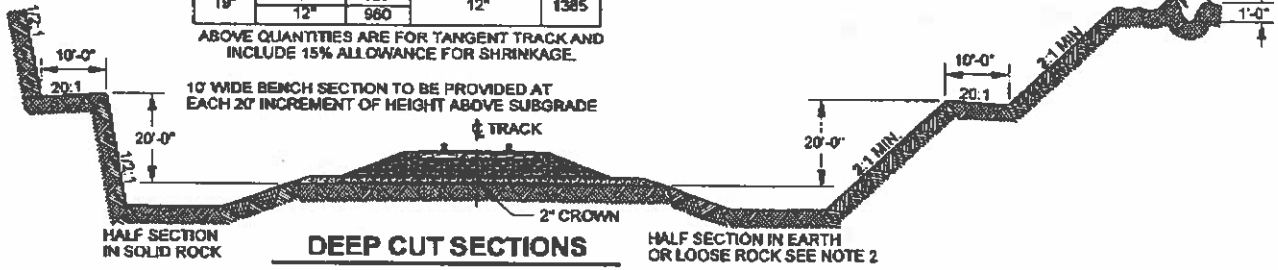
APPENDIX B

Typical UPRR Design and Construction Standards

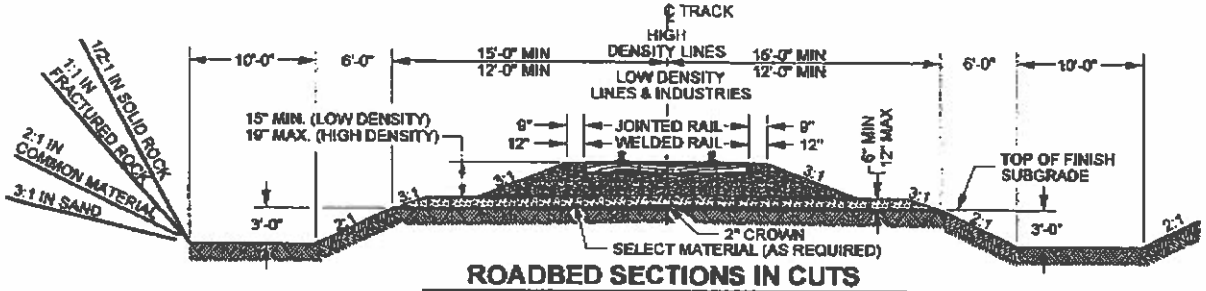
Note: This appendix contains a few select details that may be typical in the rehabilitation of the Nevada Northern Railway. For a complete set of UPRR standard details, refer to Union Pacific Railroad Track Standard Drawings (2005).

MATERIAL REQUIRED FOR 1000 FEET OF SINGLE TRACK				
BALLAST			SELECTED MATERIAL	
DEPTH	SHOULDER	CUBIC YARDS	DEPTH ABOVE TOP SUBGRADE	CUBIC YARDS
15"	9"	625	6"	700
	12"	650		
19"	9"	925	12"	1385
	12"	960		

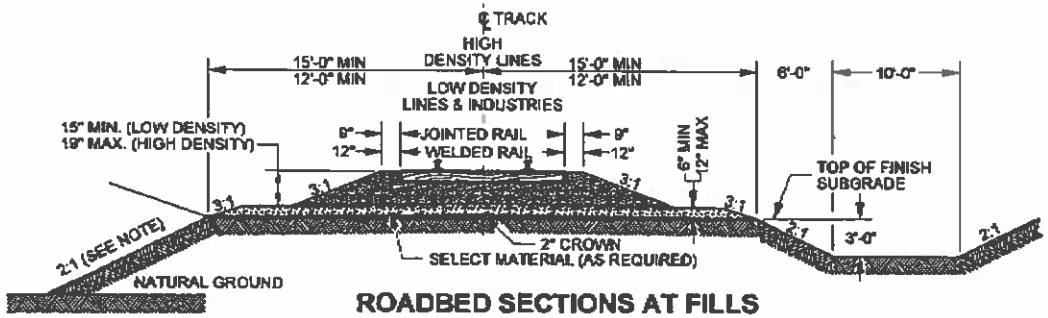
ABOVE QUANTITIES ARE FOR TANGENT TRACK AND INCLUDE 15% ALLOWANCE FOR SHRINKAGE.



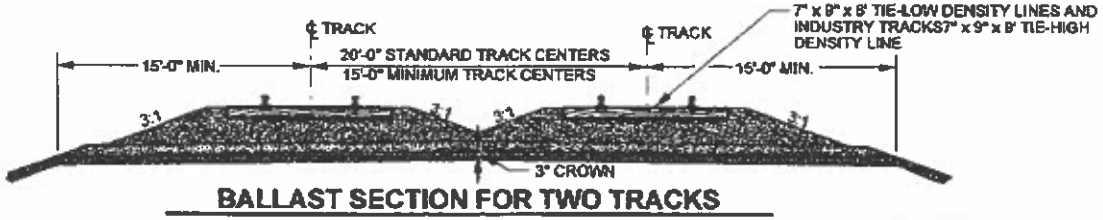
DEEP CUT SECTIONS



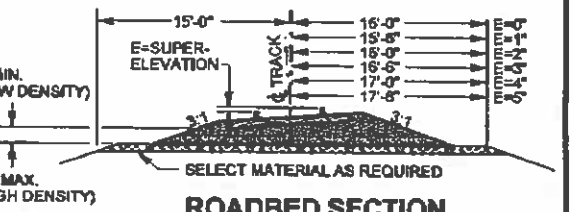
ROADBED SECTIONS IN CUTS



ROADBED SECTIONS AT FILLS



BALLAST SECTION FOR TWO TRACKS



ROADBED SECTION AT CURVED TRACK

FOR DETAILS NOT SHOWN, SEE CUT AND FILL SECTIONS ELSEWHERE ON THIS SHEET

NOTES:

1. THE DEPTH OF BALLAST AND DEPTH OF SELECTED MATERIAL SHALL BE DECIDED ON THE BASIS OF VOLUME OF TRAFFIC AND THE QUALITY OF SELECTED MATERIAL AND SUBGRADE DETERMINED BY THE RAILROAD'S ENGINEER SUBJECT TO THE APPROVAL OF THE CHIEF ENGINEER.
2. SLOPES SHOWN FOR BANKS IN CUTS AND ON FILLS SHALL BE CONSIDERED STANDARD AND GENERALLY USED, BUT MAY BE MODIFIED AS REQUIRED BY LOCAL CONDITIONS AND CHARACTER OF MATERIAL.
3. BALLAST MUST BE EQUALIZED IN ADVANCE OF DRESSING SO THAT FINAL SECTION WILL CONFORM TO SLOPE REQUIREMENTS AND CHARACTER OF MATERIAL.
4. WHERE OFF-TRACK ROADWAY IS TO BE PROVIDED, ADD 8'-0" ADDITIONAL WIDTH TO THE ROADBED SECTION AT TOP OF SELECTED MATERIAL ELEVATION.
5. ALL FILL SLOPES SHALL BE FACED WITH COVER OF MATERIAL SUITABLE FOR GROWING GRASS AND HAVING A THICKNESS OF APPROXIMATELY 6 INCHES. THE OUTER SURFACE OF THIS COVER SHALL COINCIDE WITH THE DESIGN SLOPE OF THE EMBANKMENT. MATERIAL FOR THIS COVER MAY BE OBTAINED FROM STRIPPING.
6. FLOW LINE ON 0.2% MINIMUM GRADE DITCHES AND BENCHES.
7. FLAT BOTTOM DITCHES ARE REQUIRED FOR HIGH DENSITY LINES, HOWEVER A "V" DITCH IS ACCEPTABLE FOR INDUSTRY TRACKS WHEN RIGHT-OF-WAY IS LIMITED AND WHERE LOCAL CONDITIONS AND CHARACTER OF MATERIAL SO REQUIRE.
8. REF U.P. STD DWG PAGE 0001.

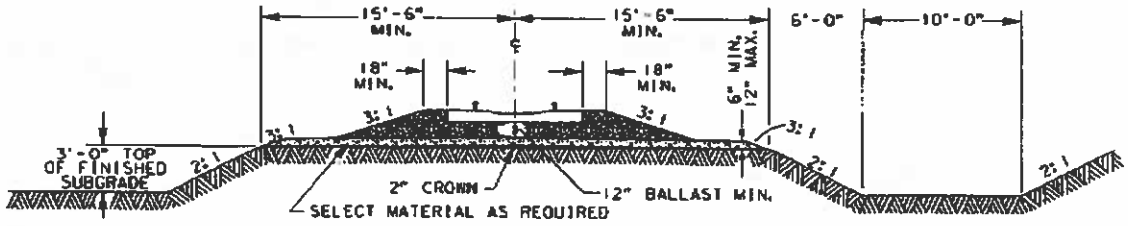
UNION PACIFIC RAILROAD ENGINEERING STANDARDS

ROADBED SECTION FOR WOOD TIE TRACK CONSTRUCTION

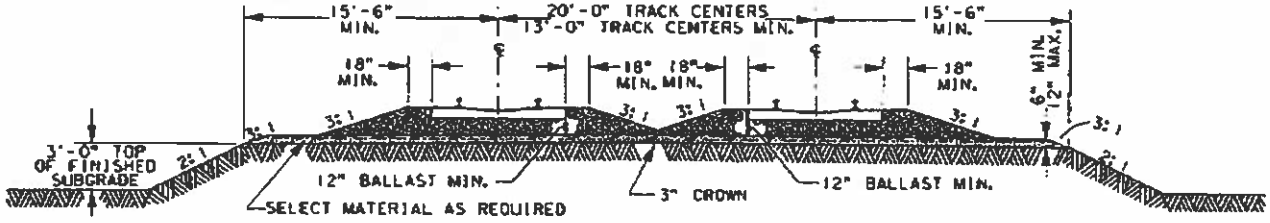
ADOPTED: JAN. 21, 1927
REVISED: JAN. 30, 2003
FILE NO.: 0001A

STD DWG 0001A

STD DWG 0001A

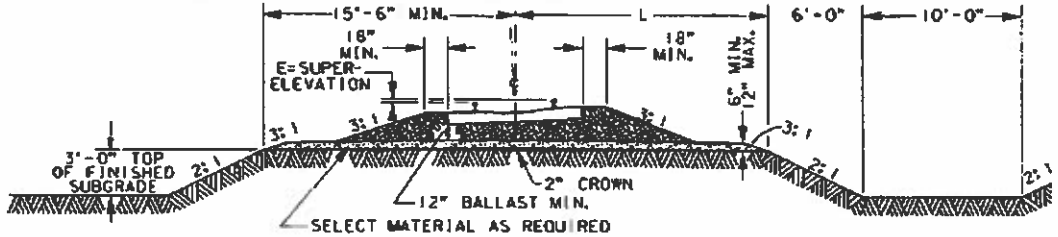


BALLAST SECTIONS FOR SINGLE TANGENT TRACK

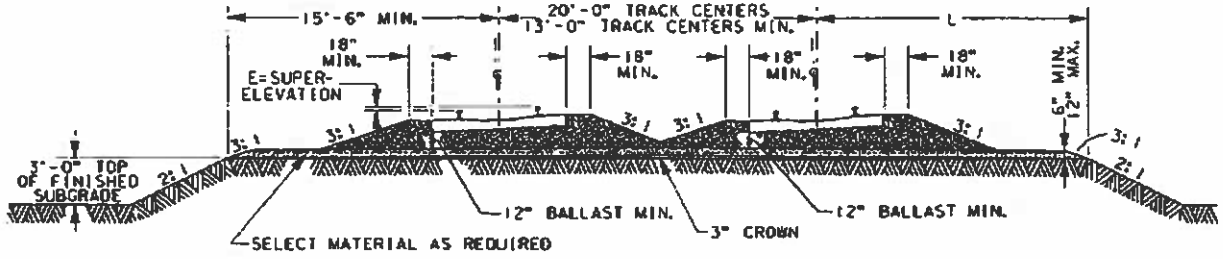


BALLAST SECTION FOR TWO TANGENT TRACKS

BALLAST REQUIRED FOR 1000 FEET OF SINGLE TRACK (CUBIC YARDS)		
E (IN.)	18"	L MIN.
0	1053	15'-6"
1	1125	16'-0"
2	1196	16'-6"
3	1274	17'-0"
4	1360	17'-6"
5	1442	18'-0"



BALLAST SECTIONS FOR SINGLE CURVED TRACK



BALLAST SECTION FOR TWO CURVED TRACKS

NOTES:
ACTUAL SUBBALLAST DEPTH TO BE DETERMINED BY CHIEF ENGINEER OF DESIGN

SUBGRADE EXTENSION TO 16'-6" WHEN SUPERELEVATION IS 5" OR GREATER.

TOP OF BALLAST TO BE FLAT ACROSS AT 1" UNDER BOTTOM OF RAIL.

FOR APPROVED BALLAST SOURCES, ACCESS BALLAST ORDER DATABASE IN LOTUS NOTES ON SERVER "UPRRDB2" UNDER FILE NAME "UPRRDB\BALLAST.NSF". ALL LISTED SOURCES ARE ACCEPTABLE FOR CONCRETE TIES EXCEPT FOR "AT-STRINGTOWN, OK".

FOR ROADBED DETAILS, SEE STD DWG 0001
FOR CONCRETE TIE DETAILS, SEE STD DWG 0201

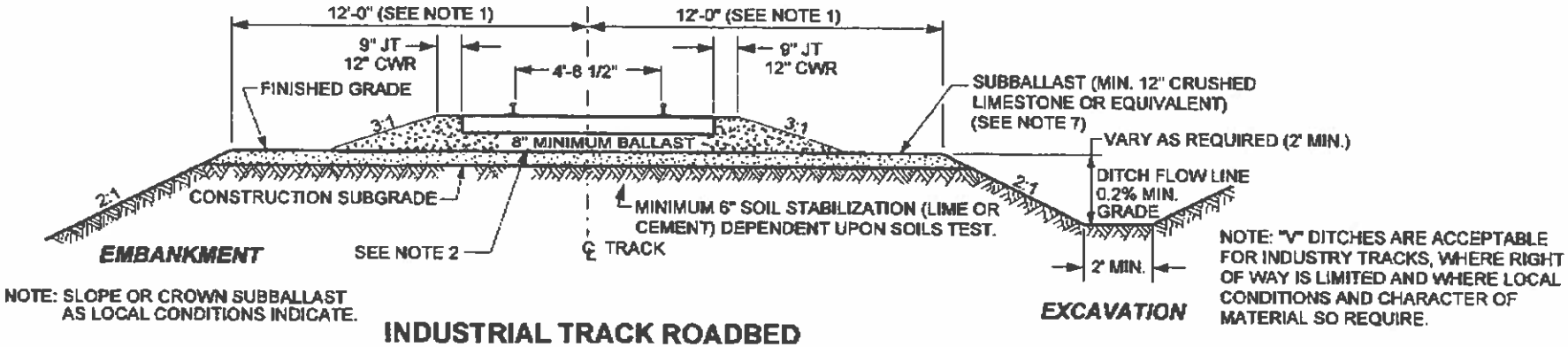
UNION PACIFIC RAILROAD
ENGINEERING STANDARDS

ROADBED SECTIONS FOR CONCRETE TIE TRACK CONSTRUCTION

ADOPTED: DEC. 31, 1996
REVISED: MARCH 1, 1998
FILE NO.: 0002

STD DWG 0002A

STD DWG 0002A

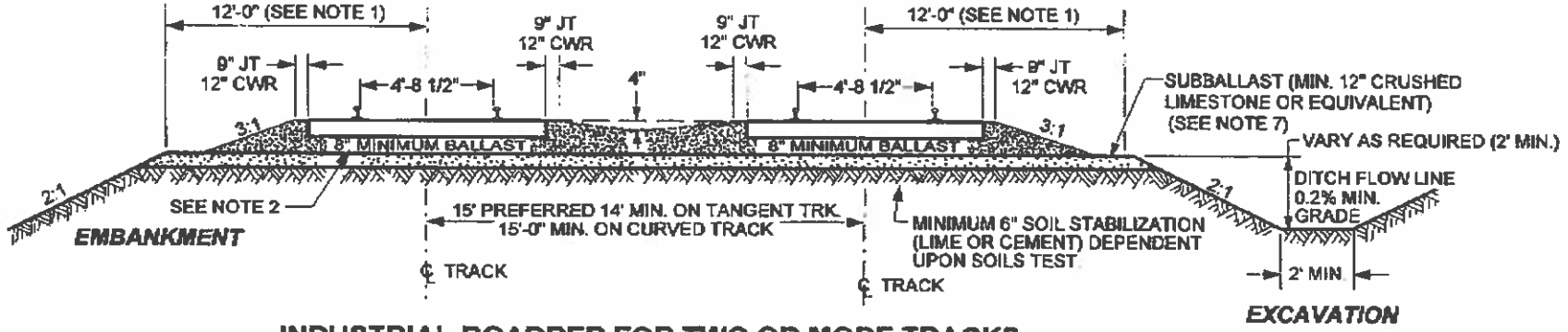


NOTE: SLOPE OR CROWN SUBBALLAST AS LOCAL CONDITIONS INDICATE.

NOTE: "V" DITCHES ARE ACCEPTABLE FOR INDUSTRY TRACKS, WHERE RIGHT OF WAY IS LIMITED AND WHERE LOCAL CONDITIONS AND CHARACTER OF MATERIAL SO REQUIRE.

INDUSTRIAL TRACK ROADBED

TYPICAL SECTION



INDUSTRIAL ROADBED FOR TWO OR MORE TRACKS

TYPICAL SECTION

NOTES:

1. 12' SHOULDER WIDTH STANDARD. 11' SHOULDER MUST BE APPROVED BY CHIEF ENGINEER.
2. IF USING CONCRETE TIES - 10" MINIMUM BALLAST UNDER TIES.
3. PREFERABLY TRACKS WILL NOT BE DEPRESSED BELOW GROUND LEVEL PARTICULARLY IN SNOW AND HIGH RUNOFF TERRITORIES, TRACKS CONSTRUCTED AT OR BELOW GROUND LEVEL MUST HAVE FULL STANDARD ROADBED DITCHES.
4. ALL NECESSARY DRAINAGE FACILITIES TO DIVERT RUNOFF WATER AWAY FROM TRACKS ARE TO BE PROVIDED AS APPROVED BY UNION PACIFIC RAILROAD'S CHIEF ENGINEER OF DESIGN.
5. WALKWAYS WILL BE CONSTRUCTED TO COMPLY WITH STATE REQUIREMENTS.
6. THESE STANDARDS DO NOT APPLY TO ORE AND COAL LINES OR OTHER HEAVILY USED TRACKS.
7. REFER TO EXHIBIT "H" IF LESS THAN 12" OF SUBBALLAST IS TO BE USED.

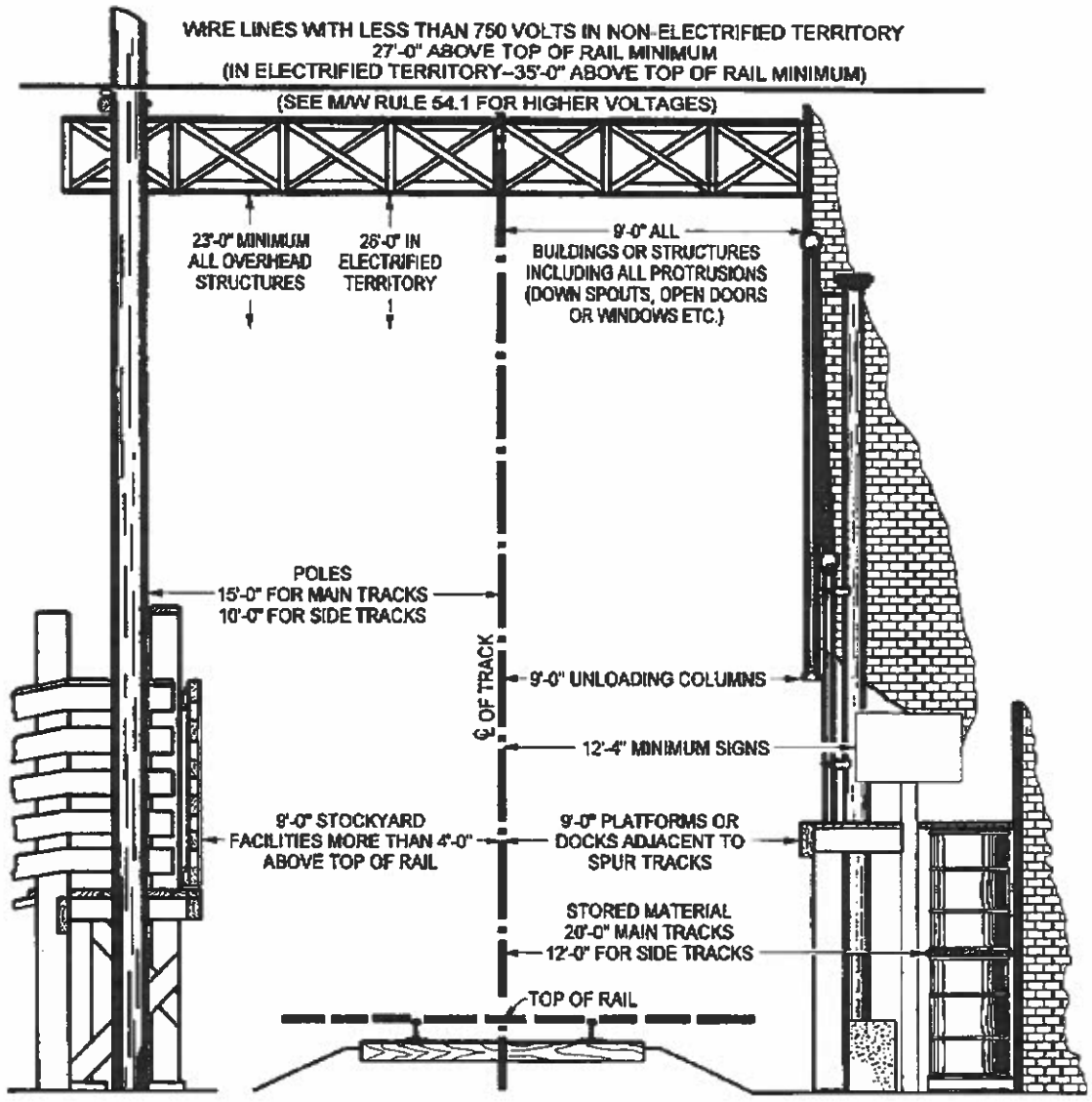
STD DWG 0003

UNION PACIFIC RAILROAD
ENGINEERING STANDARDS

ROADBED SECTION FOR INDUSTRIAL TRACK CONSTRUCTION

ADOPTED: AUG. 31, 2004
REVISED:
FILE NO.: 0003

STD DWG
0003



THROUGH INDUSTRY OWNED STRUCTURES AND FACILITIES

TRACK NOTES (SEE PAGE 2 FOR GENERAL NOTES):

TRACK CENTERS:

1. TWO OR MORE MAIN TRACKS WILL BE A MINIMUM OF 15'-0" CENTER TO CENTER. SIDE TRACKS ADJACENT TO A MAIN TRACK WILL BE A MINIMUM OF 15'-0" CENTER TO CENTER.
2. ANY TWO OR MORE SIDE OR INDUSTRY TRACKS WILL BE A MINIMUM OF 14'-0" CENTER TO CENTER.
3. LADDER TRACKS AND ANY ADJACENT TRACK WILL BE A MINIMUM OF 20'-0" CENTER TO CENTER.
4. TEAM TRACKS IN PAIRS MAY BE A MINIMUM OF 13'-0" CENTER TO CENTER.

SUPERELEVATION:

1. AN ADDITIONAL 4 1/4" HORIZONTAL CLEARANCE AT 20'-0" ABOVE TOP OF RAIL MUST BE ALLOWED ON THE LOW RAIL SIDE FOR EACH ONE INCH OF SUPERELEVATION TAPERING TO ZERO INCHES ADDITIONAL CLEARANCE AT THE TOP OF RAIL.

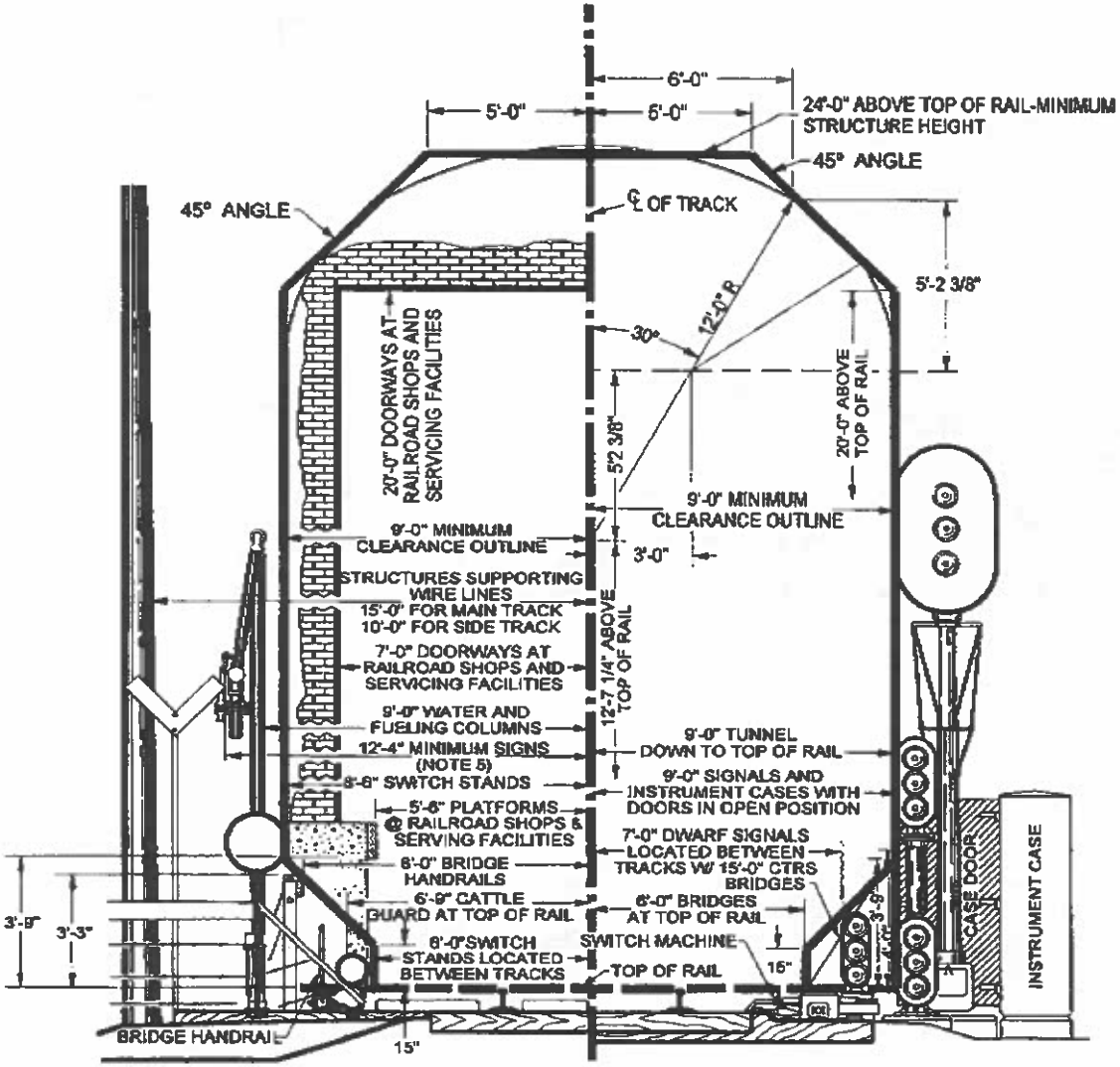
UNION PACIFIC RAILROAD ENGINEERING STANDARDS

STANDARD MINIMUM OPERATING CLEARANCES

ADOPTED: MAY 2, 1977
REVISED: OCT. 25, 2004
FILE NO.: 0038F

STD DWG 0038F PAGE 1 OF 2

STD DWG 0038F PAGE 1 OF 2



THROUGH RAILROAD OWNED STRUCTURES AND FACILITIES

GENERAL NOTES (SEE PAGE 1 FOR TRACK NOTES):

1. ALL STRUCTURES OR FACILITIES NOT SHOWN MUST BE AT LEAST 9'-0" FROM THE CENTER LINE OF TRACK AND AT LEAST 23'-0" ABOVE THE TOP OF RAIL.
2. CLEARANCES FOR STRUCTURES OR FACILITIES ON CURVES MUST BE INCREASED LATERALLY ON EACH SIDE 1 1/2" PER EACH DEGREE OF CURVATURE, EXTENDING TO 80'-0" BEYOND THE END OF THE CURVE.
3. ANY FACILITIES FALLING WITHIN THESE DIMENSIONS WILL BE CONSIDERED IMPAIRED CLEARANCE, SUBJECT TO AGREEMENT, AND MUST BE APPROVED PRIOR TO CONSTRUCTION BY UNION PACIFIC RAILROAD'S OFFICE OF THE CHIEF ENGINEER OF DESIGN.
4. WHERE STATE OR LOCAL LAWS REQUIRE GREATER CLEARANCES THAN SHOWN HERE, THOSE LAWS SHALL PREVAIL.
5. SIGNS FOR INTERIOR MAIN TRACKS IN MULTIPLE MAIN TRACK TERRITORY WILL BE A MINIMUM OF 9'-0" FROM CENTER OF TRACK.

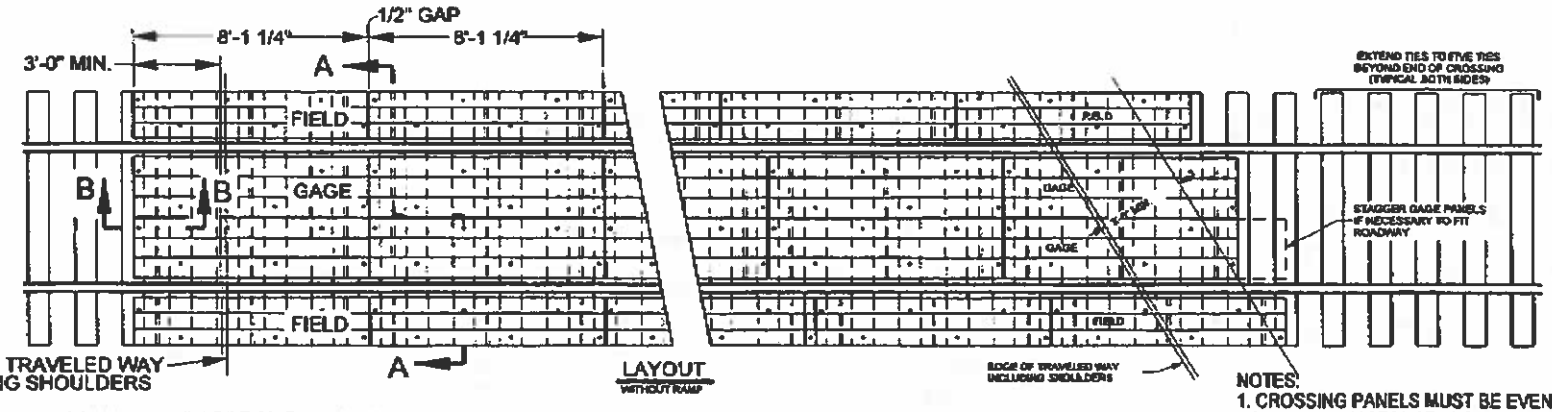
UNION PACIFIC RAILROAD ENGINEERING STANDARDS

STANDARD MINIMUM OPERATING CLEARANCES

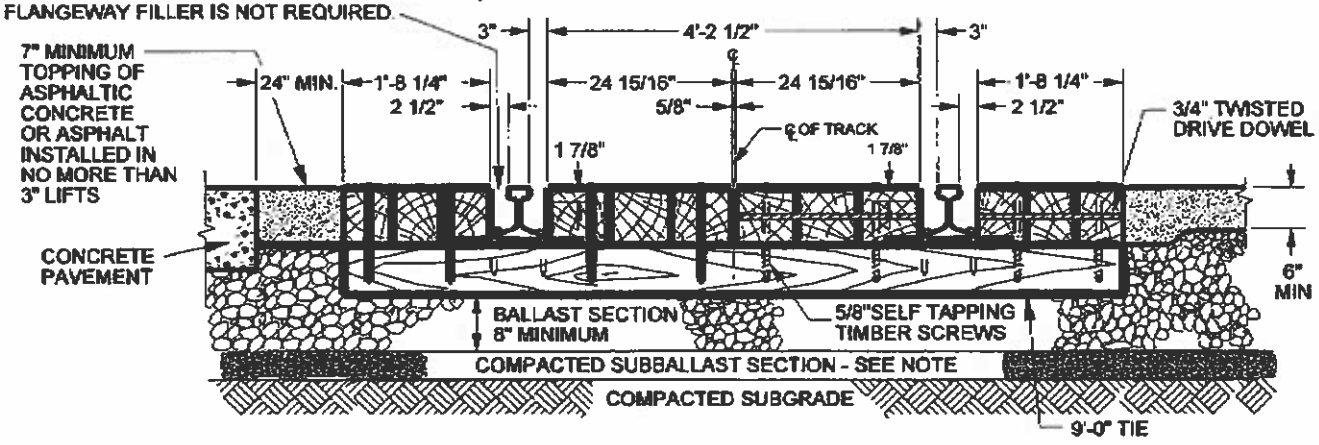
ADOPTED: MAY 2, 1977
REVISED: OCT. 25, 2004
FILE NO.: 0038F

STD DWG 0038F PAGE 2 OF 2

STD DWG 0038F PAGE 2 OF 2



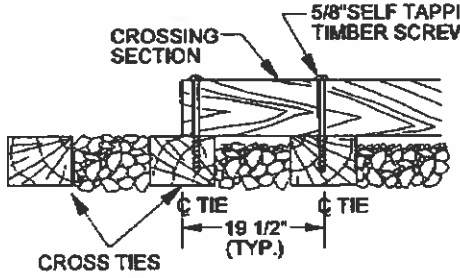
ON PUBLIC CROSSINGS, USE APPROVED RUBBER FLANGE WAY FILLER. ON PRIVATE CROSSINGS, FLANGEWAY FILLER IS NOT REQUIRED.



SECTION A-A (THROUGH CROSSING WITH TIMBER TIES)

NOTE:
PERFORATIONS TO BE PLACED DOWN-WARD NEAR FLOW LINE OF PIPE.

SECTION WITH DRAIN



SECTION B-B

NOTES:

1. CROSSING PANELS MUST BE EVENLY SUPPORTED ON ALL TIES. TRACK STRUCTURE INCLUDING RAIL, OTM, TIES, BALLAST AND ROADBED MUST BE IN EXCELLENT CONDITION. ALL TIES MUST BE 9' LONG, SPACED AT 19 1/2" CENTERS AND EXTEND FIVE TIES BEYOND END OF CROSSING. NEW 7" X 9" X 9'-0" TRACK TIES TO BE INSTALLED IF NECESSARY.
2. CROSSING SITE IS TO BE INSPECTED PRIOR TO START OF INSTALLATION TO DETERMINE THAT PROPER DRAINAGE AND SURFACE SUPPORT IS PROVIDED, TRACK GRADE IS UNIFORM AND EXISTING TIES ARE AT LEAST 9' LONG.
3. IF CONDITIONS WARRANT, SITE IS TO BE OVER-EXCAVATED AND CROSSING DRAINAGE SYSTEM INSTALLED USING COMPACTED, WELL GRADED GRANULAR FILL; SUBBALLAST, GEOTEXTILE AND PERFORATED DRAINAGE PIPE (IF REQUIRED) INSTALLED PER DETAILS OF THIS DRAWING.
4. ADDITIONAL SITE DRAINAGE INCLUDING PROPER DRAINAGE AT EACH QUADRANT OF CROSSING SHALL BE COMPLETED TO ENSURE CROSSING DRAINAGE.
5. RAIL JOINTS TO BE LOCATED TO FALL OUTSIDE THE CROSSING AREA A MINIMUM OF 15'-0" FROM END OF CROSSING TIMBER.

SEE PAGE 2 FOR THE REST OF THE NOTES

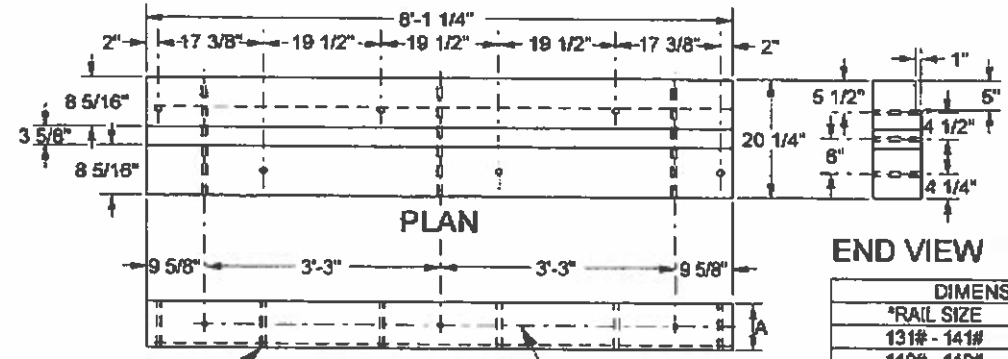
UNION PACIFIC RAILROAD ENGINEERING STANDARDS

INSTALLATION OF ROAD CROSSING W/ PREFAB TIMBER PANELS

ADOPTED: AUG. 17, 1987
REVISED: JUNE 2, 2004
FILE NO.: 0301G

STD DWG 0301G PAGE 1 OF 2

STD DWG 0301G PAGE 1 OF 2



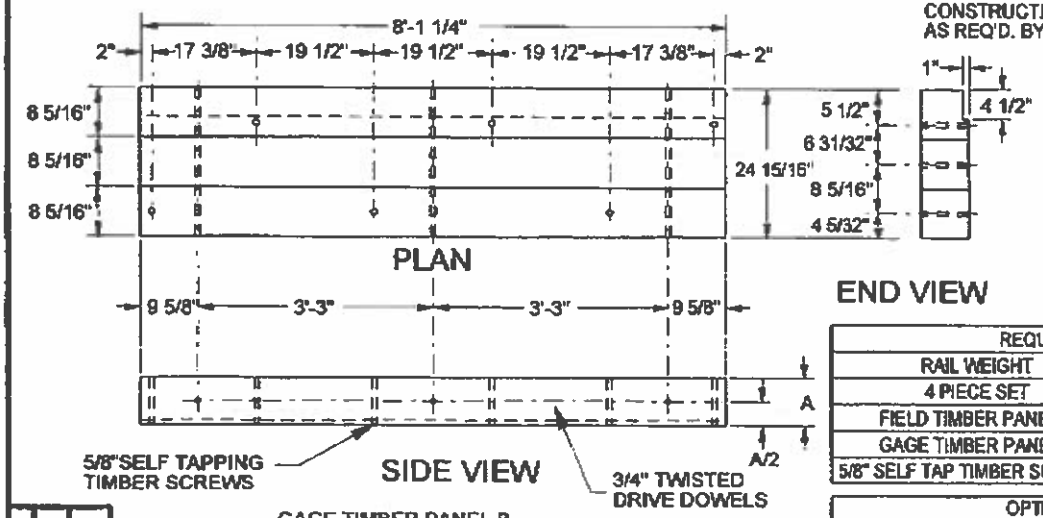
FIELD TIMBER PANEL A

MATERIAL FOR ONE SECTION
2 - A x 8 1/2" x 8'-1 1/4" TIMBERS
3 - 3/4"x19 1/2" TWISTED DRIVE DOWELS
6 - 5/8"x12" SELF TAPPING TIMBER SCREWS
1 - A x 3 1/4" x 8'-1 1/4" TIMBER

DIMENSION CHART		
*RAIL SIZE	A	SCREWS
131# - 141#	8"	5/8"x13"
110# - 119#	7 3/8"	5/8"x13"
90# & 100#	6 3/4"	5/8"x12"

* RAIL SHALL BE AT LEAST 115# FOR A MINIMUM LENGTH OF 20' BEYOND THE EDGE OF TRAVELED WAY

SUBBALLAST NOTE:
SUBBALLAST SECTION TO BE A MINIMUM OF 4" WHEN RENEWING EXISTING CROSSING. FOR NEW CONSTRUCTION, SUBBALLAST SECTION TO BE IN ACCORDANCE WITH CONSTRUCTION DESIGN STANDARDS OR AS REQ'D. BY STATE OR LOCAL AGENCIES.

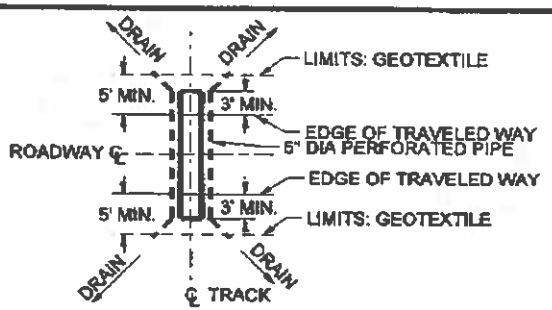


GAGE TIMBER PANEL B

MATERIAL FOR ONE SECTION
3 - A x 8 1/2" x 8'-1 1/4" TIMBERS
3 - 3/4"x24" TWISTED DRIVE DOWELS
6 - 5/8"x13" SELF TAPPING TIMBER SCREWS

REQUIRED COMPONENTS			
RAIL WEIGHT	90#-100#	110#-119#	131#-141#
4 PIECE SET	540-3500	540-3900	540-4300
FIELD TIMBER PANEL A	540-3600	540-4000	540-4400
GAGE TIMBER PANEL B	540-3700	540-4100	540-4500
5/8" SELF TAP TIMBER SCREWS	130-5400	130-5402	

OPTIONAL COMPONENTS	
20' SECTION 6" PERFORATED PIPE	510-3201
6" ADJUSTABLE PIPE ELBOW	510-3557
6" PIPE CONNECTOR BAND	510-3379
100' ROLL GEOTEXTILE	550-0119
FLANGEWAY RUBBER	540-1950



TYPICAL PIPE LAYOUT

NOTES (CONTINUED FROM PAGE 1):

FABRICATION AND TREATMENT:
1. CROSSING SECTIONS TO BE FABRICATED AND ASSEMBLED TO AVOID ANY CUTTING OR FITTING AT THE POINT OF INSTALLATION. SECTIONS TO BE PREDRILLED WITH 1/2" HOLES AND TRANSVERSELY DOWELED WITH 3/4" TWISTED DRIVE DOWELS. EACH PLANK TO BE FRAMED, BORED AND TREATED WITH A P2 SOLUTION TO 8 LBS. PER CUBIC FOOT RETENTION PRIOR TO ASSEMBLY INTO CROSSING SECTION. PLACE THE CROSSING SECTION MARK ON THE END OF ALL SECTIONS. EACH MARK TO HAVE A SUFFIX DENOTING RAIL SIZE AS SHOWN UNDER CATEGORIES IN DIMENSION CHART.

MATERIALS AND INSTALLATION:
1. REQUISITIONS FOR PREFABRICATED CROSSING SECTIONS TO BE MADE SPECIFYING THE NUMBER OF EACH TYPE OF SECTION REQUIRED (A OR B) AND THE WEIGHT OF RAIL WITH WHICH IT IS TO BE USED (133, 131, ETC.) AS DENOTED IN THE DIMENSION CHART UNDER CATEGORIES. DRILLING TO START AT THE CENTERLINE OF CROSSING AND WORK TOWARDS THE ENDS.

2. GEOTEXTILE AND PIPE TO BE INSTALLED ONLY AT LOCATIONS WHERE REQUIRED BY STATE OR LOCAL AGENCIES OR WHERE DESIGNATED BY CHIEF ENGINEER.

3. REPORT CROSSING GATE MALFUNCTIONS TO 24 HR UPRR CROSSING HOT LINE AT 1-800-848-8715.

4. ALL EXCEPTIONS TO THIS PLAN MUST BE APPROVED BY THE CHIEF ENGINEER.

UNION PACIFIC RAILROAD ENGINEERING STANDARDS

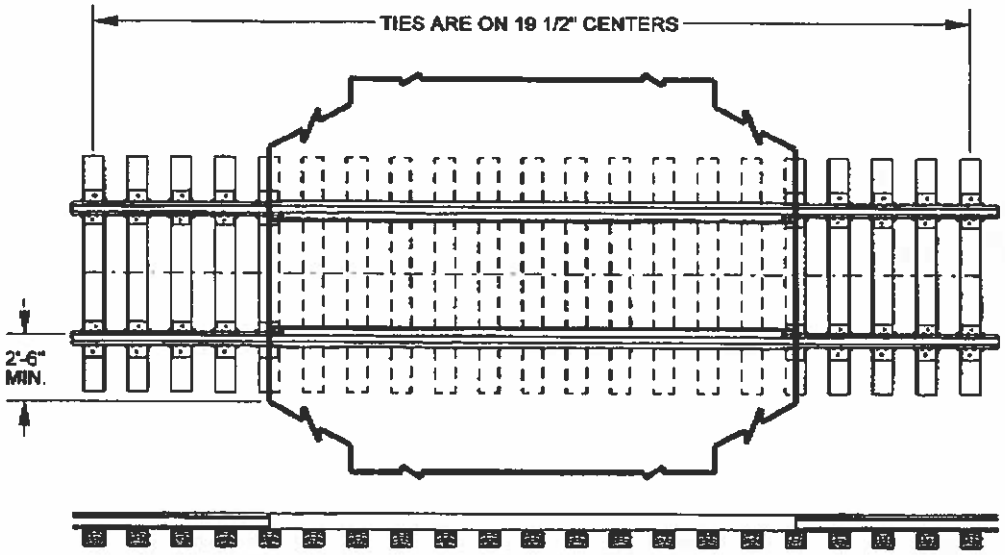
INSTALLATION OF ROAD CROSSING W/ PREFAB TIMBER PANELS

UNION PACIFIC

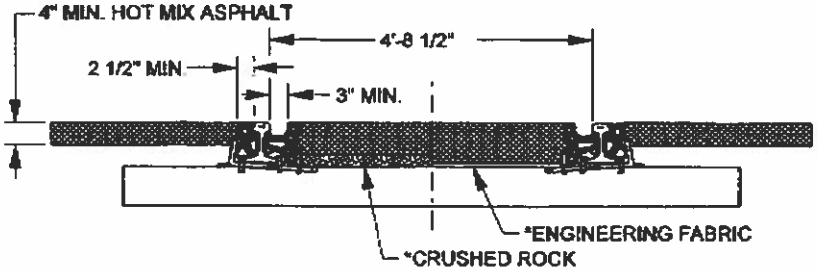
ADOPTED: AUG. 17, 1987
REVISED: JUNE 2, 2004
FILE NO.: 0301G

STD DWG
0301G
PAGE 2 OF 2

STD DWG 0301G PAGE 2 OF 2

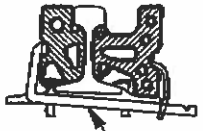


NOTE: SEE STD DWG 0301 FOR DRAINAGE DETAILS



*ENGINEERING FABRIC OR 2" OF CRUSHED ROCK MUST BE USED TO PREVENT HOT MIX ASPHALT FROM BONDING TO TIES

CROSS SECTION DETAIL



SEAL SECTION

ORDERING NOTE:
RUBBER RAIL SEAL CROSSING SECTIONS ARE TO BE ORDERED BY "TRACK FEET" IN 8'-0" INCREMENTS. EACH 8'-0" INCREMENT WILL INCLUDE (2) GAGE & (2) FIELD SIDE RAIL SEAL SECTIONS, (10) CLAMPS & ANY REQUIRED HARDWARE TO CONNECT THE SECTIONS TOGETHER.

NOTES:
1) USE OF THIS STANDARD FOR NEW CONSTRUCTION IS LIMITED TO INDUSTRIAL LEAD TRACKS, AND SPUR TRACKS WHERE THE AVERAGE DAILY TRAFFIC VOLUME DOES NOT EXCEED 500. USE ON MAIN LINES IS RESTRICTED TO TEMPORARY REPAIRS TO EXISTING CROSSINGS SURFACES.

2) CROSSING SITE IS TO BE INSPECTED PRIOR TO START OF INSTALLATION TO DETERMINE THAT PROPER DRAINAGE AND SURFACE SUPPORT IS PROVIDED, TRACK GRADE IS UNIFORM.

3) FOR COMPLETE RENEWAL OF CROSSING & NEW CONSTRUCTION: TRACK STRUCTURE INCLUDING RAIL, OTM, TIES, BALLAST, AND ROADBED MUST BE IN EXCELLENT CONDITION. ALL TIES MUST BE 9 FT. LONG, SPACED AT 19 1/2" CENTERS AND EXTEND 5 TIES BEYOND END OF CROSSING. NEW 7"X9"X9' TRACK TIES TO BE INSTALLED IF NECESSARY. IF CONDITIONS WARRANT, SITE IS TO BE OVER-EXCAVATED AND CROSSING DRAINAGE SYSTEM INSTALLED USING COMPACTED, WELL-GRADED GRANULAR FILL; SUBBALLAST, GEOTEXTILE, AND PERFORATED DRAINAGE PIPE (IF REQUIRED) INSTALLED PER DETAILS OF THIS DRAWING. ADDITIONAL SITE DRAINAGE INCLUDING PROPER DRAINAGE AT EACH QUADRANT OF CROSSING SHALL BE COMPLETED TO ENSURE CROSSING DRAINAGE. SUBBALLAST SECTION TO BE A MINIMUM OF 4" WHEN COMPLETE RENEWAL OF EXISTING CROSSING. FOR NEW CONSTRUCTION, SUBBALLAST SECTION TO BE IN ACCORDANCE WITH CONSTRUCTION DESIGN STANDARDS OR AS REQUIRED BY STATE OR LOCAL AGENCIES. USE OF GEOTEXTILE AND DRAINAGE PIPE TO BE ONLY AT LOCATIONS WHERE REQUIRED BY STATE OR LOCAL AGENCIES OR WHERE SPECIFICALLY DESIGNATED BY CHIEF ENGINEER.

4) IN ALL INSTALLATIONS THE RAIL JOINTS SHOULD FALL OUTSIDE THE CROSSING AREA A MINIMUM OF 15 FEET FROM THE END OF THE CROSSING.

5) USE OF CLAMPS ARE REQUIRED IN EACH TIE CRIB WITHIN THE LIMITS OF THE CROSSING. CLAMPS MUST BE ATTACHED PRIOR TO PLACEMENT OF ASPHALTIC CONCRETE (SEE SECTION DETAILS).

6) HOT MIX ASPHALTIC CONCRETE MUST COMPLY WITH STATE D.O.T. SPECIFICATIONS AND BE PLACED IN 2 INCHES MINIMUM & 4 INCHES MAXIMUM LIFTS. CARE MUST BE TAKEN DURING COMPACTION OF ASPHALT TO PREVENT DAMAGE TO HOLD DOWN CLAMPS OR RUBBER. ASPHALT SHOULD BE ROLLED PARALLEL TO THE RAIL UNTIL THE FINAL LIFT AND COMPACTION. FINAL LIFT OF ASPHALT IS TO BE LEVEL WITH THE TOP OF RAIL FOR 30 INCHES FROM THE FIELD SIDE OF THE RAIL.

7) SLOPE EDGE OF PAVING TO RETURN TO ORIGINAL EDGE OF PAVING ALIGNMENT. LENGTH OF TRANSITION WILL DEPEND ON LOCAL CONDITIONS.

8) AT THE TIE-IN POINT WITH THE EXISTING PAVEMENT, THE OLD PAVEMENT MUST BE CUT DOWN A MINIMUM 2" TO ELIMINATE A FEATHER EDGE ON THE NEW PAVEMENT.

9) USE STATE D.O.T. SPECIFICATION FOR THE ASPHALT SPRAY TACK COAT.

10) ENVIRONMENTAL RULES OF THE GOVERNMENT BODY HAVING AUTHORITY WILL BE FOLLOWED WHEN DISPOSING OF THE PAVEMENT REMOVED FROM THE CROSSING.

11) MATERIAL USED ON GAGE SIDE RAIL SEAL SHALL HAVE AN ELECTRICAL RESISTANCE OF A MINIMUM OF 10 MEGOHMS AT 500 VOLTS DC.

12) REPORT CROSSING GATE MALFUNCTIONS TO 24 HR UPRR CROSSING HOT LINE AT 1-800-848-8715.

13) ALL EXCEPTIONS TO THIS PLAN MUST BE APPROVED BY THE CHIEF ENGINEER.

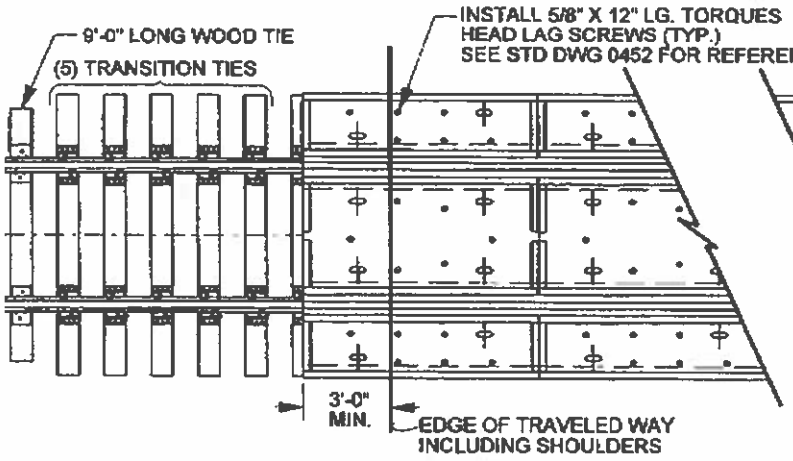
RAIL SIZE	ITEM NO.
112-115 LB.	540-0206
132-141 LB.	540-1290

UNION PACIFIC RAILROAD ENGINEERING STANDARDS

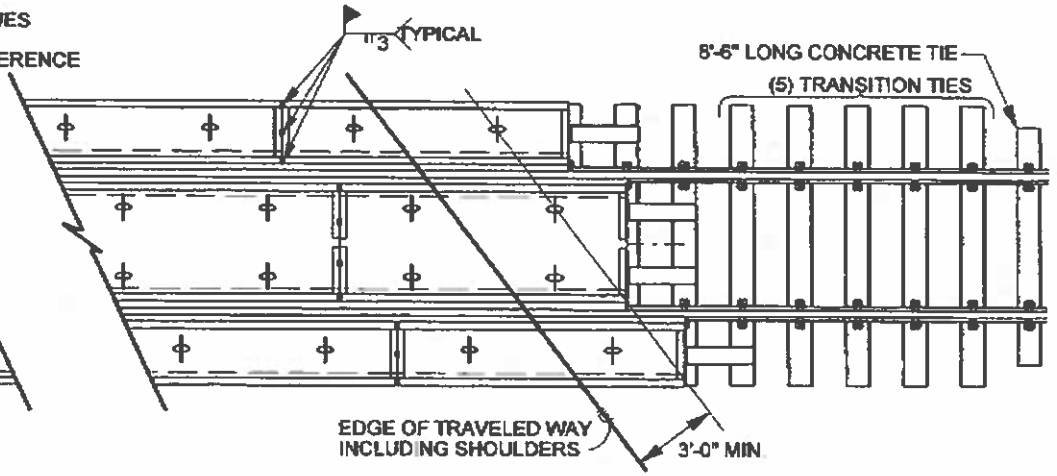
LIGHT DUTY ROAD CROSSING ASPHALT WITH RUBBER SEAL SECTIONS

ADOPTED: FEB. 3, 2001
REVISED: DEC. 17, 2001
FILE NO. 0302A

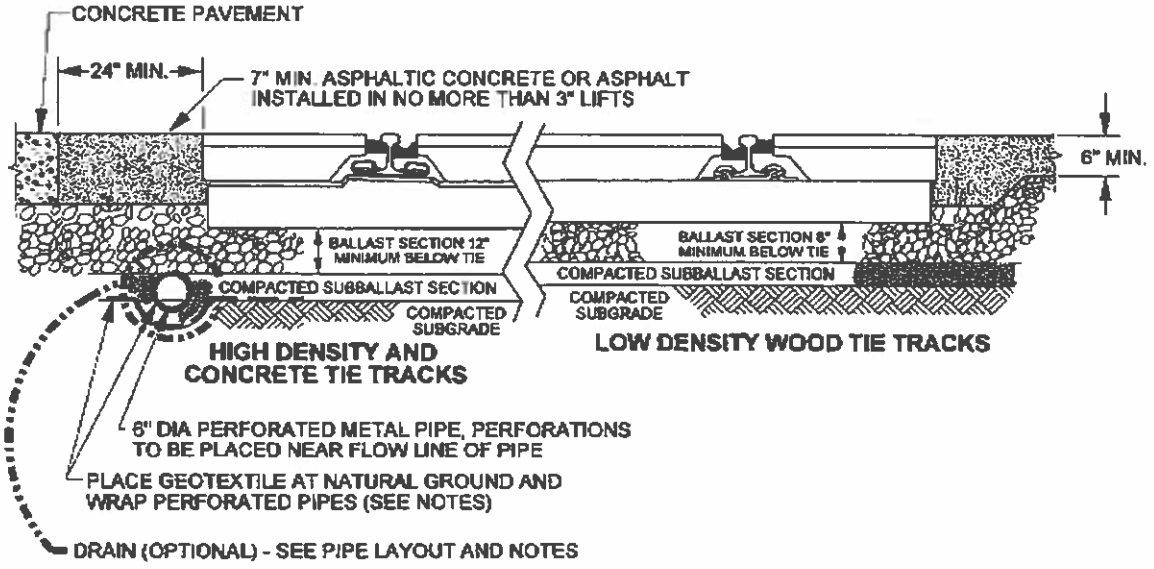
STD DWG 0302A



PLAN VIEW OF PANEL WITH TIMBER TIES



PLAN VIEW OF PANEL & JOINT WELD LOCATION W/CONCRETE TIES



TYPICAL BALLAST AND ASPHALT DETAIL

NOTES:
SEE PAGE 2 FOR NOTES AND MORE DETAILS.

UNION PACIFIC RAILROAD ENGINEERING STANDARDS

INSTALLATION OF ROAD CROSSINGS W/ PRECAST CONCRETE PANELS

ADOPTED: DEC. 19, 1987
REVISED: MAY 1, 2004
FILE NO.: 0304E

STD DWG 0304E PAGE 1 OF 2

NOTES:

1. CROSSING PANEL SUPPORT THROUGH THE CROSSING MUST BE UNIFORM. CONCRETE TIE SPACING IS TO BE A MAXIMUM OF 24" CENTER TO CENTER. WOOD TIE SPACING TO BE MAXIMUM OF 19 1/2" CENTER TO CENTER. TIE SPACING MUST BE ADJUSTED TO SUPPORT THE ENDS OF THE PANELS

2. CROSSING SITE IS TO BE INSPECTED PRIOR TO START OF INSTALLATION TO DETERMINE THAT PROPER DRAINAGE AND SURFACE SUPPORT IS PROVIDED, TRACK GRADE IS UNIFORM AND EXISTING TIES ARE AT LEAST 10' LONG.

3. IF CONDITIONS WARRANT, SITE IS TO BE OVER-EXCAVATED AND CROSSING DRAINAGE SYSTEM INSTALLED USING COMPACTED, WELL GRADED GRANULAR FILL, SUBBALLAST, GEOTEXTILE AND PERFORATED DRAINAGE PIPE (IF REQUIRED) INSTALLED PER DETAILS OF THIS DRAWING.

4. ADDITIONAL SITE DRAINAGE INCLUDING PROPER DRAINAGE AT EACH QUADRANT OF CROSSING SHALL BE COMPLETED TO ENSURE CROSSING DRAINAGE.

5. PRECAST PANELS ARE TO BE HANDLED AND SUPPORTED AT SPECIFIED LIFTING INSERT LOCATIONS ONLY. LIFTING EQUIPMENT AND CONNECTION INSERTS ARE TO BE PROPERLY SIZED TO HANDLE THE LENGTH OF PANELS BEING INSTALLED. RING LIFTING DEVICES ARE AVAILABLE FROM COMPANY WAREHOUSE

6. APPROACH ASPHALT ROADWAY PAVING IS TO MEET STATE DOT HIGHWAY SPECIFICATIONS AND INSTALLED ACCORDINGLY. ASPHALT IS TO BE INSTALLED WITH PAVER WITH MAXIMUM 3" LIFTS AND LAID PARALLEL TO CROSSING TO MINIMIZE APPROACH SETTLEMENTS.

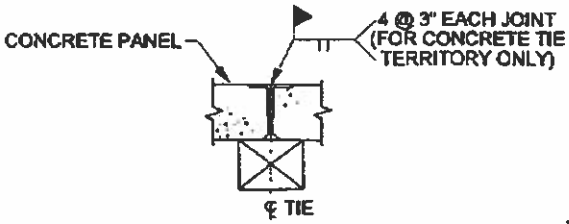
7. GEOTEXTILE AND PIPE TO BE INSTALLED ONLY AT LOCATIONS WHERE REQUIRED BY STATE OR LOCAL AGENCIES OR WHERE DESIGNATED BY CHIEF ENGINEER.

8. GALVANIZED ELASTIC FASTENERS ARE TO BE USED WITHIN THE CROSSING AREA AND ON THE (5) TRANSITION TIES ON EACH SIDE OF THE CROSSING. PANDROL E-CLIPS TO BE USED ON WOOD TIE CROSSINGS AND SAFELOK CLIPS ON CONCRETE TIE CROSSINGS.

9. ALL RAIL JOINTS IN CROSSING AREA TO BE WELDED, DO NOT INSTALL BOLTED JOINT BARS.

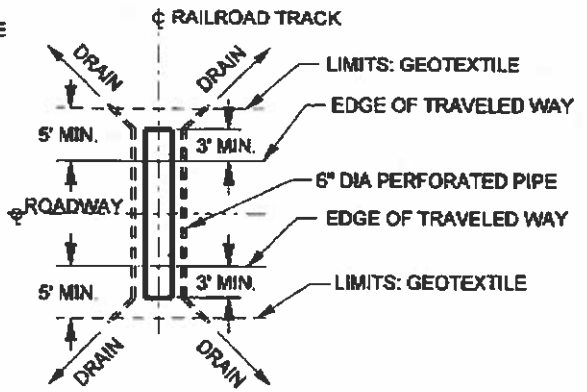
10. REPORT CROSSING GATE MALFUNCTIONS TO 24 HR UPRR CROSSING HOT LINE AT 1-800-848-8715.

11. ALL EXCEPTIONS TO THIS PLAN MUST BE APPROVED BY THE CHIEF ENGINEER.



JOINT BETWEEN PANELS

INTERIOR JOINTS BETWEEN PANELS MUST REST ON CENTER LINE OF A WOOD OR CONCRETE TIE AS SHOWN

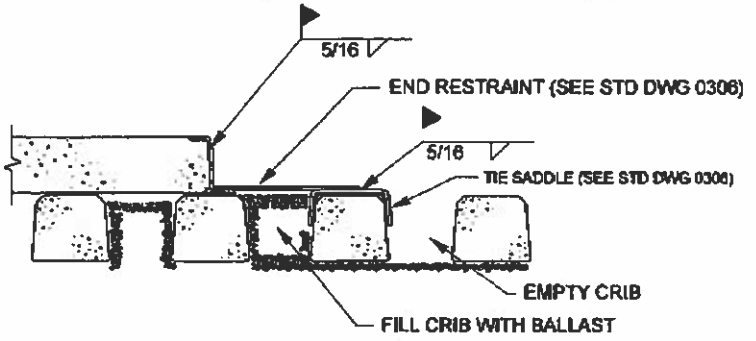


TYPICAL PIPE LAYOUT

NOTE:
GEOTEXTILE & PIPE TO BE INSTALLED ONLY AT LOCATIONS WHERE REQUIRED BY STATE OR LOCAL AGENCIES OR WHERE DESIGNATED BY CHIEF ENGINEER.

REQUIRED COMPONENTS	
RING LIFTING DEVICE	410-1371
5/8" TORQUES SCREW FOR WOOD TIES (STD DWG 0452)	130-5400
ELASTOMERIC BEARING PAD FOR 141 LB. RAIL ON WOOD TIES	540-0203
CONFORMAL ELASTOMERIC BEARING PAD FOR 10'-0" CONCRETE TIES	503-6315
CONFORMAL ELASTOMERIC BEARING PAD FOR 8'-6" CONCRETE TIES	503-6312
END RESTRAINT FOR CONCRETE TIES (ONLY)	540-1925

OPTIONAL COMPONENTS (SET INCLUDES 6 PIECES)	
20' SECTION 6" PERFORATED PIPE	510-3201
6" ADJUSTABLE ELBOW	510-3557
6" PIPE BANDS	510-3379
100' ROLL GEOTEXTILE	550-0119



END RESTRAINT DETAIL (FOR CONCRETE TIES ONLY)

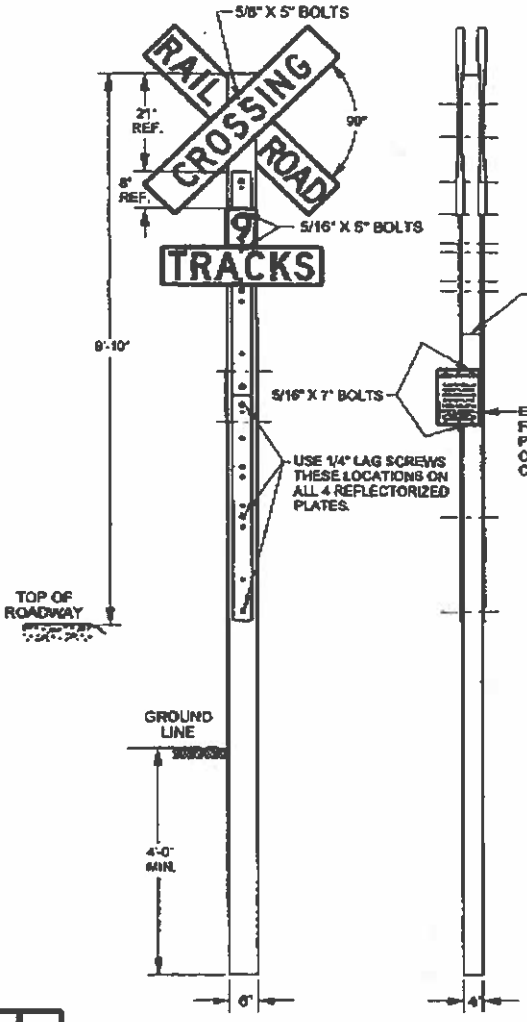
UNION PACIFIC RAILROAD ENGINEERING STANDARDS

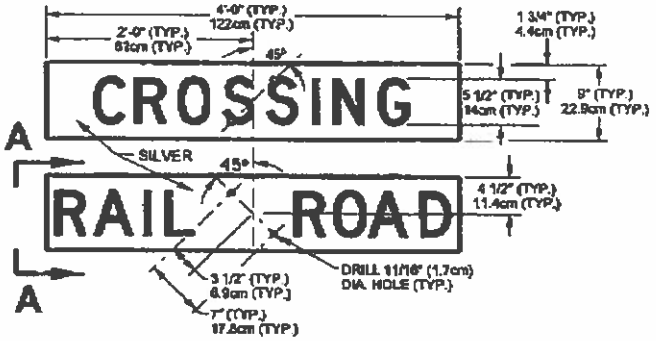
INSTALLATION OF ROAD CROSSINGS W/ PRECAST CONCRETE PANELS

UNION PACIFIC

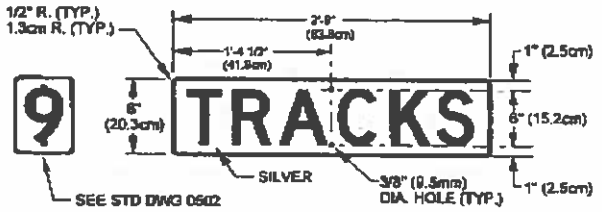
ADOPTED: DEC. 19, 1967
REVISED: MAY 1, 2004
FILE NO.: 0304E

STD DWG 0304E PAGE 2 OF 2

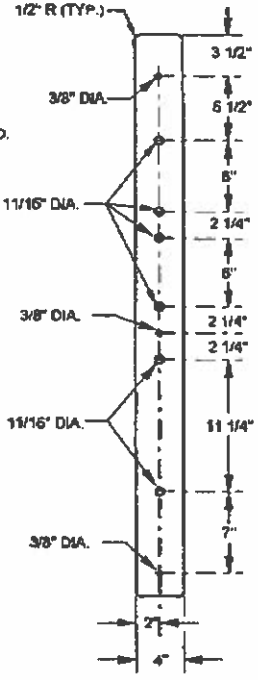




CROSS BUCK DETAIL

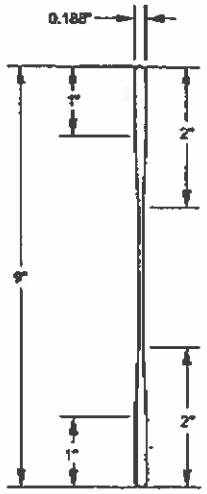


MULTIPLE TRACK SIGN DETAIL



REFLECTORIZED FACE PLATE

*REFLECTORIZED FACE PLATE, ITEM NO. 393-1195, COMES IN 2-48" STRIPS. 96" OF STRIPPING IS REQUIRED ON BOTH SIDES OF POST.



VIEW A-A

NOTES:

1. CROSS BUCKS TO BE ALUMINUM ALLOY 5063-T6 PER DETAIL (REF. DYE NO. AY-5655). TWO DOUBLE FACED CROSS BUCKS ARE REQUIRED FOR EACH SIGN. BACKGROUND SURFACE TO BE 3M NO. 3990 SILVER DIAMOND GRADE OR EQUIVALENT REFLECTIVE SHEETING. LETTERS TO BE BLACK GOTHIC SERIES "C".
2. "TRACK" SIGN TO BE 0.080" THICK SHEET ALUMINUM 3105. ONE SINGLE FACED SIGN REQUIRED FOR EACH CROSSING WHERE TWO OR MORE TRACKS ARE TO BE CROSSED. BACKGROUND SURFACE TO BE 3M NO. 3990 SILVER DIAMOND GRADE OR EQUIVALENT REFLECTIVE SHEETING.
3. ONE SIGN TO BE PLACED ON THE RIGHT HAND APPROACH TO EACH CROSSING WHERE PHYSICALLY FEASIBLE AND LOCATED TO ADMIT THE BEST VIEW FROM THE ROADWAY. SET CENTER OF POST 15' (4.6M) FROM THE CENTER LINE OF THE NEAREST TRACK, WITH BLADES AT RIGHT ANGLES TO THE ROADWAY, AND LOCATED NOT LESS THAN 8' (2.4M) FROM EDGE OF ROADWAY SHOULDER. WHERE THERE IS NO ROADWAY SHOULDER, CENTER OF POST TO BE LOCATED NOT LESS THAN 14' (4.3M) FROM EDGE OF TRAVELED WAY. IN URBAN AREAS WHERE A CURB IS PRESENT, CENTER OF POST TO BE LOCATED NOT LESS THAN 4' (1.2M) FROM FACE OF THE CURB. ON ONE WAY STREETS, SIGNS TO BE LOCATED ON BOTH SIDES OF STREET.
4. MORE THAN TWO SIGNS MAY BE NECESSARY WHERE UNUSUAL CONDITIONS EXIST OR WHERE THE DISTANCE BETWEEN TRACKS CROSSED EXCEEDS 100' MEASURED ALONG THE ROADWAY.
5. FOR LETTERING, SEE STD DWG 0501
   FOR 6" NUMERALS, SEE STD DWG 0502
   FOR EMERGENCY SIGN, SEE STD DWG 0530
   FOR POST AND HARDWARE, SEE STD DWG 0599

ITEM	ITEM NO.
CROSS BUCK	393-1194
"TRACKS" SIGN	393-6387
POST 4" X 6" X 16'	505-1630
EMERGENCY SIGN	393-1355
*REFLECTORIZED FACE PLATE	393-1195

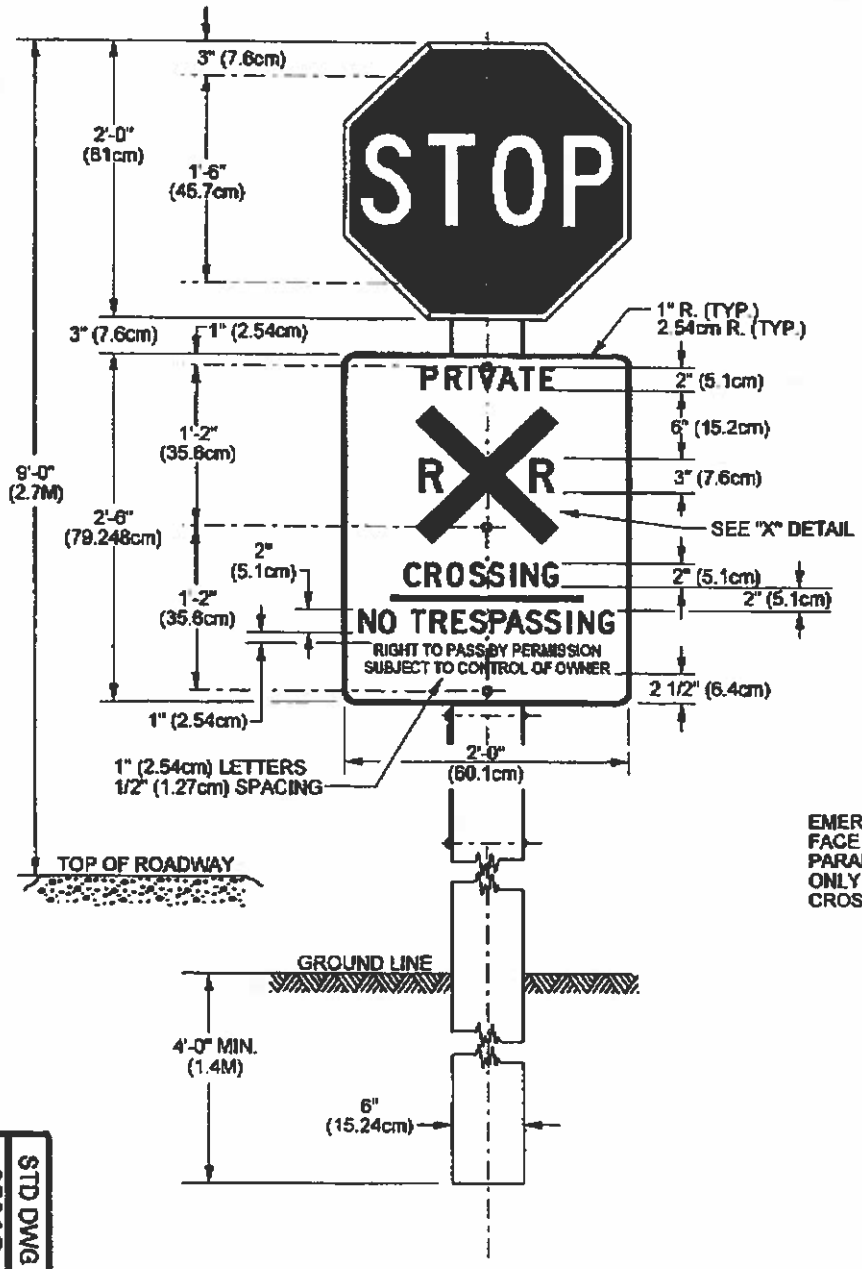
UNION PACIFIC RAILROAD
ENGINEERING STANDARDS

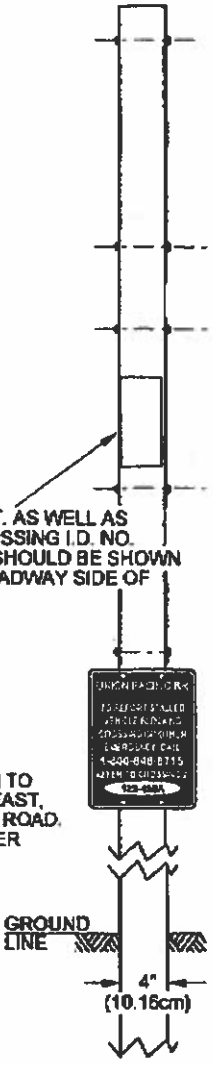
PUBLIC HIGHWAY CROSSING SIGN

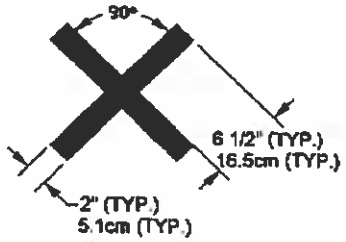
ADOPTED: OCT. 1, 1904
REVISED: JULY 17, 2003
FILE NO.: 0529F

STD DWG
0529F

STD DWG
0529F







DETAIL "X"

NOTES:
PRIVATE CROSSING SIGN TO BE 3290 SILVER 3M HIGH INTENSITY GRADE BACKGROUND ON .080" SHEET ALUMINUM.

AT ALL PRIVATE ROADWAY GRADE CROSSINGS WHERE THE GENERAL PUBLIC HAS ACCESS AND ARE NOT OTHERWISE EQUIPPED WITH TRAIN ACTIVATED WARNING DEVICES, ONE SIGN IS TO BE PLACED TO THE RIGHT OF EACH APPROACH. THE SIGNS ARE NOT INTENDED FOR USE AT IN-PLANT INDUSTRIAL CROSSINGS, CROSSINGS BETWEEN FARM FIELDS OR SIMILAR RESTRICTED LOCATIONS, EXCEPT IN STATES WHERE REQUIRED BY LAW.

SIGN LOCATION SHOULD BE 15' (4.6M) FROM THE CENTERLINE OF THE NEAREST TRACK WITH THE CENTER OF POST NO LESS THAN 8' (2.4M) FROM THE EDGE OF THE TRAVELED ROADWAY. POSITION THE SIGN TO PROVIDE THE BEST VIEW FROM THE ROADWAY APPROACH.

FOR STOP SIGN, SEE STD DWG 0547
FOR LETTERING, SEE STD DWG 0501
FOR MOUNTING, SEE STD DWG 0599
FOR EMERGENCY SIGN, SEE STD DWG 0530

ITEM	ITEM NO.
STOP SIGN	393-5896
PRIVATE CROSSING SIGN	393-3510
EMERGENCY SIGN	393-1355
POST	505-1621

UNION PACIFIC RAILROAD ENGINEERING STANDARDS

PRIVATE ROADWAY GRADE CROSSING SIGN

ADOPTED: OCT. 31, 1974
REVISED: FEB. 22, 2001
FILE NO.: 0531C

STD DWG 0531C

STD DWG 0531C

APPENDIX C

Summary of Existing Culverts, Road Crossings, Fence Crossings and Sidings

NEVADA NORTHERN RAILWAY FENCE SUMMARY
MP 18.5 - MP 120

Approximate MP	CRS Inspection Notes
19.5	Fence and cattle guard
28.6	Fence and cattle guard
49.6	Fence
56.9	Fence and cattle guard
63.0	Fence with no trespassing sign and cattle guard
63.1	Fence and cattle guard
74.4	Fence
80.4	Fence and cattle guard
81.0	Fence
81.7	Fence
101.0	Fence and cattle guard
106.3	Fence and cattle guard
106.8	Fence and cattle guard, no gate, barricaded, passable if barricade is removed
107.3	Fence and cattle guard
107.6	Fence and cattle guard, no gate, not passable
109.3	Fence and cattle guard
111.4	Fence and cattle guard
114.2	Fence and cattle guard
114.8	Fence and cattle guard that is ripped out
117.1	Fence crossing

Prepared:
February 23, 2007

CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAILWAY ROAD CROSSING SUMMARY
MP 18.5 - MP 120

Approximate MP	FRA Crossing #	Type	CRS Inspection Notes
18.50	855858G	Public	Appears to be active-north of the UPRR line
18.70	855859N	Private	Appears to be active
19.50			Adjacent roads visible but crossing appears to be inactive
25.80			Appears to be active
30.85	855860H	Private	Appears to be active
34.30			Appears to be active
39.80			Appears to be active
40.74	855861P	Private	Appears to be active
41.50			Adjacent roads visible but crossing appears to be inactive
48.96	855862W	Private	Appears to be active
52.50			Appears to be active
58.40			Appears to be active
58.60	855863D	Private	No crossing observed at 58.6. This is probably the crossing observed at 58.4.
60.85	855864K	Private	Appears to be active
62.20	855865S	Private	Appears to be active
63.02	855867F	Private	Appears to be active
63.07	855866Y	Public	Active highway crossing at Currie
64.07			Appears to be active
65.75	855868M	Public	Active high speed gravel road
67.30			Adjacent roads visible but crossing appears to be inactive
71.02			Appears to be active
81.07	855869U	Private	Appears to be active
81.96	855870N	Private	Appears to be active
87.10			Appears to be active
91.20	855871V	Public	Active highway crossing at Cherry Creek
94.33			Appears to be active
95.20			Appears to be active
96.30	855872C	Public	Active high speed gravel road
106.75			Appears to be active
108.04	855873J	Public	Active high speed gravel road
110.68	855874R	Private	Appears to be active
113.40			Appears to be active
114.20			Appears to be active
117.10			Appears to be active
118.59	855875X	Private	Appears to be active

Note-Milepost stations listed are to within 0.2 miles accuracy. Exact stations will be updated during final design.

Prepared:
February 23, 2007

CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAILWAY CULVERT SUMMARY
MP 18.5 - MP 120

Approximate MP	Type (material)	Size	Shape	CRS Inspection Notes	Inspection Form / Survey
40.70	CMP	24"	Round	Culverts parallel to railroad on east and west sides. East culvert needs cleaning. West culvert needs fixing on smashed end.	x
49.80	Unknown	Unknown	Unknown	Two culverts not sighted on map	Not Found
50.10	CMP	30"	Round	2-30" CMPs	x
50.10	Unknown	Unknown	Unknown	Old culvert has been covered, needs new one	x
50.20	Unknown	Unknown	Unknown	Data from BRRW report	Not Found
52.50	TBD	TBD	TBD	Need culverts parallel with rail under road crossing on both sides of rail	x
54.15	Concrete	21" x 17.5"	Triangular	Triangular culverts to be replaced	x
55.90	CMP	24"	Round	MP 55.9 24" CMP Culvert	x
56.00	TBD	TBD	TBD	This area of the access road is difficult for vehicular access. It would be a good idea to install a culvert under the access road here.	x
56.20	Concrete	Unknown	Box	Data from NNR ROW	Not Found
56.40	CMP	72"	Round	MP 56.4 double cmp	x
57.60	Unknown	Unknown	Unknown	Data from BRRW report	Not Found
58.00	Concrete	10' x 5'	Box	1916 concrete box culvert - 10' side by 5' tall	x
58.00	Concrete	60" x 121"	Box	MP 58 - this area of the access road is difficult for vehicular access. It may be a good idea to install a new culvert under the access road at this location. This is the location of a large box culvert/bridge.	x
58.60	Wood	24" x 18"	Triangular	Rectangular wood culvert- shows triangular on map. May be smashed.	x
58.60	CMP	53" x 31"	Elliptical	Elliptical CMP 53" Wide by 31" Tall	x
58.60	Concrete	21" x 17.5"	Triangular	Triangular concrete culvert - 21" wide by 17.5" tall	x
58.65	CMP	53" x 31"	Elliptical	MP 58.6 ELLIPTICAL CMP CULVERT - 53" WIDE BY 31" TALL	x
58.70	Unknown	Unknown	Unknown	Data from BRRW report	Not Found
58.90	CMP	53" x 31"	Elliptical	52" wide and 38" high	x
58.95	Concrete	24" x 28"	Triangular	Concrete triangle	x
59.05	Concrete	24"	Round	(3) 24" round CMP	x
61.40	Steel	24"	Round	MP 61.4 - 24" CULVERT	x
62.30	Concrete	Unknown	Box	Data from NNR ROW	Not Found
63.00	CMP	TBD	Round	Culvert under hwy parallel with rail w/ cross bars. It may be good to replace culverts under the rail with culverts like this.	x
64.10	Concrete	39" x 96"	Box	MP 64.1 BOX CULVERT	x
64.60	Cast Iron	36"	Unknown	Data from NNR ROW	Not Found
64.60	Unknown	Unknown	Unknown	Data from BRRW report	Not Found
64.70	CMP	22" x 36"	Elliptical	MP 64.7 CULVERT	x
64.71	CMP	30"	Eliptical	MP 64.71 CMP CULVERT	x
64.85	Cast Iron	30"	Eliptical	MP 64.85 CULVERT	x
64.90	CMP	32" x 42"	Elliptical	MP 64.9 ELLIPTICAL CMP CULVERT	x
64.95	CMP	36"	Round	MP 64.95 CULVERT	x
65.30	Unknown	Unknown	Box	Data from NNR ROW	Not Found

Prepared:
February 23, 2007

CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAIL..AY CULVERT SUMMARY
MP 18.5 - MP 120

Approximate MP	Type (material)	Size	Shape	CRS Inspection Notes	Inspection Form / Survey
66.20	Unknown	Unknown	Box	Data from NNR ROW	Not Found
68.35	CMP	30"	Round	MP 68.35 30" CMP CULVERT	x
69.10	CMP	30"	Round	MP 69.1 30" CMP CULVERT	x
69.60	CMP	36"	Round	MP 69.6 36" CMP CULVERT	x
71.20	CMP	24"	Round	MP 71.2 24" CMP CULVERT	x
71.40	CMP	24"	Round	MP 71.4 24" CMP CULVERT	x
71.80	CMP	24	Round	RL Banks and BRRW	Not Found
72.10	CMP	30"	Round	MP 72.1 30" CMP CULVERT	x
72.30	CMP	24"	Round	MP 72.3 24" CMP CULVERT	x
73.20	CMP	42"	Round	MP 73.2 42" CMP CULVERT	x
73.70	Unknown	Unknown	Box	Data from NNR ROW	Not Found
75.30	CMP	30"	Round	MP 75.3 30" CMP CULVERT	x
76.10	Unknown	Unknown	Unknown	Data from BRRW report	Not Found
77.80	Concrete	36" x 96"	Box	MP 77.8 CONCRETE BOX CULVERT	x
77.90	Concrete	36" x 96"	Box	MP 77.9 CONCRETE BOX CULVERT	x
78.00	Unknown	Unknown	Unknown	Data from BRRW report	Not Found
78.30	Unknown	Unknown	Box	Data from NNR ROW	Not Found
78.60	CMP	24"	Round	MP 78.6 24" CMP CULVERT	x
79.20	Unknown	Unknown	Box	Data from NNR ROW	Not Found
79.50	Unknown	Unknown	Box	Data from NNR ROW	Not Found
79.80	Unknown	Unknown	Box	Data from NNR ROW	Not Found
80.50	CMP	18"	Round	MP 80.5 CMP CULVERT	x
80.60	Concrete	24"	Triangular	Double Triangular-NNR ROW	Not Found
80.70	CMP	36"	Round	MP 80.7 CMP CULVERT	x
80.82	Concrete	24"	Triangular	Double Triangular-NNR ROW	Not Found
80.90	Steel	21" x 17.5"	Triangular	MP 80.9 STEEL TRIANGULAR CULVERTS	x
81.10	CMP	30"	Round	MP 81.1 30" +/- CMP CULVERT-hard to tell size because it is buried	x
81.10	Concrete	24"	Triangular	Double Triangular-NNR ROW	Not Found
81.30	Concrete	24"	Triangular	Double Triangular-NNR ROW	Not Found
81.35	Unknown	Unknown	Box	Data from NNR ROW	Not Found
81.60	CMP	24"	Round	MP 81.6 24" CMP CULVERT	x
81.65	CMP	24"	Round	MP 81.65 24" CMP CULVERT	x
81.67	CMP	24"	Round	MP 81.67 24" CMP CULVERT	x
81.70	CMP	24"	Round	MP 81.7 24" CMP CULVERT	x
83.00	Concrete	8' x 3'	Box	MP 83.0 8' X 3' CONCRETE BOX CULVERT	x
83.35	Concrete	8' x 3.5'	Box	MP 83.35 8'WIDE BY 3.5' TALL CONCRETE BOX CULVERT	x
83.70	CMP	42"	Unknown	Data from RL Banks report	Not Found

Prepared:
February 23, 2007

CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAIL..AY CULVERT SUMMARY
MP 18.5 - MP 120

Approximate MP	Type (material)	Size	Shape	CRS Inspection Notes	Inspection Form / Survey
83.80	CMP	42"	Round	MP 83.8 42" CMP CULVERT	x
83.90	CMP	30"	Round	MP 83.9 - 30" CMP CULVERT	x
85.70	CMP	24	Double Barrel	RL Banks	Not Found
85.90	Unknown	Unknown	Unknown	Data from BRRW report	Not Found
85.95	CMP	30'	Round	MP 85.95 DOUBLE 30" CMP CULVERTS	x
86.50	Unknown	Unknown	Box	Data from NNR ROW	Not Found
87.20	Unknown	Unknown	Box	Data from NNR ROW	Not Found
89.01	Unknown	Unknown	Box	Data from NNR ROW	Not Found
90.40	Unknown	Unknown	Box	Data from NNR ROW	Not Found
90.90	Unknown	Unknown	Box	Data from NNR ROW	Not Found
91.20	CMP	27"X43"	Elliptical	Two culverts run parallel with rail	x
91.30	Unknown	Unknown	Box	Data from NNR ROW	Not Found
92.10	Unknown	Unknown	Box	Data from NNR ROW	Not Found
93.50	Unknown	Unknown	Box	Data from NNR ROW	Not Found
94.10	Unknown	Unknown	Box	Data from NNR ROW	Not Found
94.80	CMP	24"	Round	MP 94.8 24" CMP CULVERT	x
96.10	Unknown	Unknown	Box	Data from NNR ROW	Not Found
97.10	CMP	24"	Round	MP 97.1 24" CMP CULVERT	x
98.10	CMP	24"	Round	MP 98.1 (2) CMP CULVERTS	x
98.30	Unknown	Unknown	Unknown	Data from BRRW report	Not Found
98.80	Cast Iron	5"	Round	MP 98.8 5" C.I. CULVERT	x
98.90	Unknown	Unknown	Box	Data from NNR ROW	Not Found
99.10	TBD	TBD	TBD	POSSIBLE CULVERT LOCATION	x
99.30	Unknown	Unknown	Box	Data from NNR ROW	Not Found
100.50	TBD	TBD	TBD	FLAT SPOT - POSSIBLE NEW CULVERT OR ENLARGE SWALES.	x
101.10	TBD	TBD	TBD	MP 101.1 - POSSIBLE NEW CULVERT	x
101.30	Unknown	Unknown	Box	Data from NNR ROW	x
101.60	CMP	24"	Round	MP 101.6 24" CMP CULVERT	x
102.20	Unknown	Unknown	Box	Data from NNR ROW	x
103.20	Unknown	Unknown	Box	Data from NNR ROW	Not Found
103.50	Unknown	Unknown	Box	Data from NNR ROW	Not Found
104.40	Unknown	Unknown	Box	Data from NNR ROW	Not Found
104.60	Unknown	Unknown	Box	Data from NNR ROW	Not Found
106.10	Unknown	Unknown	Box	Data from NNR ROW	Not Found
106.80	Unknown	Unknown	Box	Data from NNR ROW	Not Found
106.80	Steel	24"	Round	circular 24" steel culvert	x
107.20	Unknown	Unknown	Box	Data from NNR ROW	Not Found
107.80	Unknown	Unknown	Box	Data from NNR ROW	Not Found
108.10	CMP	24"	Round	24" CMP, round	x
108.75	CMP	24"	Round	Round 24" CMP	x

Prepared:
February 23, 2007

CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAIL..AY CULVERT SUMMARY
MP 18.5 - MP 120

Approximate MP	Type (material)	Size	Shape	CRS Inspection Notes	Inspection Form / Survey
108.80	Unknown	Unknown	Box	Data from NNR ROW	Not Found
109.05	CMP	24"	Round	24" round CMP	x
109.80	CMP	24"	Round	24" round culvert	x
109.80	Unknown	Unknown	Box	Data from NNR ROW	x
110.60	Unknown	Unknown	Box	Data from NNR ROW	Not Found
110.60	CMP	24"	Round	24" round CMP	x
110.80	CMP	24"	Round	24" round culvert	x
110.90	Unknown	Unknown	Box	Data from NNR ROW	Not Found
111.60	CMP	30"	Box	30" CMP (surveyed)	x
111.70	CMP	24"	Round	24" round culvert	x
111.80	Unknown	Unknown	Box	Data from NNR ROW	Not Found
112.10	CMP	24"	Round	24" round culvert	x
112.20	Unknown	Unknown	Box	Data from NNR ROW	Not Found
112.40	CMP	30"	Round	30" round culvert	x
112.50	Steel	12"	Round	12" round steel culvert	x
112.60	Unknown	Unknown	Box	Data from NNR ROW	Not Found
112.80	Steel	12"	Round	12" round steel culvert	x
113.00	CMP	24"	Round	24" round culvert	x
113.10	CMP	30"	Round	30" round CMP	x
113.30	Unknown	Unknown	Box	Data from NNR ROW	Not Found
113.80	CMP	24"	Round	24" round CMP	x
113.80	Unknown	Unknown	Box	Data from NNR ROW	Not Found
114.20	Unknown	Unknown	Unknown	Data from BRRW report	Not Found
114.40	Concrete	4' by 9'	Rectangular	4' by 9' rectangular concrete structure	x

Prepared:
February 23, 2007

CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAILWAY SIDING SUMMARY
MP 18.5 - MP 120

Approximate MP	Name	Length (ft)	Side of Track	CRS Inspection Notes
18.5	Shafter	3087	East	
31	Decoy	1513	West	
40.5	Dolly Varden	983	South East	
52.9	Mizpah	909	South West	
63	Currie	1968	East	
71	Goshute	2005	West	
80.4	Greens	720	West	
91.35	Cherry Creek	2141	East	
91.35	Cherry Creek	673	West	
100	Raiff	2499	East	
107.8	Warm Springs	760	West	

Prepared:
February 23, 2007

CALDWELL RICHARDS SORENSEN

NEVADA NORTHERN RAILWAY UTILITY SUMMARY
MP 18.5 - MP 120

Approximate MP	Type	Height / Clearance	CRS Inspection Notes
766	Fiber Optic		Shafter Utilities
18.5	OHP	22.10 ft	Shafter Utilities
18.7	OHP	27.10 ft	Shafter Utilities
62.88	OHP	31.85 ft	
63.07	OHP	21.9 ft	
63.07	Fiber Optic		
63.1	Phone		Underground Telephone Cable
77.95	OHP	33.50 ft	
91.2	OHP	37.10 ft	
91.2	Fiber Optic		Nevada Bell
108.05	OHP	26.25 ft	

Prepared:
February 23, 2007

CALDWELL RICHARDS SORENSEN

APPENDIX D

NDOT's Diagnostic Review Report

DIAGNOSTIC REVIEW REPORT
PASSIVE IMPROVEMENT PROJECT FOR NNRY

Diagnostic Reviews were conducted at public at-grade railroad crossings throughout Northern Nevada, to determine what upgrades to passive warning devices are needed to comply with the current 2003 MUTCD. Correct signage is the minimum standard for all public at-grade crossings.

The Nevada Northern Railway (White Pine Historical Railroad Foundation) Diagnostic Review report is published separately to facilitate project segmentation from UPRR crossings. The NNRY reviews were conducted September 20 - 22, 2005.

Those in attendance were:

Robbie Peartree, Manager Track Maintenance & Train Operations, NNRY
Randy Larson, Senior Marketing Analyst, Quadra Mining – Robinson Project
Casey Kelly, District III Traffic Engineer, NDOT
Tony Locke, Public Works Director, White Pine County
Kerry Sprouse, Road Superintendent, White Pine County
Dean Day, City Engineer, City of Ely
Vic Crumley, Railway Track Inspector, NPUC
Rick Makley, District III Utility Coordinator, NDOT
Anita Boucher, Railroad Safety Coordinator, NDOT
Chris Jalkson, Assistant Railroad Safety Coordinator, NDOT

The MUTCD and FHWA's "Guidance On Traffic Control Devices At Highway-Rail Grade Crossings" criteria that were reviewed included warrants for crossing closures, double-faced retroreflective Crossbucks with retroreflective post tape, Emergency Notification signs, STOP signs, YIELD signs, Advance Warning signs and their placement, pavement markings and the addition of other applicable signage. There are new warrants for STOP or YIELD signs at all passive crossings. All improvements will be constructed by an NDOT contractor. The NNRY does not have any Emergency Notification signs and they will be installed at all crossings, including private crossings.

Crossings identified with the potential for improvements, outside of the scope of this review, will be improved by the road jurisdiction and/or railroad, reviewed individually as they are prioritized on the Statewide Hazard Index or the other means of mitigation will be indicated.

The following are the reviews and recommendations for each crossing:

U.S. 93 at Currie, U.S. DOT #855-866Y, RRMP 63.07: U.S. 93 at Currie is located in a rural area, by the Currie store and resort, which is currently closed.

The roadway is a two-lane Other Principal Arterial with 950 AADT, including trucks and hazmat vehicles. The speed limit is 55 mph. The crossing has one mainline track and one industry lead track, with no current rail traffic. There have been two property-damage-only collisions at the crossing.

The tracks were temporarily unused and were removed and the road paved by NDOT. This was safety measure. The flashing lights and crossbucks were also removed and were stored at the NDOT Currie Maintenance Station. The crossbucks are no longer standard. The signal cabinet is still in place.

The NNRY plans to reopen the rail line to the junction with UPRR at Shafter, so the crossing was reviewed.

The sight distance is impaired in one quadrant and standing boxcars can block the view. However, these factors can be mitigated by reinstallation of the automatic warning devices. There are no queuing or other considerations at this crossing.

RECOMMENDATIONS

The crossing does not meet the warrants for closure. If the U.S. 93 Currie crossing is reopened, the Diagnostic Review Team recommends installation of flashing lights, double-faced retroreflective crossbucks, multiple track signs, W10-1 Advance Warning signs, railroad pavement markings with a No Passing zone and an Emergency Notification sign on the signal cabinet. Additionally, a standard concrete crossing surface will be needed. This work is beyond the scope of the current contract and is not required at this time.

Cordano Ranch Road (previously County Road), U.S. DOT #855-868M, RRMP 65.75: The Cordano Ranch Road crossing is immediately south of U.S. 93 at Currie. The roadway has two graded dirt travel lanes. It is a local roadway and has an AADT of 10, including hazmat vehicles. The realistic road speed is 35 mph. The area is rural and leads to ranches. The crossing has one mainline track, with train speed of 10 mph and no current train service. There have been no collisions at the crossing. Warning devices include double-faced retroreflective crossbucks, one W10-1 Advance Warning sign and one Humpback word sign. All signs are in very poor condition.
There is a substantial vertical roadway curve of -13" on the east side and -9" on the west side of the crossing. The sight distance is adequate and there are no perception, queuing, storage or other road approach considerations to mitigate.

RECOMMENDATIONS

There are no warrants for road closure and not enough of the required warrants for STOP sign installation on Cordano Ranch Road. If the NNRY fails to resume service, the track needs to be removed from the roadway and the roadway repaired to County standards. If service resumes, the Diagnostic Review Team recommends installation of double-faced retroreflective Crossbucks with

retroreflective post tape, YIELD signs, Emergency Notification signs, W10-1 Advance Warning signs, W10-5 Humpback signs. Low clearance vehicles can be detoured through the Cherry Creek Highway crossing. Detour signs will be needed on U.S. 93 at Cordano Ranch Road and at Cherry Creek Highway. Preconstruction mitigation was not recommended. Construction will be accomplished with roadside work zones.

Cherry Creek Highway, U.S. DOT #855-871V, RRMP 91.20: Cherry Creek Highway is a two-lane, paved Major Collector, with 50 AADT, including school buses and commercial and hazmat vehicles. The speed limit is 55 mph. The commercial vehicle traffic typically consists of delivery trucks and propane trucks servicing the nearby ranches and the town of Cherry Creek. The crossing is on a mainline with a train speed of 10 mph but no current train traffic. There have been no collisions at this crossing. The crossing has double-faced retroreflective crossbucks, W10-1 Advance Warning signs and fading RxR and No Passing Zone pavement markings.

There are no issues with sight distance, vertical curve, queuing, storage or other approach problems.

RECOMMENDATIONS

If the NNRY fails to resume service, the track needs to be removed from Cherry Creek Highway and the roadway repaired to County standards. The crossing meets none of the road closure warrants. The Diagnostic Review Team recommended installation RxR pavement markings at the existing Advance Warning signs, a stop bar and a no passing zone. Retroreflective tape and Emergency Notification signs were recommended for the crossbuck posts. Because there is no current train traffic, the crossing does not meet warrants for STOP signs. If there are more than two trains daily, STOP signs need to be installed, as all of the warrants will be met. If there is sporadic rail traffic, YIELD signs are needed. This may be resolved by the time this project is realized. Construction will be done on half of the roadway at a time, with work zone traffic detours. Interim measures were not recommended.

Schellbourne (Old Cherry Creek Road), U.S. DOT #855-872C, RRMP 96.30: The Schellbourne crossing is on the mainline, with no current train traffic, and a train speed of 10 mph. The road is a two-lane, dirt facility, with 10 AADT, at 25 mph. The road users include hazmat vehicles. This is a rural ranching area. The warning devices consist of double-faced retroreflective Crossbucks, W10-1 Advance Warning signs and word-type Humpback signs. All of the signs are in poor condition.

The sight distance is acceptable. However, the 50° skew limits perception of the crossing. There is a slight vertical curve of -3" on the east side and -4.5" on the west side of the crossing. There are no queuing, storage or other approach problems at Schellbourne. There have been no collisions at this crossing.

RECOMMENDATIONS

Schellbourne Road meets none of the road closure warrants. If the NNRY fails to resume service, the track needs to be removed from the roadway and the roadway repaired to County standards. The Diagnostic Review Team recommended YIELD signs for the Schellbourne crossing because the crossing does not currently meet the mandatory warrants for STOP signs. Two or more trains daily are required for STOP signs. Additionally, there is good sight distance, the YIELD sign and retroreflective post tape will provided added warning and the addition of unnecessary STOP signs detracts from the effectiveness of STOP signs at locations with significant challenges. For these reasons, the Diagnostic Review Team recommended YIELD signs if rail service commences. All other signage, including Crossbucks and W10-1 Advance Warning signs, needs to be replaced. Additionally, standard W10-5 Humpback signs and Emergency Notification signs are recommended. Detour signage, for low profile vehicles, will direct vehicles to Cherry Creek Highway or Warm Springs Road (Monte Neva). The signs will be placed on U.S. 93, at each of the detour roads and at U.S. 93 and Schellbourne. Other detour signs are needed at Schellbourne Road intersections with Steptoe Bench Road and Egan Road and at the intersections of Warm Springs Road (Monte Neva) with Steptoe Bench Road and Egan Road. Construction will be accomplished with roadside work zones. No interim mitigation was recommended.

Warm Springs (Monte Neva) Road, U.S. DOT #855-873J, RRMP 108.04: Warm Springs Road is on the mainline track, with no routine train traffic. The train speed is 10 mph. The roadway is used by 20 vehicles daily, including commercial vehicles. It is an alternate route to Cherry Creek and is in a rural area. There have been no collisions at Warm Springs Road.

Warning devices include double-faced retroreflective Crossbucks, W10-1 Advance Warning signs and word-type Humpback signs. All of the signs are in poor condition. The Warm Springs is a two-lane, dirt road. There are no sight distance, vertical curve, queuing, storage or approach issues at the crossing. The Humpback sign is not needed.

RECOMMENDATIONS

If the NNRY fails to resume service, the track needs to be removed from the roadway and the roadway repaired to County standards. Warm Springs Road does not meet warrants for road closure. The Diagnostic Review Team recommended the addition of YIELD signs, Crossbucks with retroreflective post tape, W10-1 Advance Warning signs and Emergency Notification signs. The crossing does not meet any of the warrants for STOP signs, because of the lack of train traffic. Additionally, there is good sight distance, the YIELD sign and retroreflective post tape will provided added warning and the addition of unnecessary STOP signs detracts from the effectiveness of STOP signs at locations with significant challenges. Removal of the Humpback sign is

recommended. No interim measures were recommended. Construction will be done in a roadside work zone.

APPENDIX E

GeoCon Phase I Geotechnical Investigation

Project No. R8402-06-01
September 29, 2006

Mr. Luke Papez
Project Associate
White Pine Energy Associates, LLC
Reno, NV 89503

SUBJECT: REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION

Dear Mr. Papez,

This letter presents our findings, conclusions and recommendations for a future design-level geotechnical investigation for the Rehabilitation of the Nevada Northern Railway located in Elko and White Pine Counties, Nevada.

INTRODUCTION

White Pine Energy Associates, LLC (WPEA) is in the planning stages for the development of a coal-fired electric generating station to be located approximately 30 miles north of the town of Ely in Steptoe Valley, White Pine County, Nevada. WPEA is wholly owned by LS Power Associates, L.P. which is managed by LS Power Development, LLC.

It is our understanding that the proposed project will require the rehabilitation of approximately 85 miles of the Nevada Northern Railway as shown on Figure 1. The rehabilitation effort will include the construction of new sidings and extending the lengths of existing sidings. Coal from the Powder River Basin in Wyoming will be transported to a transfer location at Shafter, Nevada (Mile Post 18.5) located in Elko County. Two 135 car unit trains per day will transport the coal from Shafter to the proposed preferred plant location at Mile Post 103. In order to efficiently transport the coal, it is envisioned that the existing rail facility will be upgraded to FRA Class 3 standards.

The Nevada Northern Railway was originally constructed in the early 1900's and operated until 1999. The primary use for the railroad was to support the Robinson Mine located just west of Ely by bringing in mining equipment and transporting out copper concentrates. Only intermittent service occurred from 1978 until 1999 due to the failing mine operation. The portion of the railroad being considered for rehabilitation was constructed at or near original grade. Ties were placed directly on native soils in cuts or on low embankments (generally less than 10 feet high) without ballast. Sixty pound per yard rail was used for the original construction. Today, only a small portion of the railway between McGill and Ruth is still in operation as a tourist railroad operated by Nevada Northern Railway.

SCOPE OF WORK

Geocon Consultants, Inc, was contracted by White Pine Energy Associates, LLC to provide a preliminary geotechnical assessment based on a site visit and limited geotechnical sampling. The specific scope of work was defined in our proposal (Proposal No. LR-06-44) dated August 4, 2006. The primary focus of our investigation was to evaluate the ballast section materials for possible reuse and to make general geotechnical observations regarding any adverse geotechnical conditions. An additional task was to review previous reports on the project and to compile published geologic and soils data. Documents reviewed for our investigation included the following:

- *Nevada Northern Railroad Project Engineering Study and Cost Estimate,* R. L. Banks & Associates, July 15, 2002
- *Nevada Northern Railroad Track Evaluation,* Railroad Industries Incorporated, April 19, 2004
- *White Pine Energy Associates, LLC, 115 Mile Rehabilitation Study of the Nevada Northern Railway, Rehabilitation Plan*, Caldwell, Richards, Sorensen and Mountain States Contracting, August 25, 2005
- *Soils Report for White Pine County Area, Nevada,* USDA,
- *Soils Report for Elko County Area, Nevada,* USDA,
- *Bulletin 85, Geology and Mineral Resources of White Pine County, Nevada,* Nevada Bureau of Mines and Geology, 1976
- *Bulletin 101, Geology of Elko County, Nevada,* Nevada Bureau of Mines and Geology, 1987

Representative samples of the ballast and subgrade were obtained for laboratory testing to determine conformance with Union Pacific Railroad ballast requirements. Based on our work a proposal for a thorough geotechnical investigation is provided herewith.

EXISTING CONDITIONS

The following discussion is based on the references cited above and the observations made during our site visit. Representative photographs of specific features along the alignment are included as Appendix C for reference.

TOPOGRAPHY

The project alignment extends from Shafter south through Goshute and Steptoe valleys. Topography along the alignment generally consists of gentle slopes. Elevations range from 6,100 to 5,580 feet above mean sea level. The highest portions of the alignment are in the southern portion of the project. The grade of the alignment is estimated to be less than two percent along the entire length (Photo 1 and 2).

SURFACE WATERCOURSES AND GROUNDWATER

Only intermittent surface water is mapped on the 7.5 Minute USGS quadrangles along the alignment. Named watercourses include Indian Creek (MP-43), Nelson Creek (MP-43 to MP56), Phalen Creek (MP-59), Goshute Lake (MP-64 to MP-76) and Duck Creek (MP-76 to MP-114). Numerous unnamed dry washes intersect the aligument along its entire length. In addition, small playa lakes are also mapped in the area of MP-99. At the time of our site visit, August 2006,

running water was only observed along a short section of alignment just south of the Currie Nevada crossing (MP-64 to MP-65). The original plans for the railroad show two springs located adjacent to the track in this area.

It was observed that clayey silt deposits were present along much of the raised embankment portions of the alignment indicating ponding of surface water during wetter periods of the year. Standing water was observed at a single location, Mile Post 99. At this location a series of intermittent ponds are located near the alignment (Photo 3).

Limited groundwater data is available for the immediate vicinity of the project alignment. Based on regional groundwater information and depth to water reported in wells within the vicinity of the alignment (Nevada Department of Water Resources), groundwater ranges from approximately 60 to 100 feet bgs along most of the alignment. Numerous springs are present along the various range fronts. During wet periods of the year, perched groundwater conditions are anticipated to be present near streams, springs and pluvial lakes.

GEOLOGIC AND SOIL CONDITIONS

Geologic mapping of the project alignment is published by the Nevada Bureau of Mines and Geology in the county reports for Elko and White Pine counties (Bulletin 85 and Bulletin 101). The geology of the alignments is shown on the attached geologic maps, Figures 2 and 3. The geology underlying the alignment is almost entirely Quaternary alluvial and pluvial deposits derived from the adjacent mountain ranges. The geomorphic setting is typical Basin and Range Geology. Mountain ranges that bound the valleys in which the project traverses are the Goshute Range, Pequop Mountains, Dolly Varden Mountains, Cherry Creek Range, and Schell Creek Range. The geologic maps show that the mountains are predominantly composed of Paleozoic sedimentary rocks and metamorphic rocks with significant Tertiary volcanic rocks also present. Geologic units within the ranges include from oldest to youngest: Ordovician quartzites and carbonate rocks, Permian limestone and dolomite, Jurassic granite and Tertiary extrusive and intrusive volcanic rocks. Tertiary volcanics are dominant in the mountains east of the alignment from near Currie (Mile Post 61) to the preferred Plant site (Mile Post 103). Tertiary volcanics are also present in the mountains west of the alignment from the vicinity of Cherry Creek (Mile Post 87) to the preferred Plant site.

The Egan, Cherry Creek and Pequop mountain ranges border Steptoe and Goshute Valleys to the west and the Goshute, Schell Creek, Toano ranges boarder the valleys to the east. The ranges trend generally north south and are bounded by normal faults that create steep scarps along the sides of the valleys.

The Soil Conservation Service (SCS) characterizes the soils within the majority of the project alignment as alluvial material formed from mixed alluvium, lacustrine sediments and minor amounts of volcanic ash and loess. A total of 23 soil units are mapped along the 85 miles of the project alignment as shown on Figures 4 through 11. Most of the soil units are comprised of granular soils including silts (ML), silty sands (SM), and lean clay (CL). A few gravelly soil units are also present. Soils data from the County reports is attached as Figure 12 through Figure 17.

GEOLOGIC HAZARDS

Topographically, the alignment is relatively flat and level. No landslides or significant slopes were observed along the alignment or on adjacent properties that may affect the site, and we do not consider the potential for land sliding to be a hazard to this project.

Liquefaction of granular soils can be caused by strong vibratory motion due to earthquakes. Soils that are highly susceptible to liquefaction are loose, granular aud saturated. Liquefaction of soils may cause surface distress, loss of bearing capacity, and settlement of structures. Liquefaction generally is restricted to within 50 feet of the surface due to confining pressures. The potential for liquefaction during a seismic event relatively low along most of the alignment. The potential for liquefaction is higher in areas where pluvial lakes, ponds, springs and stream crossings are present.

Hazards relating to expansive soils are not anticipated to impact the project alignment. However, most native soils present along the alignment are fine grained and are susceptible to frost heaving.

FIELD INVESTIGATION

At the time of our preliminary investigation, August 22, 23 and 24, 2006 the track bed was generally in a state of disrepair. Sections of rail were missing at a few locations. Spikes were missing or loose at many locations. Rail anchors are randomly spaced, in many cases missing or displaced so that they were not in contact with the ties. The track bed for most of its length is constructed on embankments that appeared to consist of native soils obtained directly adjacent to the alignment. Slight (1 to 2 feet deep) depressions were typically present on both sides of the alignment and were approximately 20 to 30 feet wide (see Photo 4 and Photo 5). The typical embankment dimension was 10 to 12 feet wide at the top of the tie. Side slopes were estimated to be approximately 1.5 to 1 or steeper.

Native vegetation ranged from sparse to dense along the route (Photos 1, 2, 4, 5, 6, 7, & 8). Vegetation was dominantly rabbit brush and other low shrubs and occasionally sagebrush. The densest growth of vegetation on the track bed was in low-lying areas along Goshute Lake and just south of the Currie crossing (Photos 5 & 8).

Ties were typically spaced from 16 to 22 inches, center to center. It was apparent that at least two generations of ties were present. The older ties were generally 8 feet long and 6 inches by 8 inches in cross section. Replacement ties ranging from approximately 15% to 50% of the total ties were typically 8.5 feet long with the same cross section as the older ties. It was evident at a number of locations that some ties had failed (displayed excessive splitting and/or crushing).

Sidings were generally in poor condition. Several of the sidings appeared to have been abandoned prior to the last episode of operations as evidenced by dense vegetative growth. In a few cases, rail had been removed from the siding. The pit run rock in a couple of instances was placed on the "main line" but not on the adjacent siding track bed (see Photo 9).

The Nevada Northern alignment is almost entirely comprised of 60 pound per yard track typically bearing production dates in the early 1900's. The only exception to the 60 pound rail is found just south of Currie. At this location 90 pound rail is present for a short distance (MP 64 to MP 66) as shown on Photo 10. This heavier rail is located where the only relatively sharp turns on the alignment are present. An active surface watercourse that emanates from a spring area meanders

along this curved section crossing the track in culverts. We infer that the area of heavier rail was subject to track bed stability problems.

Rounded to sub-angular "ballast" or more accurately "pit run" is present as a veneer over most of the length of the project (Photo 1, 2, 8 & 9). Samples of the pit run materials and subgrade soils were recovered by manual methods at approximately five-mile intervals. Between the ties, the pit run was typically less than three inches thick (from the top of the tie) as shown on Photos 11 and 12. Outside of the rails, the pit run was thicker usually near the bottom of tie and deepening outward onto the fill slope. It is inferred that the embankments had over time eroded due to their steepness and the pit run placed to help confine the rail-tie prism. Typically, the veneer of pit run between the ties rested directly on native silty to clayey soils. South of Goshute Lake it appeared that the pit run had been tamped. In these areas the pit run was mixed with native soils and extended down to about the bottom of the ties.

At a few locations, mine waste rock had been placed over the pit run (Photo 13). The material consisted of a four inch minus to one-half inch angular rock. The rock consisted of limestone, gossan, pyritic limestone, siliceous metamorphic, and igneous intrusive rocks. This material appeared to be typical of older mine dumps located at the Robinson Mine, in Ruth, Nevada. Stockpiles of the pit run material are present adjacent to the track near Mile Post 96 as shown of Photo 14.

No materials that would meet a modern Union Pacific (or AREMA) ballast specification for fractured face (100% crushed rock) or gradation were observed along the existing alignment. Union Pacific Ballast Specifications are included as Figure 18 and Figure 19.

LABORATORY TESTING AND ANALYSIS

Pit Run ("Ballast") Materials

Nineteen samples of the Pit Run materials were recovered during our preliminary investigation. In one case (MP-86), two samples were taken; one of the "clean" pit run materials and one of pit run materials significantly contaminated by subgrade soils. The intent of our sampling was to determine characteristic engineering properties to estimate the potential for reuse of the materials. The testing results are presented in Appendix B.

Ten of the nineteen aggregate samples were selected for testing. Testing performed included: gradation analysis and " Los Angeles" abrasion (LA Rattler). The gradation analysis showed that the pit run materials did not meet any of the Union Pacific (UP) recommended ballast gradations. The typical materials contained excessive materials passing the 3/4 to 3/8 screen sizes. The gradations were closest to Type 5 or Type 57 yard ballast material gradations. The excessive fines are suggestive of contamination by wind blown sand and silt or heaving of the subgrade soils into the rock section.

The abrasion tests indicated that the pit run materials while within specifications were relatively susceptible to degradation. Abrasion percentages of 22%, 23% and 25% were determined for the three samples. The maximum allowed value for quartzite is 30%.

Visual inspection of the materials indicated that the materials were almost entirely sub-rounded to sub-angular sedimentary and metamorphic gravels dominated by quartzite. The sub-rounded to sub-angular shape of the materials is contrary to AREMA recommendations for "angular particle structure providing sharp corners and cubical fragments...". Based on the material descriptions

and failing gradation analyses, the remainder of the recommended ballast tests included in our proposal were not performed.

However it should be noted that for industrial applications ballast requirements are subject to interpretation depending on the controlling authority. The following quote is taken from *Track Geotechnology and Substructure Management, Selig and Waters 2002.*

Traditionally, angular, crushed, hard stones and rocks, uniformly graded, free of dust and dirt, and not prone to cementing action have been considered good ballast materials .However, at present no universal agreement exists concerning the proper specifications for the ballast material index characteristics such as size, shape, hardness, abrasion resistance, and composition that will provide the best track performance....Availability and economic considerations have been the prime factors in the selection of ballast materials.

Therefore careful consideration should be given to establishing the project specific ballast specifications.

Subgrade and Embankment Soils

Sixteen subgrade soils were obtained in the field for testing. The location of the samples were coincident with the locations that the pit run samples were obtained. The subgrade ranged from silty sand (SM) to sandy lean clay (CL) with some clayey sand (SC) and clayey sandy silt (ML). The finer grained soils were typically associated with the low areas along the alignment such as the Goshute Lake area.

The finer grained samples tested were characteristically low in clay contents as indicated by Plasticity Indices ranging from 8 to 17.

The representative samples were also tested for pH. The values were all slightly to moderately alkaline ranging from a low of 8.06 to a high of 8.96.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

The following conclusions are preliminary due to the lack of grading and improvement plans, conceptual nature of design parameters, and the limited number of material tests conducted. The following information is intended for use in project planning and cost estimating, and not to take the place of a more thorough geotechnical investigation.

Track Geometric Considerations

- The track bed is narrow (10-13 feet wide) and well below minimum width standards. Modern standards call for at least 24 feet in width for industrial track. The width includes walkways on both sides of the rail bed and 3:1 slopes for the ballast. It is possible that the Public Utilities Commission might wave the width requirement based on the historic nature of the rail road.
- Where widening of the track bed is required, new fill should be constructed on one side of the existing embankment wherever possible to avoid "sliver fills" which can be difficult to construct.

- The side slopes of the existing embankments are generally steep (1:1 to 1.5:1) and prone to excessive erosion. Stable slopes for native soils would be 1.5:1 to 2:1.

Soils

- Most native soils are generally fine grained and are considered to be structurally weak (low CBR) and compressible.
- The fine grained soils are also susceptible to frost heaving.
- Soils are prone to migration into voids when subject to excessive moisture and cyclic loadings.
- Soils are generally moderately alkaline and not likely to be aggressive to concrete. Additional testing including chlorides should be performed to verify this conclusion.
- Soils are likely to be aggressive to uncoated steel. Resistivity testing should be conducted to verify this conclusion and to provide data for coating or cathodic protection as necessary.

Ballast and Sub-ballast

- The materials placed as ballast are pit run gravels that are rounded, contain significant fines and would not pass either UP or AREMA gradation specifications for mainline ballast. This material was produced and placed in 1995/1996 according to Bryson Pickens formerly of Doniker Corporation, the supplier of the material. Mr. Pickens identified the materials as having been produced at the Highline Pit, a BLM borrow source located just south of Ely.
- The materials are relatively durable and could be blended to create sub-ballast or rototilled into the subgrade to produce a higher strength subgrade.
- Sub-ballast, filter fabric or both will likely be required over most of the length of the project to prevent migration of fines into the ballast section.
- The required ballast section will likely be relatively thick based on the low strength of the fine grained soils found along most of the alignment.
- Importation of ballast and sub-ballast is probable if UP or AREMA specifications are required on the project.

Grading

- Removal of vegetation will be required along the alignment length with dense vegetation to be removed in a few areas.
- Widening of embankments will require keying of the fills into existing side slopes.
- Native fine-grained soils will be relatively difficult to moisture condition, adequately compact and to control dust.
- During wet periods the native fine grained soils may pump or yield. Access of both light weight and heavy equipment will be difficult during these times. Pluvial lakes and shallow ponds will limit access and require dewatering and stabilization of soils. Stabilization is anticipated to be a particular concern in new siding areas, in areas of stream crossings and pluvial lakes depending on the time of year and precipitation.

- During freezing weather, subgrade soils will need to be protected from freezing. Protection will most likely consist of a blanket of six to twelve inches of loose soil over the working surface each night. For small areas, construction blankets may be appropriate.
- Blending of fine-grained soils with the existing pit run or native granular soils may be desirable to improve the subgrade (reduce thickness of sub-ballast/ballast section).
- Oversize materials are anticipated to be a minor concern to new construction.
- All embankments side slopes should either be regraded with maximum slopes of 1:5 to 1 to 2:1 (depending on soil type) or mechanically stabilized with rip rap.

LIMITATIONS

This preliminary report is intended for the sole and exclusive use of LS Power Development, and their designated agents only. It is not intended to support construction or take the place of a more thorough design level geotechnical investigation. The information contained in this report is based on standards of investigation and design guidelines generally accepted in the Northern and Eastern Nevada areas, on our understanding of the project scope as outlined herein. If changes to the project scope are made in the final plans or if soil/bedrock conditions are found not to be as depicted herein, the engineer should be contacted immediately to determine if modifications to this report are necessary. No guarantee as to the continuity of soil or geologic conditions is implied or intended.

This report is issued with the understanding that it is the responsibility of the owner, or of designated representative, to ensure that the information and recommendations contained herein are transmitted to the design team. No guarantee as to the continuity of soils or other geologic conditions across the site is implied or intended.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of two years.

Respectfully Submitted,

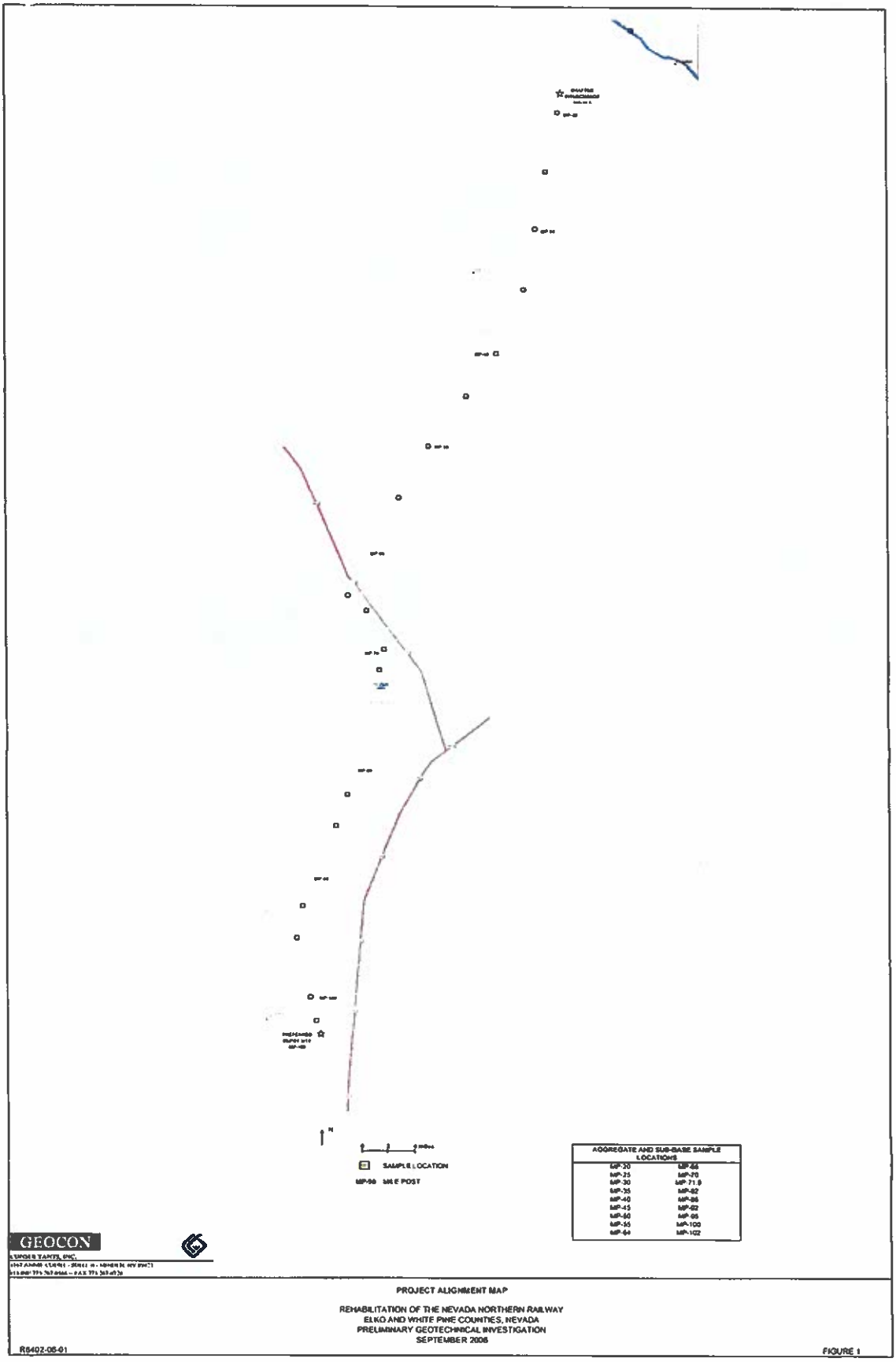
Geocon Consultants, Inc

Gary Luce, PE
Senior Engineer/Geologist

Kiersten Briggs
Geologist

Attachments:

Appendix A	Figures
Appendix B	Site Photographs
Appendix C	Laboratory Data
Appendix D	Proposal for Design Level Geotechnical Investigation



GEOCON

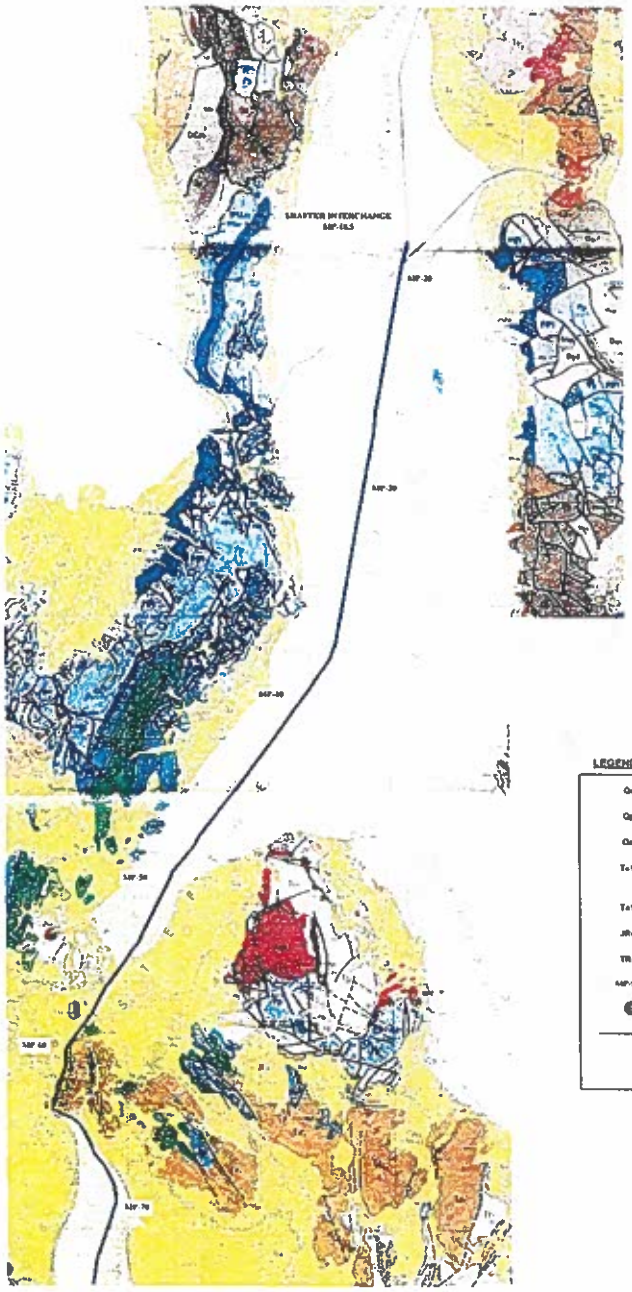
CONSULTANTS, INC.

PROJECT ALIGNMENT MAP

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R6402-06-01

FIGURE 1



LEGEND

- Q_{os} Sedimentary rocks
- Q_p Pluvial lake deposits including beach-and-bar gravel and playa silt
- Q_a Alluvium - Silt, sand and gravel along present streams and alluvial fans
- T_{cs} Sedimentary rocks - Limestone, conglomerate, sandstone, claystone, siltstone, shale and tuff
- T_{cl} Adesitic to latitic flows and pyroclastic rocks
- JR_n Non-marine sedimentary rocks
- TR_m Marine sedimentary rocks
- MP-nn Approximate mile post locations
- Approximate location of preferred site
- Nevada Northern Railway project alignment

Map Reference: Nevada Bureau of Mines and Geology, Bulletin 101 Geology of Elko County Nevada, 1987

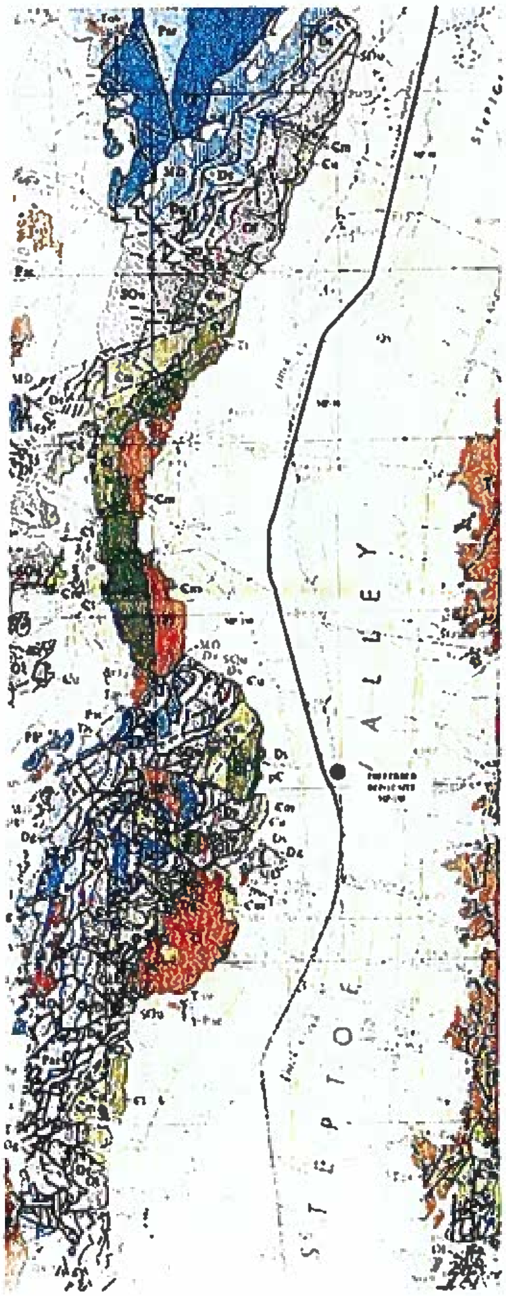
GEOCON
CONSULTANTS, INC.
1167 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0966 – FAX 775 267-0978

GEOLOGIC MAP - NORTH

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 2



LEGEND

Sedimentary rocks

Qp Pluvial lake deposits including beach and bar gravel and playa silt

Qa Alluvium - Silt, sand and gravel along present streams and alluvial fans

Tst Sedimentary rocks - Limestone, conglomerate, sandstone, claystone, siltstone, shale and tuff

Tat Andesite to latite flows and pyroclastic rocks

Non-marine sedimentary rocks

Marine sedimentary rocks

Approximate mile post locations

Approximate location of preferred depot site

Nevada Northern Railway project alignment

Map Reference: Nevada Bureau of Mines and Geology, Bulletin 85, Geology and Mineral Resources of White Pine County, Nevada, 1976

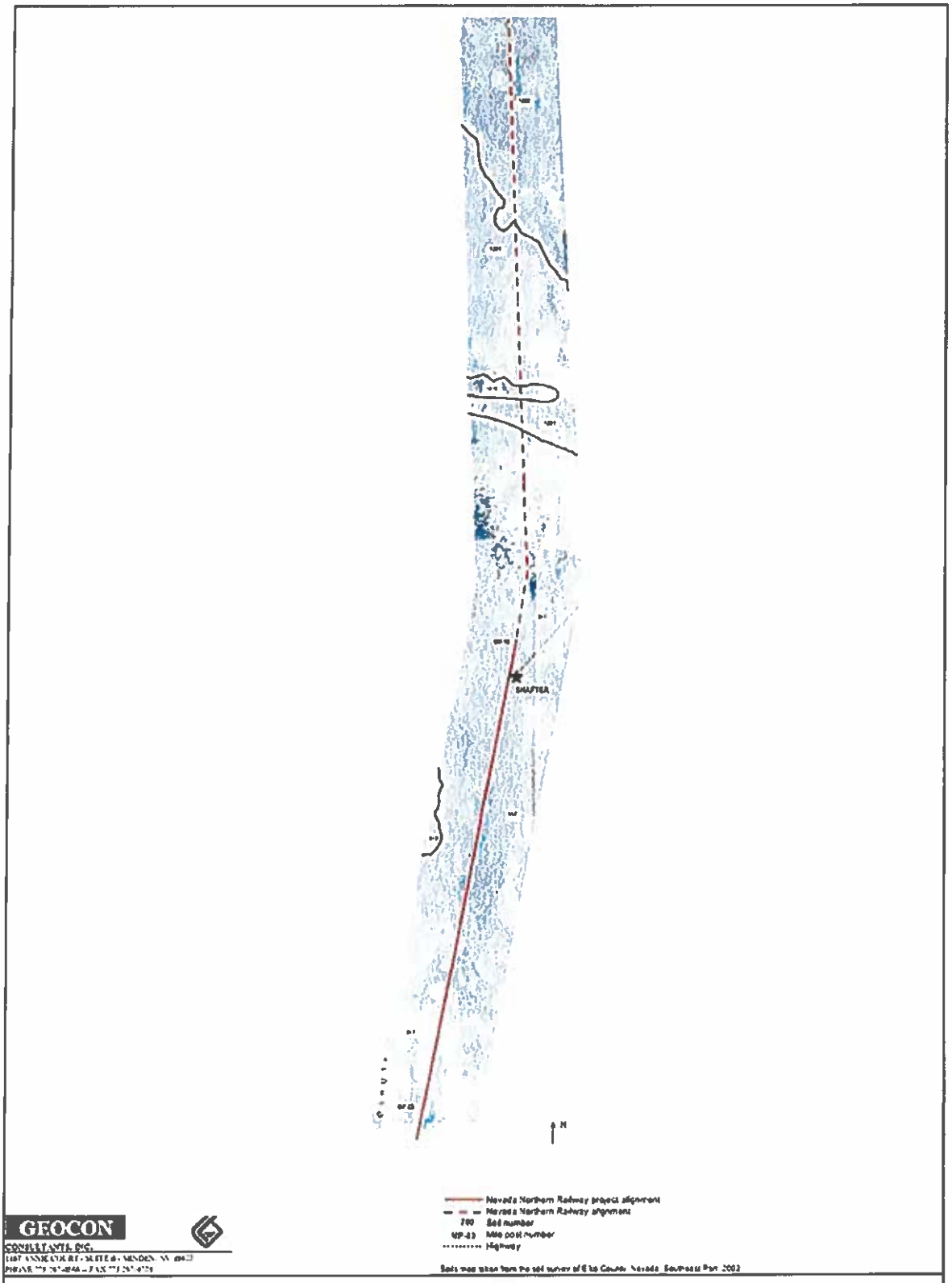
GEOCON
CONSULTANTS, INC.
[illegible]

GEOLOGIC MAP - SOUTH

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

[illegible]

FIGURE 3



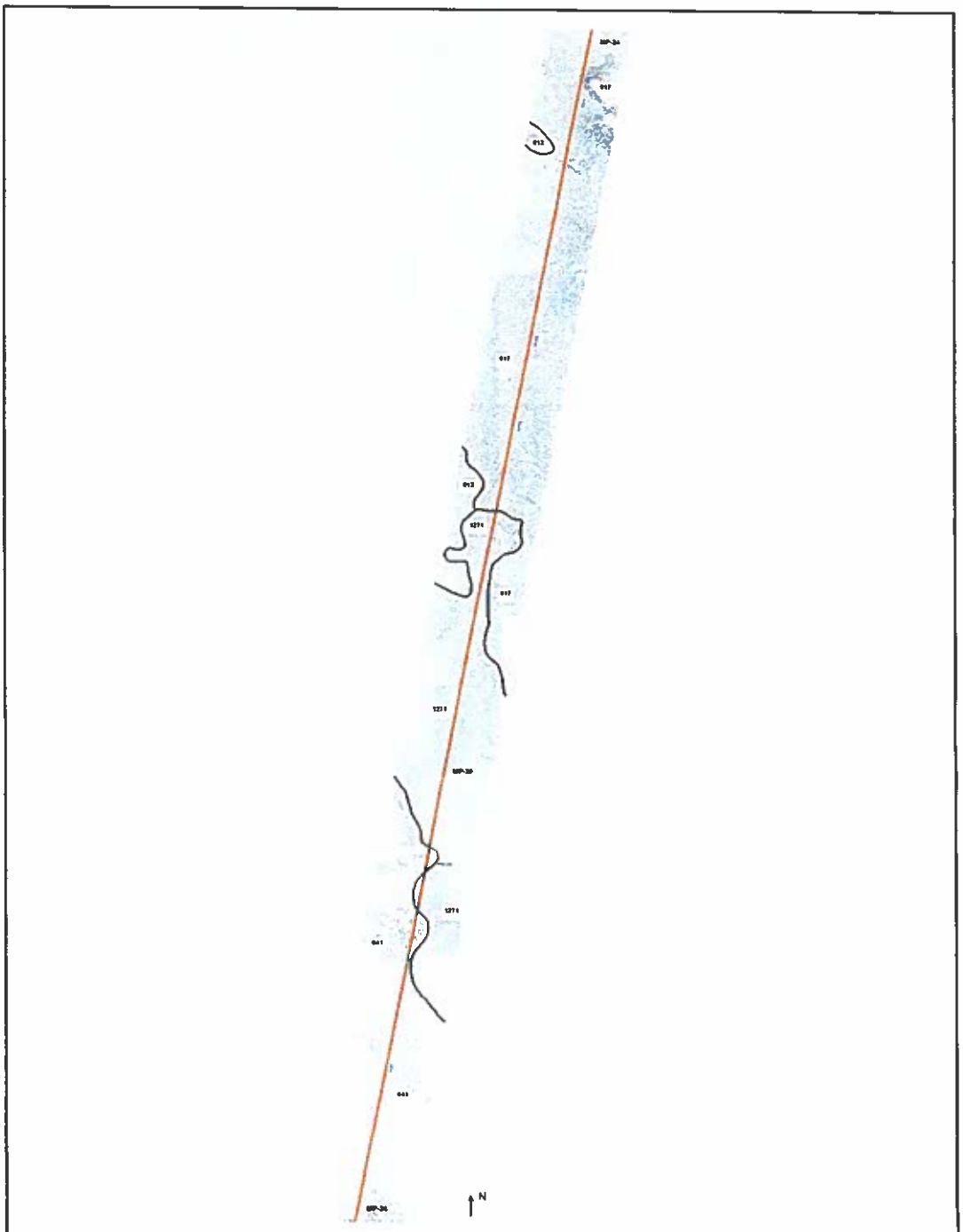
GEOCON
CONSULTANTS INC.

SOIL MAP: MP-18 to MP-23

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-02

FIGURE 4



GEOCON
CONSULTANTS, INC.
1167 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE: 775 267-0566 -- FAX 775 267-0728

SOIL MAP: MP-24 to MP-34

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 5

GEOCON
CONSULTANTS, INC.
1167 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0566 – FAX 775 267-0728

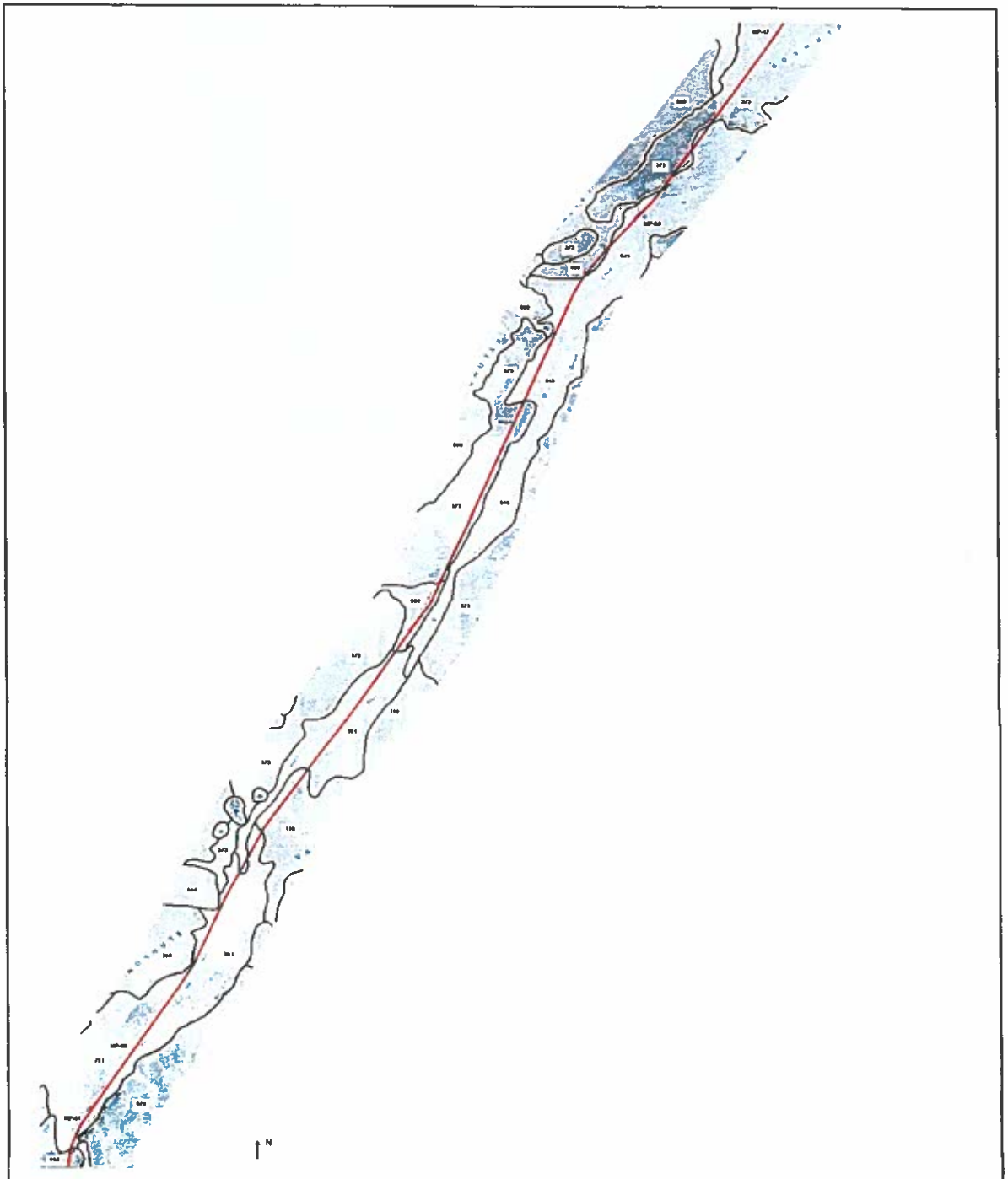
Soils map taken from the soil survey of Elko County, Nevada, Southeast Part, 2002

SOIL MAP: MP-35 to MP-46

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 6



GEOCON
CONSULTANTS, INC.
867 ANVIL COURT - SUITE B - MINDEN, NV 89423
PHONE: 775 267-0600 – FAX 775 267-0720

SOIL MAP: MP-47 to MP-61

REHABILITAITON OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 7

Nevada Northern Railway project alignment
Nevada Northern Railway alignment
760 Soil number
MP-83 Mile post number
Highway

Soils map taken from the soil survey of Elko County, Nevada, Southeast Part, 2002

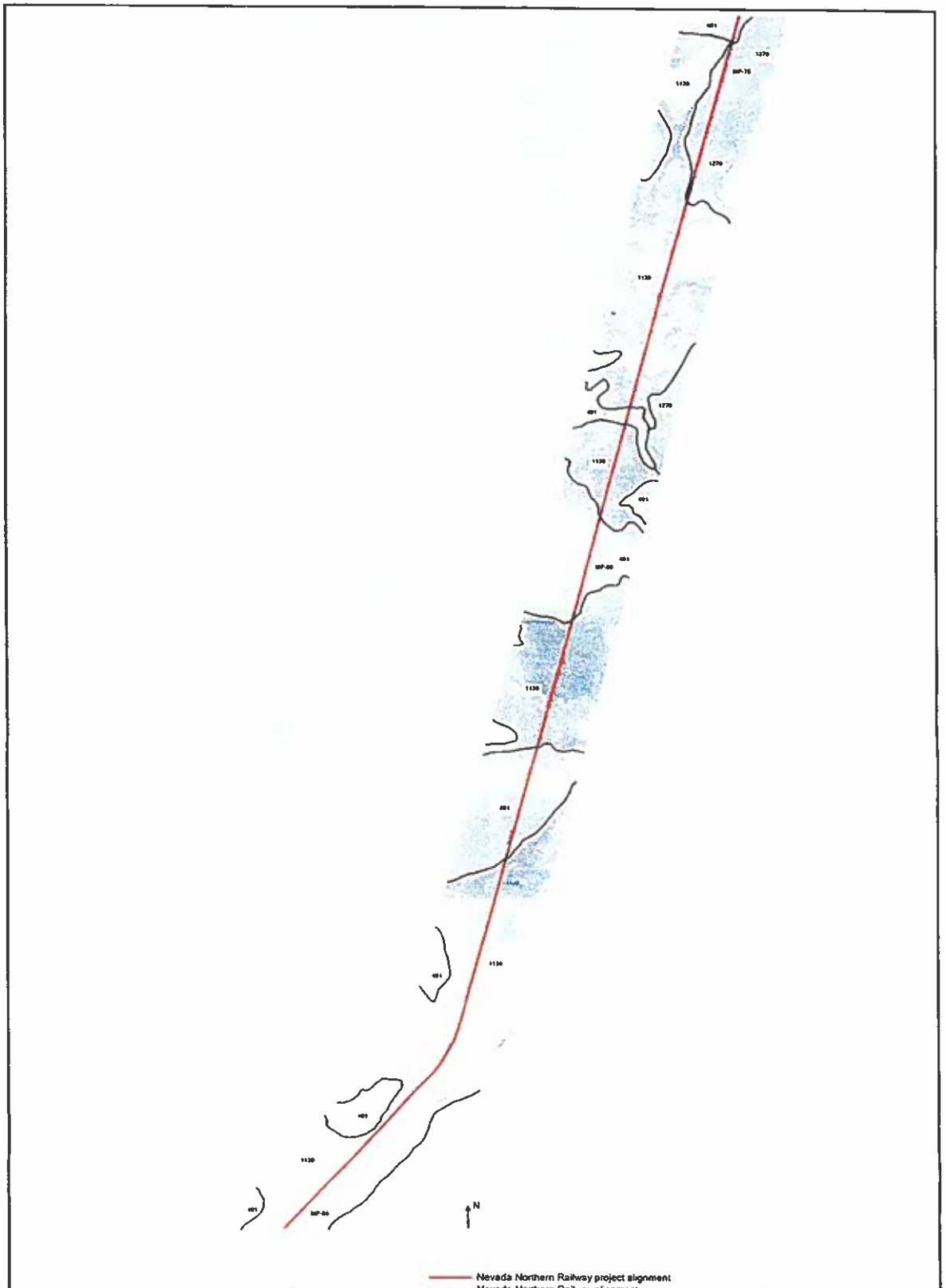
GEOCON
CONSULTANTS, INC.
1187 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0566 -- FAX 775 267-0728

SOIL MAP: MP-62 to MP-74

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 8



Soils map taken from the soil survey of Western White Pine County Area, Nevada, 1990

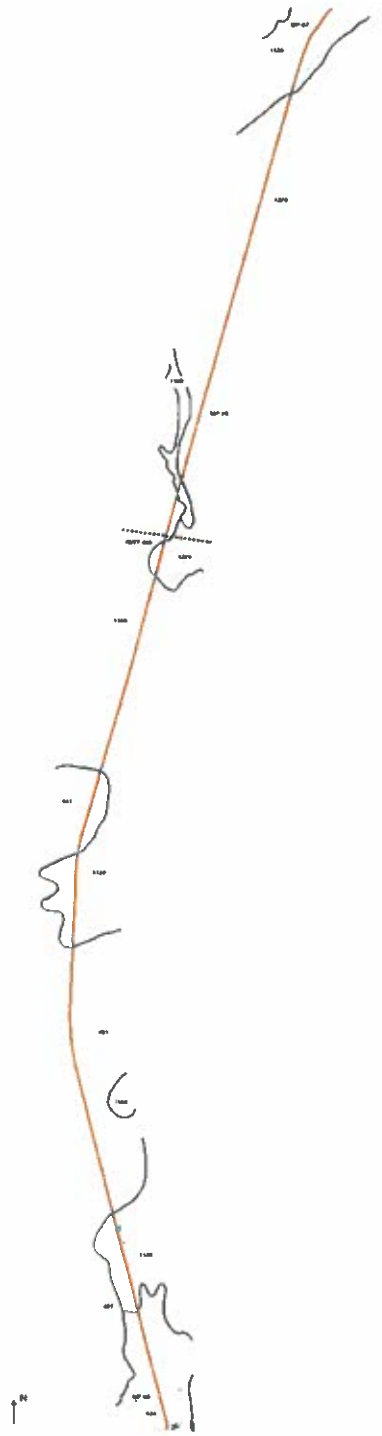
GEOCON
CONSULTANTS, INC.
[illegible] ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0568 – FAX 775 267-0728

SOIL MAP: MP-75 to MP-86

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 9



Soils map taken from the soil survey of Western White Pine County Area, Nevada, 1990

GEOCON

CONSULTANTS, INC.

1117 ANNE STREET - SUITE B - MINDEN, NV 89423

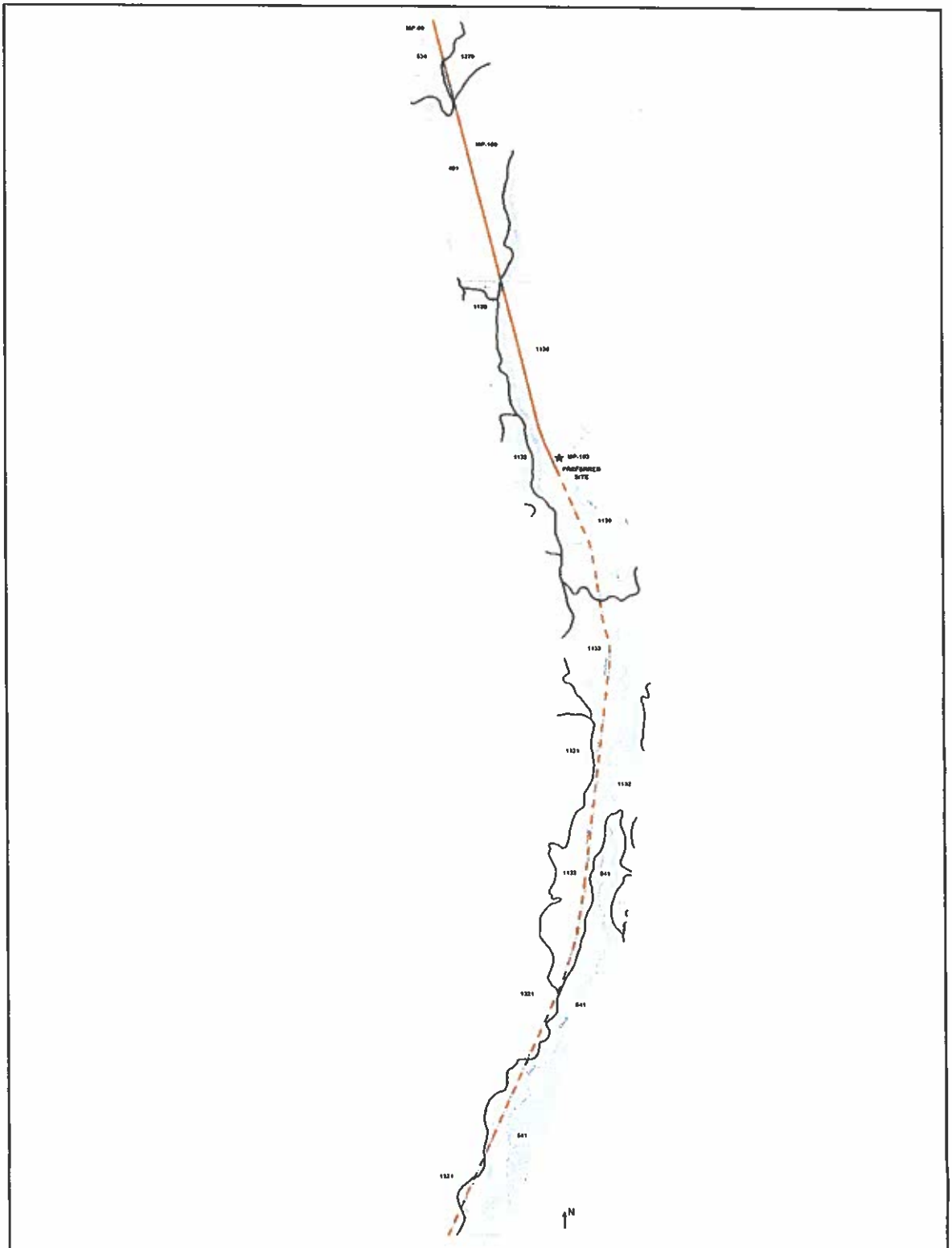
PHONE 775 267-0966 - FAX 775 267-0728

SOIL MAP: MP-87 to MP-98

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 10



Soils map taken from the soil survey of Western White Pine County Area, Nevada, 1990

GEOCON
CONSULTANTS, INC.
1167 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0566 – FAX 775 267-0728

SOIL MAP: MP-99 to MP-103

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 11

			Engineering Properties					Soil Features			Water Features			
Soil Number	Soil Name	Depth	USDA Texture	Unified Soil Classification	Fragments 3-16 inches (percent)	Liquid Limit (percent)	Plasticity Index	Potential For Frost Action	Risk of Corrosion-Uncoated Steel	Risk of Corrosion-Concrete	Water Table Upper Limit (feet)	Water Table Lower Limit (feet)	Ponding Frequency	Flooding Frequency
373	Timpie-Pancown-Lincyer Association													
	Timpie	0 - 8	Silt loam	CL-ML, ML	0	25 - 30	5 - 10	High	High	High	–	–	None	None
		8 - 19	Silt loam	CL-ML, ML	0	25 - 30	5 - 10							
		19 - 80	Silt loam	CL-ML, ML	0	25 - 30	5 - 10							
	Pancown	0 - 10	Fine sandy loam	SM	0	20 - 25	NP - 5	Low	High	Low	–	–	None	None
		10 - 60	Fine sandy loam, sandy loam, very fine sandy loam	SM	0	20 - 25	NP - 5							
	Lincyer	0 - 9	Silt loam	CL-ML, ML	0	15 - 25	NP - 10	Low	High	Moderate	–	–	None	None
		9 - 60	Silt loam, very fine sandy loam	CL-ML, ML	0	15 - 25	NP - 10							
849	Kumiller-Sycamore Association													
	Kumiller	0 - 4	Gravelly sandy loam	GM, SM	0	15 - 25	NP - 5	Moderate	High	Moderate	–	–	None	Very rare
		4 - 11	Loam	CL-ML, ML	0	20 - 30	NP - 10							
		11 - 41	Fine sandy loam, sandy loam	SC-SM, SM	0	20 - 30	NP - 10							
		41 - 60	Loam	CL-ML, ML	0	20 - 30	NP - 10							
	Sycamore	0 - 3	Gravelly sandy loam	SM	0	15 - 30	NP - 5	Low	High	Low	–	–	None	None
		3 - 21	Gravelly silt loam, gravelly sandy loam, loam	GM, ML, SM	0	15 - 30	NP - 5							
		21 - 48	Gravelly coarse sandy loam, gravelly loam, sandy loam	GM, ML, SM	0	15 - 30	NP - 5							
		48 - 60	Very gravelly loamy sand, very gravelly sand	GP, GP-GM	0 - 8	–	NP							
862	Shelfie-Kelelane Association													
	Shelfie	0 - 10	Fine sandy loam	ML	0	20 - 25	NP - 8	Moderate	High	High	5.0 - >6.0	>6.0	None	None
		10 - 60	Stratified silt loam to clay	CL, MH, ML	0	40 - 60	15 - 25							
	Kelelane	0 - 5	Silt loam	CL, CL-ML	0	20 - 30	5 - 10	Moderate	High	High	–	–	None	None
		5 - 28	Silt loam	CL	0	25 - 35	10 - 15							
		28 - 32	Stratified silt loam to silty clay loam	CL	0	25 - 40	10 - 20							
		32 - 32	Stratified silt loam to silty clay loam	CL	0	40 - 50	15 - 25							
781	Mycol-Benin-Weedane Association													
	Mycol	0 - 5	Silty clay loam	CL	0	35 - 45	15 - 20	Moderate	High	High	–	–	None	Rare
		5 - 17	Silty clay loam, silt loam	CL	0	30 - 45	10 - 20							
		17 - 31	Silty clay loam, silt loam	CL	0	30 - 45	10 - 20							
		31 - 60	Stratified very gravelly coarse sand to fine sandy loam	SM	0 - 10	–	NP							
	Benin	0 - 7	Silt loam	CL, CL-ML, ML	0	25 - 35	5 - 10	Low	High	High	–	–	None	None
		7 - 60	Clay, silty clay	CH, CL, MH	0	45 - 55	20 - 25							
	Weedane	0 - 8	Silty clay loam	CL, ML	0	35 - 45	10 - 20	High	High	High	2.5 - 4.0	>6.0	None	None
		8 - 42	Silt loam, very fine sandy loam	ML	0	30 - 40	NP - 10							
		42 - 60	Stratified silt loam to clay loam	CL, ML	0	35 - 45	10 - 20							
806	Mazuma-Teano Association													
	Mazuma	0 - 15	Silt loam	ML	0	25 - 35	NP - 8	Low	High	High	–	–	None	None
		15 - 60	Stratified gravelly coarse sand to silt loam	SM	0	20 - 25	NP - 5							
	Teano	0 - 9	Silt loam	ML	0	30 - 50	NP - 5	Low	High	Moderate	–	–	None	None
		9 - 27	Silt loam, very fine sandy loam	ML	0	30 - 50	NP - 8							
		27 - 60	Silt loam, very fine sandy loam	ML	0	30 - 50	NP - 8							
846	Kelelane-Ragtown-Timpie Association													
	Kelelane	0 - 5	Silt loam	CL, CL-ML	0	20 - 30	5 - 10	Moderate	High	High	–	–	None	None
		5 - 28	Silt loam	CL	0	25 - 35	10 - 15							
		28 - 32	Stratified silt loam to silty clay loam	CL	0	25 - 40	10 - 20							
		32 - 60	Stratified silt loam to silty clay loam	CL	0	40 - 50	15 - 25							
	Ragtown	0 - 3	Silt loam	CL	0	30 - 40	10 - 15	Low	High	High	–	–	None	None
		3 - 26	Stratified sandy clay loam to silty clay loam	CL	0	35 - 45	15 - 20							
		26 - 60	Stratified silty clay loam to clay	CH, CL, MH	0	40 - 55	20 - 25							
	Timpie	0 - 8	Silt loam	CL, CL-ML	0	25 - 30	5 - 10	High	High	High	–	–	None	None
		8 - 19	Silt loam	CL, CL-ML	0	25 - 30	5 - 10							
		19 - 60	Silt loam	CL, CL-ML	0	25 - 30	5 - 10							
880	Outfer, Drained-Outfer-Kolda Association													
	Outfer	0 - 4	Silt loam	CL	0	30 - 35	10 - 15	High	High	High	3.0 - 5.0	>6.0	None	Rare
		4 - 60	Silty clay loam, silt loam	CL	0	30 - 45	10 - 20							
	Drained-Outfer	0 - 25	Silt loam	CL	0	35 - 40	15 - 20	High	High	High	1.5 - 3.0	>6.0	None	Occasional
		25 - 60	Silty clay loam, silt loam	CL	0	30 - 40	10 - 20							
	Kolda	0 - 4	Silt loam	CL, CL-ML	0	25 - 35	5 - 15	High	High	High	0.0 - 1.5	>6.0	None	None
		4 - 11	Silt loam	CL, CL-ML	0	25 - 35	5 - 15							
		11 - 30	Clay, silty clay	CH, CL	0	45 - 60	20 - 35							
881	Outfer-Kumiller Association													
	Outfer	0 - 4	Silt loam	CL	0	30 - 35	10 - 15	High	High	High	3.0 - 5.0	>6.0	None	Rare
		4 - 60	Silty clay loam, silt loam	CL	0	30 - 45	10 - 20							
	Kumiller	0 - 18	Loam	CL-ML, ML	0	20 - 30	NP - 10	Moderate	High	Moderate			None	None
		18 - 48	Fine sandy loam, sandy loam	SC-SM, SM	0	20 - 30	NP - 10							
		48 - 60	Loam	CL-ML, ML	0	20 - 30	NP - 10							

NOTES NP - Non Plastic
– No Data Available

SOIL DATA: ELKO COUNTY ENGINEERING PROPERTIES, SOIL FEATURES AND WATER FEATURES

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 12

			Engineering Properties					Soil Features			Water Features			
Soil Number	Soil Name	Depth	USDA Texture	Unified Soil Classification	Fragments 3-10 inches (percent)	Liquid Limit (percent)	Plasticity Index	Potential For Frost Action	Risk of Corrosion-Uncoated Steel	Risk of Corrosion-Concrete	Water Table Upper Limit (feet)	Water Table Lower Limit (feet)	Ponding Frequency	Flooding Frequency
662	Duffer-Kelda Association													
	Duffer	0 - 25	Silt loam	CL	0	30 - 35	15 - 20	High	High	High	1.5 - 3.0	>6.0	None	Occasional
		25 - 60	Silty clay loam, silt loam	CL	0	30 - 45	10 - 20							
	Kelda	0 - 4	Silt loam	CL, CL-ML	0	25 - 35	5 - 15	High	High	High	0.0 - 1.5	>6.0	None	None
		4 - 11	Silt loam	CL, CL-ML	0	25 - 35	5 - 15							
		11 - 60	Clay, silty clay	CH, CL	0	45 - 60	20 - 30							
912	Ketalana Association	0 - 5	Silt loam	CL, CL-ML	0	20 - 30	5 - 10	Moderate	High	High	-	-	None	None
		5 - 28	Silt loam	CL	0	28 - 35	10 - 15							
		28 - 32	Stratified silt loam to silty clay loam	CL	0	25 - 40	10 - 20							
		32 - 60	Stratified silt loam to silty clay loam	CL	0	40 - 50	15 - 25							
917	Ketalana-Sheffa-Ragtown Association													
	Ketalana	0 - 5	Silt loam	CL, CL-ML	0	20 - 30	5 - 10	Moderate	High	High	-	-	None	None
		5 - 28	Silt loam	CL	0	28 - 35	10 - 15							
		28 - 32	Stratified silt loam to silty clay loam	CL	0	25 - 40	10 - 20							
		32 - 60	Stratified silt loam to silty clay loam	CL	0	40 - 50	15 - 25							
	Sheffa	0 - 4	Silt loam	CL, CL-ML, ML	0	25 - 35	5 - 10	Moderate	High	High	0.0 - >6.0	>6.0	None	None
		4 - 60	Stratified silt loam to clay	CL, MH, ML	0	40 - 60	15 - 25							
	Ragtown	0 - 16	Silty clay loam	CL	0	35 - 45	20 - 30	Low	High	High			None	None
		16 - 60	Stratified sandy clay loam to silty clay loam	CH, CL	0	45 - 65	20 - 50							
941	Sheffa-Zorravista Association													
	Sheffa	0 - 10	Fine sandy loam	CL, CL-ML, ML	0	25 - 35	NP - 5	Moderate	High	High	3.0 - >6.0	>6.0	None	None
		10 - 60	Stratified silt loam to clay	CL, MH, ML	0	40 - 60	15 - 25							
	Zorravista	0 - 6	Loamy fine sand	SM	0	-	NP	Low	High	Low				
		6 - 60	Fine sand, sand	SM, SP-SM	0	-	NP							
1271	Uvada-Ragtown Association													
	Uvada	0 - 5	Silt clay loam	MH, ML	0	45 - 55	15 - 25	Low	High	High	-	-	None	None
		5 - 8	Silty clay	MH	0	55 - 75	20 - 35							
		8 - 17	Silty clay	MH	0	55 - 75	20 - 35							
		17 - 52	Stratified silty clay loam to silty clay	MH	0	50 - 65	15 - 30							
		52 - 60	Stratified silty clay loam to silty clay	MH	0	50 - 65	15 - 30							
	Ragtown	0 - 16	Silty clay loam	CL	0	35 - 45	20 - 30	Low	High	High	-	-	None	None
		16 - 60	Stratified sandy clay loam to silty clay loam	CH, CL	0	45 - 65	30 - 50							

NOTES NP - Non Plastic
- No Data Available

SOIL DATA: ELKO COUNTY ENGINEERING PROPERTIES, SOIL FEATURES AND WATER FEATURES CONTINUED

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-08-01

FIGURE 13

			Chemical Soil Properties					Physical Soil Properties	
Soil Number	Soil Name	Depth	pH	Calcium Carbonate (percent)	Gypsum (percent)	Salinity	Sodium Adsorption Ratio	Saturated Hydraulic Conductivity (micro m/sec)	Shrink-Swell Potential
373	Timpie-Pilldown-Lincyer Association								
	Timpie	0 - 8 8 - 19 19 - 60	8.5 - 9.6	15 - 40	0	0.0 - 4.0 4.0 – 8.0 16.0 - 32.0	5 - 13 13 - 50 13 - 50	1.4 - 4.0 1.4 - 4.0 1.4 - 4.0	Low
	Pilldown	0 - 10 10 - 60	7.4 - 9.0	1 - 10	0	0.0 - 4.0 2.0 - 8.0	0 1 - 5	4.0 - 14.0 4.0 - 14.0	Low
	Lincyer	0 - 9 9 - 60	7.9 - 9.0	5 - 30	0	0.0 - 2.0 0.0 - 2.0	0 0	4.0 - 14.0 4.0 - 14.0	Low
540	Kunzler-Sycamat Association								
	Kunzler	0 - 4 4 - 11 11 - 41 41 - 60	7.9 - 9.0	1 - 20	0	0.0 - 2.0 2.0 - 4.0 4.0 - 16.0 4.0 - 16.0	0 - 10 0 - 10 15 - 35 40 - 60	14.0 - 42.0 4.0 - 42.0 1.4 - 4.0 4.0 - 14.0	Low
	Sycamat	0 - 3 3 - 21 21 - 48 48 - 60	7.9 - 9.4	10 - 30	0	2.0 - 4.0 2.0 - 4.0 2.0 - 4.0 2.0 - 4.0	0 - 5 0 - 5 0 - 5 0 - 5	4.0 - 14.0 4.0 - 14.0 4.0 - 14.0 42.0 - 141.0	Low
582	Shettit-Katelana Association								
	Shettit	0 - 10 10 - 60	8.5 - 9.6	10 - 35	0 - 5	2.0 - 4.0 8.0 - 16.0	1 - 5 13 - 45	14.0 - 42.0 0.01 - 0.42	Low - High
	Katelana	0 - 5 5 - 28 28 - 32 32 - 32	8.5 - 9.0	20 - 60	0 - 2	4.0 - 8.0 4.0 - 8.0 16.0 - 32.0 16.0 - 32.0	2 - 12 2 - 12 46 - 90 90 - 180	4.0 - 14.0 4.0 - 14.0 4.0 - 14.0 1.4 - 4.0	Moderate - High
781	Mysel-Benin-Wendane Association								
	Mysel	0 - 5 5 - 17 17 - 31 31 - 60	7.9 - 9.6	1 - 15	0 - 1	0.0 - 4.0 0.0 - 4.0 8.0 - 16.0 8.0 - 16.0	1 - 12 1 - 12 13 - 30 13 - 30	0.42 - 1.4 0.42 - 1.4 0.42 - 1.4 14.0 - 42.0	Low - Moderate
	Benin	0 - 7 7 - 60	7.6 - 9.6	1 - 10	0 - 5	0.0 - 16.0 4.0 - 16.0	0 - 13 13 - 50	4.0 - 14.0 0.01 - 0.42	Low - High
	Wendane	0 - 8 8 - 42 42 - 60	7.9 - 9.6	5 - 15	0	16.0 - 32.0 16.0 - 32.0 16.0 - 32.0	46 - 99 1 - 12 1 - 5	1.4 - 4.0 4.0 - 14.0 1.4 - 4.0	Low - Moderate
800	Mazuma-Teano Association								
	Mazuma	0 - 15 15 - 60	7.9 - 9.6	1 - 10	0 - 2	0.0 - 4.0 4.0 - 16.0	5 - 12 13 - 45	4.0 - 14.0 14.0 - 42.0	Low
	Teano	0 - 9 9 - 27 27 - 60	7.9 - 9.0	10 - 30	0 - 1	0.0 - 2.0 0.0 - 4.0 8.0 - 16.0	0 - 2 0 - 2 1 - 12	4.0 - 14.0 4.0 - 14.0 4.0 - 14.0	Low
845	Katelana-Ragtown-Timpie Association								
	Katelana	0 - 5 5 - 28 28 - 32 32 - 60	8.5 - 9.0	20 - 60	0 - 2	4.0 - 8.0 4.0 - 8.0 16.0 - 32.0 16.0 - 32.0	2 - 12 2 - 12 46 - 90 90 - 180	4.0 - 14.0 4.0 - 14.0 4.0 - 14.0 1.4 - 4.0	Moderate - High
	Ragtown	0 - 5 5 - 26 26 - 60	8.5 - 9.6	10 - 40	0 - 2	4.0 - 8.0 16.0 - 32.0 16.0 - 32.0	1 - 5 13 - 45 31 - 90	1.4 - 4.0 1.4 - 4.0 0.42 - 1.4	Moderate - High
	Timpie	0 - 8 8 - 19 19 - 60	8.5 - 9.6	15 - 40	0	0.0 - 4.0 4.0 - 8.0 16.0 - 32.0	5 - 13 13 - 50 13 - 50	1.4 - 4.0 1.4 - 4.0 1.4 - 4.0	Low
880	Duffer, Drained-Duffer-Kolda Association								
	Duffer	0 - 4 4 - 60	7.9 - 9.6	20 - 60	1 - 5	8.0 - 16.0 8.0 - 16.0	46 - 90 13 - 30	4.0 - 14.0 1.4 - 4.0	Moderate
	Drained-Duffer	0 - 25 25 - 60	7.9 - 9.6	20 - 60	1 - 2	4.0 - 16.0 16.0 - 32.0	31 - 45 46 - 90	1.4 - 4.0 1.4 - 4.0	Moderate
	Kolda	0 - 4 4 - 11 11 - 30	8.5 - 9.6	1 - 40	0	4.0 - 8.0 4.0 - 8.0 4.0 - 8.0	0 0 0	4.0 - 14.0 4.0 - 14.0 0.42 - 1.4	Moderate - High

NOTES: NP - Non Plastic
– No Data Available

SOIL DATA: ELKO COUNTY CHEMICAL AND PHYSICAL SOIL PROPERTIES

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 14

			Chemical Soil Properties					Physical Soil Properties	
Soil Number	Soil Name	Depth	pH	Calcium Carbonate (percent)	Gypsum (percent)	Salinity	Sodium Adsorption Ratio	Saturated Hydraulic Conductivity (micro m/sec)	Shrink-Swell Potential
881	Duffer-Kunzler Association								
	Duffer	0 - 4	7.9 - 9.6	20 - 60	1 - 5	8.0 - 16.0	46 - 90	4.0 - 14.0	Moderate
		4 - 60				8.0 - 16.0	13 - 30	1.4 - 4.0	
	Kunzler	0 - 16	7.9 - 9.0	1 - 20	0	0.0 - 2.0	0 - 13	4.0 - 14.0	Low
		16 - 48				4.0 - 16.0	13 - 30	1.4 - 4.0	
		48 - 60				4.0 - 16.0	30 - 60	4.0 - 14.0	
882	Duffer-Kolda Association								
	Duffer	0 - 25	7.9 - 9.6	20 - 60	1 - 2	4.0 - 16.0	31 - 45	1.4 - 4.0	Moderate
		25 - 60				16.0 - 32.0	46 - 90	1.4 - 4.0	
	Kolda	0 - 4	8.5 - 9.6	1 - 40	0	4.0 - 8.0	0	4.0 - 14.0	Moderate - High
		4 - 11				4.0 - 8.0	0	4.0 - 14.0	
		11 - 60				4.0 - 8.0	0	0.42 - 1.4	
912	Katelana Association	0 - 5	8.5 - 9.0	20 - 60	0 - 2	4.0 - 8.0	2 - 12	4.0 - 14.0	Moderate - High
		5 - 28				4.0 - 8.0	2 - 12	4.0 - 14.0	
		28 - 32				16.0 - 32.0	46 - 90	4.0 - 14.0	
		32 - 60				16.0 - 32.0	90 - 180	1.4 - 4.0	
917	Katelana-Sheffit-Ragtown Association								
	Katelana	0 - 5	8.5 - 9.8	20 - 60	0 - 2	4.0 - 8.0	2 - 12	4.0 - 14.0	Moderate - High
		5 - 28				4.0 - 8.0	2 - 12	4.0 - 14.0	
		28 - 32				16.0 - 32.0	46 - 90	4.0 - 14.0	
		32 - 60				16.0 - 32.0	90 - 180	1.4 - 4.0	
	Sheffit	0 - 4	8.5 - 9.6	20 - 60	0 - 5	4.0 - 8.0	5 - 12	4.0 - 14.0	Moderate - High
		4 - 60				8.0 - 16.0	13 - 45	0.01 - 0.42	
	Ragtown	0 - 16	8.5 - 9.6	10 - 40	0 - 2	0.0 - 4.0	13 - 30	1.4 - 4.0	Moderate - High
		16 - 60				16.0 - 32.0	46 - 90	0.42 - 1.4	
941	Sheffit-Zorravista Association								
	Sheffit	0 - 10	8.5 - 9.6	15 - 35	0 - 5	4.0 - 8.0	5 - 12	4.0 - 14.0	Moderate - High
		10 - 60				8.0 - 16.0	13 - 45	0.01 - 0.42	
	Zorravista	0 - 6	7.4 - 9.0	1 - 10	0	0.0	0	42.0 - 141.0	Low
		6 - 60				0.0 - 2.0	0	141.0 - 705.0	
1271	Uvada-Ragtown Association								
	Uvada	0 - 5	8.5 - 9.6	1 - 40	0 - 5	0.0 - 2.0	0 - 5	1.4 - 4.0	High
		5 - 8				0.0 - 4.0	13 - 30	0.01 - 0.42	
		8 - 17				8.0 - 16.0	150 - 170	0.01 - 0.42	
		17 - 52				8.0 - 16.0	150 - 180	0.01 - 0.42	
		52 - 60				8.0 - 16.0	160 - 190	0.01 - 0.42	
	Ragtown	0 -16	8.5 - 9.6	10 - 40	0 - 2	0.0 - 4.0	13 - 30	1.4 - 4.0	Moderate - High
		16 - 60				16.0 - 32.0	46 - 90	0.42 - 1.4	

NOTES: NP - Non Plastic
-- No Data Available

SOIL DATA: ELKO COUNTY CHEMICAL AND PHYSICAL SOIL PROPERTIES CONTINUED

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006

R8402-06-01

FIGURE 15

			Engineering Properties					Soil Features			Water Features			
Soil Number	Soil Name	Depth	USDA Texture	Unified Soil Classification	Fragments 3-10 inches (percent)	Liquid Limit (percent)	Plasticity Index	Potential For Frost Action	Risk of Corrosion-Uncoated Steel	Risk of Corrosion-Concrete	Water Table Upper Limit (feet)	Water Table Lower Limit (feet)	Ponding Frequency	Flooding Frequency
611	Kenaston-Kobeluna Association													
	Kenaston	0 - 10	Loam	CL-ML, ML	0	20 - 30	NP - 10	Moderate	High	Moderate	–	–	None	None
		10 - 26	Loam	CL-ML, ML	0	20 - 30	NP - 10							
		26 - 60	Fine sandy loam, sandy loam	SC-SM, SM	0	20 - 30	NP - 10							
	Kobeluna	0 - 2	Silt loam	CL, CL-ML	0	20 - 30	5 - 10	Moderate	High	High	–	–	None	None
		2 - 19	Silt loam	CL	0	25 - 35	10 - 15							
		19 - 32	Silt loam to silty clay loam	CL	0	35 - 40	10 - 20							
		32 - 62	Silty clay loam to clay loam	CL	0	40 - 50	15 - 25							
		62 - 79	Clay, silty clay	MH, ML	0	40 - 50	15 - 25							
634	Duffer-Kobeh Association													
	Duffer	0 - 6	Silt loam	CL	0	30 - 35	10 - 15	High	High	High	1.5 - 3.0	>6.0	None	Rare - Occasional
		6 - 60	Silty clay loam, silt loam	CL	0	30 - 35	10 - 20							
	Kobeh	0 - 6	Silt loam	CL, CL-ML	0	25 - 35	5 - 15	High	High	High	0.0 - 1.5	>6.0	None	None
		6 - 72	Silt loam	CL, CL-ML	0	25 - 35	5 - 15							
		72 - 80	Clay, silty clay	CH, CL	0	45 - 60	20 - 30							
641	Kobeh-Duffer Association													
	Kobeh	0 - 6	Silt loam	CL, CL-ML	0	25 - 35	5 - 15	High	High	High	0.0 - 1.5	>6.0	None	None
		6 - 22	Silt loam	CL, CL-ML	0	25 - 35	5 - 15							
		22 - 60	Clay, silty clay	CH, CL	0	45 - 60	20 - 30							
	Duffer	0 - 6	Silt loam	CL	0	25 - 30	5 - 10	High	High	High	1.5 - 3.0	>6.0	None	Occasional
		6 - 60	Silty clay loam, silt loam	CL	0	30 - 40	10 - 20							
1120	Duffer-Equin Association													
	Duffer	0 - 6	Silt loam	CL	0	25 - 35	25 - 30	High	High	High	1.5 - 3.0	>6.0	None	Rare - Occasional
		6 - 60	Silty clay loam, silt loam	CL	0	30 - 45	30 - 40							
	Equin	0 - 6	Silty clay	MH	0	60 - 80	60 - 80	Moderate	High	High	1.0 - 3.0	>6.0	None	Rare
		6 - 30	Clay, silty clay	MH	0	60 - 80	60 - 80							
		30 - 50	Silty clay, silty clay loam	MH	0	50 - 70	30 - 70							
		50 - 60	Silty clay, Silty clay loam, silt loam	MH, ML	0	35 - 70	35 - 70							
1132	Duffer silt loam, sandy bedded, 0 to 2 percent slopes	0 - 6	Silt loam	CL	0	30 - 35	30 - 35	High	High	High	3.0 - 5.0	>6.0	None	Rare
		6 - 60	Silty clay loam, silt loam	CL	0	30 - 45	30 - 45							
1169	Kobeh-Bastian Association													
	Kobeh	0 - 2	Silt loam	CL, CL-ML	0	20 - 30	5 - 10	Moderate	High	High	–	–	None	None
		2 - 19	Silt loam	CL	0	25 - 35	10 - 15							
		19 - 32	Silt loam to silty clay loam	CL	0	35 - 40	10 - 20							
		32 - 62	Silty clay loam to clay loam	CL	0	40 - 50	15 - 25							
		62 - 79	Clay, silty clay	MH, ML	0	40 - 55	15 - 25							
	Bastian	0 - 5	Silty clay	CH, CL	0	45 - 60	25 - 35	High	High	High	0.0	>6.0	Frequent	Rare
		5 - 20	Silty clay loam to clay	CH, CL	0	45 - 60	30 - 35							
		20 - 60	Fine sandy loam to silt loam	ML, SM	0	15 - 25	NP - 5							
1270	Bastian-Equin Association													
	Bastian	0 - 5	Silty clay	CH, CL	0	45 - 60	25 - 35	High	High	High	0.0	>6.0	Frequent	Rare
		5 - 20	Silty clay loam to clay	CH, CL	0	45 - 60	30 - 35							
		20 - 60	Fine sandy loam to silt loam	ML, SM	0	15 - 25	NP - 5							
	Equin	0 - 6	Silty clay	MH	0	60 - 80	30 - 35	Moderate	High	High	1.0 - 3.0	>6.0	None	Rare
		6 - 30	Clay, silty clay	MH	0	60 - 80	30 - 35							
		30 - 50	Silty clay, silty clay loam	MH	0	50 - 70	15 - 25							
		50 - 60	Silty clay, Silty clay loam, silt loam	MH, ML	0	35 - 70	10 - 25							
1321	Dynamont sandy loam, 0 to 4 percent slopes	0 - 4	Sandy loam	ML, SM	0	15 - 25	NP - 5	Low	High	Low	–	–	None	None
		4 - 15	Sandy loam	ML, SM	0	15 - 25	NP - 5							
		15 - 44	Sandy loam	ML, SM	0	15 - 25	NP - 5							
		44 - 60	Sandy loam to sand	SM	0	–	NP							

NOTES: NP - Non Plastic
– No Data Available

SOIL DATA: WHITE PINE COUNTY ENGINEERING PROPERTIES, SOIL FEATURES AND WATER FEATURES

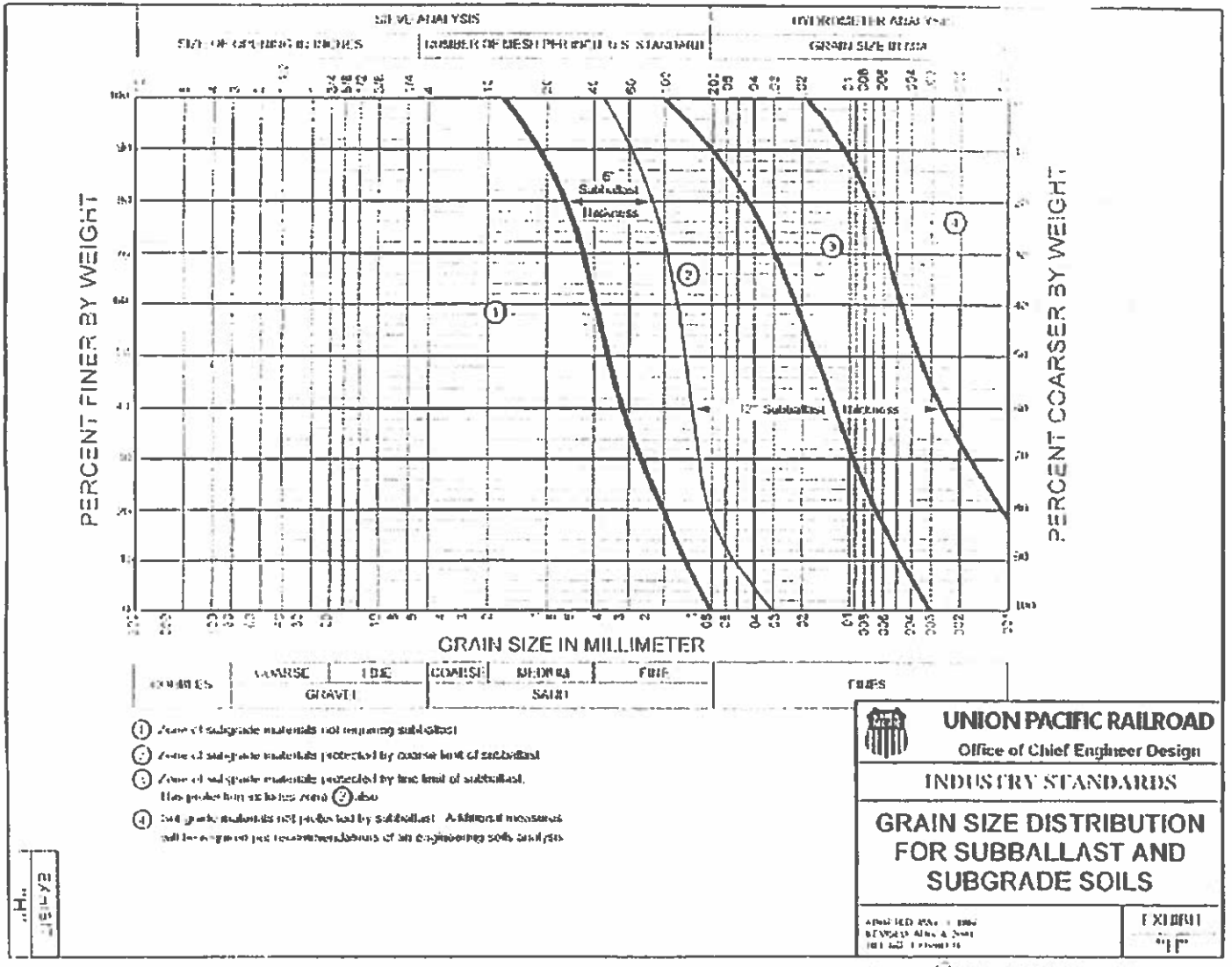
REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2008

			Chemical Soil Properties					Physical Soil Properties	
Soil Number	Soil Name	Depth	pH	Calcium Carbonate (percent)	Gypsum (percent)	Salinity	Sodium Adsorption Ratio	Saturated Hydraulic Conductivity (micro m/sec)	Shrink-Swell Potential
491	Kunzler-Katalana Association								
	Kunzler	0 - 10	7.9 - 9.6	1 - 5	0	0.0 - 2.0	0 - 12	4.0 - 14.0	Low
		10 - 26		10 - 15	0	2.0 - 4.0	0 - 12	4.0 - 14.0	
		26 - 60		15 - 20	0	4.0 - 16.0	13 - 30	1.4 - 4.0	
	Katalana	0 - 2	8.5 - 9.8	20 - 40	0	4.0 - 8.0	2 - 12	4.0 - 14.0	Moderate - High
		2 - 19		40 - 50	0	4.0 - 8.0	2 - 12	4.0 - 14.0	
		19 - 32		40 - 65	0	16.0 - 32.0	45 - 90	4.0 - 14.0	
		32 - 62		40 - 65	1 - 2	16.0 - 32.0	90 - 180	1.4 - 4.0	
		62 - 75		30 - 50	2 - 20	16.0 - 32.0	90 - 180	0.42 - 1.4	
834	Duller-Kobla Association								
	Duller	0 - 6	7.9 - 9.8	20 - 40	1 - 2	8.0 - 16.0	31 - 45	4.0 - 14.0	Moderate
		6 - 60		40 - 60	1 - 5	16.0 - 32.0	45 - 90	1.4 - 4.0	
	Kobla	0 - 6	8.5 - 9.6	1 - 5	0	4.0 - 8.0	0	4.0 - 14.0	Moderate - High
		6 - 22		1 - 10	0	4.0 - 8.0	0	4.0 - 14.0	
		22 - 60		10 - 40	0	4.0 - 8.0	0	0.42 - 1.4	
841	Kobla-Duller Association								
	Kobla	0 - 6	8.5 - 9.6	1 - 5	0	4.0 - 8.0	0	4.0 - 14.0	Moderate - High
		6 - 22		1 - 10	0	4.0 - 8.0	0	4.0 - 14.0	
		22 - 60		10 - 40	0	4.0 - 8.0	0	0.42 - 1.4	
	Duller	0 - 6	7.9 - 9.8	20 - 40	1 - 2	8.0 - 16.0	31 - 45	4.0 - 14.0	Moderate
		6 - 60		40 - 60	1 - 2	16.0 - 32.0	45 - 90	1.4 - 4.0	
1138	Duller-Equis Association								
	Duller	0 - 6	7.9 - 9.6	20 - 40	1 - 2	8.0 - 16.0	31 - 45	4.0 - 14.0	Moderate
		6 - 60		40 - 60	1 - 5	16.0 - 32.0	45 - 90	1.4 - 4.0	
	Equis	0 - 6	8.5 - 9.0	35 - 45	0	8.0 - 16.0	31 - 70	0.01 - 0.42	High
		6 - 30		45 - 65	1 - 2	8.0 - 16.0	5 - 70	0.01 - 0.42	
		30 - 50		45 - 65	1 - 2	4.0 - 8.0	1 - 5	0.01 - 0.42	
		50 - 60		40 - 60	1 - 2	4.0 - 8.0	1 - 5	0.42 - 1.4	
1122	Duller silt loam, sandy flooded, 0 to 2 percent slopes	0 - 6	7.9 - 9.6	20 - 40	1 - 2	8.0 - 16.0	45 - 90	4.0 - 14.0	Moderate
		6 - 60		40 - 60	1 - 5	8.0 - 16.0	13 - 30	1.4 - 4.0	
1190	Katalana-Beefus Association								
	Katalana	0 - 2	8.5 - 9.0	20 - 40	0	4.0 - 8.0	1 - 12	4.0 - 14.0	Moderate - High
		2 - 19		40 - 50	0	4.0 - 8.0	1 - 12	4.0 - 14.0	
		19 - 32		40 - 60	0	16.0 - 32.0	45 - 90	4.0 - 14.0	
		32 - 62		40 - 60	1 - 2	16.0 - 32.0	90 - 180	1.4 - 4.0	
		62 - 73		30 - 50	2 - 20	16.0 - 32.0	90 - 180	0.42 - 1.4	
	Beefus	0 - 5	8.5 - 9.8	1 - 10	0	16.0 - 32.0	50 - 80	0.42 - 1.4	Low - High
		5 - 20		1 - 10	0	16.0 - 32.0	50 - 80	0.42 - 1.4	
		20 - 60		1 - 10	1 - 2	0.0 - 2.0	10 - 30	14.0 - 42.0	
1270	Beefus-Equis Association								
	Beefus	0 - 5	8.5 - 9.6	1 - 10	0	16.0 - 32.0	50 - 80	0.42 - 1.4	Low - High
		5 - 20		1 - 10	0	16.0 - 32.0	50 - 80	0.42 - 1.4	
		20 - 60		1 - 10	1 - 2	0.0 - 2.0	10 - 30	14.0 - 42.0	
	Equis	0 - 6	8.5 - 9.6	35 - 45	0	8.0 - 16.0	31 - 70	0.01 - 0.42	High
		6 - 30		45 - 65	1 - 2	8.0 - 16.0	5 - 70	0.01 - 0.42	
		30 - 50		45 - 65	1 - 2	4.0 - 8.0	1 - 5	0.01 - 0.42	
		50 - 60		40 - 60	1 - 2	0.0 - 4.0	1 - 5	0.42 - 1.4	
1321	Sycamat sandy loam, 0 to 4 percent slopes	0 - 4	7.9 - 9.6	10 - 20	0	0.0 - 4.0	1 - 12	14.0 - 42.0	Low
		4 - 15		15 - 30	0	0.0 - 4.0	13 - 30	14.0 - 42.0	
		15 - 44		15 - 30	0	8.0 - 16.0	13 - 30	4.0 - 14.0	
		44 - 60		15 - 30	0	8.0 - 16.0	13 - 30	14.0 - 42.0	

NOTES: NP - Non Plastic
– No Data Available

SOIL DATA: WHITE PINE COUNTY CHEMICAL AND PHYSICAL SOIL PROPERTIES

REHABILITATION OF THE NEVADA NORTHERN RAILWAY
ELKO AND WHITE PINE COUNTIES, NEVADA
PRELIMINARY GEOTECHNICAL INVESTIGATION
SEPTEMBER 2006



UNION PACIFIC RAILROAD
Office of Chief Engineer Design

INDUSTRY STANDARDS

GRAIN SIZE DISTRIBUTION FOR SUBBALLAST AND SUBGRADE SOILS

EXHIBIT "H"

PROPERTY	Granite	Taprock	Quartzite	Limestone	Domestic Limestone	Blast Furnace Slag	Steel Slag	ASTM Test
Percent Material Passing No. 200 Sieve	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	C 117
Bulk Specific Gravity (See Note #2)	2.60	2.60	2.60	2.60	2.60	2.30	2.90	C 127
Absorption Percent	1.0	1.0	1.0	2.0	2.0	5.0	2.0	C 127
Clay Lumps & Friable 5 Cycles	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	C 142
Degradation	35%	25%	30%	35%	35%	40%	30%	See Note #1
Soundness (Sodium Sulfate)	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	C 88
Flat and/or Elongated Particles	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	C 4791

NOTES:

1. MATERIALS HAVING GRADATIONS CONTAINING PARTICLES RETAINED ON THE 1" SIEVE SHALL BE TESTED BY ASTM C 535 IF GREATER THAN 3/4" AND C 131 IF LESS THAN 1 1/2". MATERIALS HAVING GRADATIONS WITH 100% SIEVE SHALL BE TESTED BY ASTM C 131.

2. THE LIMIT FOR SPECIFIC GRAVITY IS A MINIMUM VALUE. LIMITS FOR THE REST ARE MAXIMUM VALUES.

UNION PACIFIC RAILROAD
Office of Chief Engineer Design

INDUSTRY STANDARDS

RECOMMENDED LIMITING VALUES OF TESTING FOR BALLAST MATERIAL

EXHIBIT "G"

EXHIBIT "G"

FIGURE-19

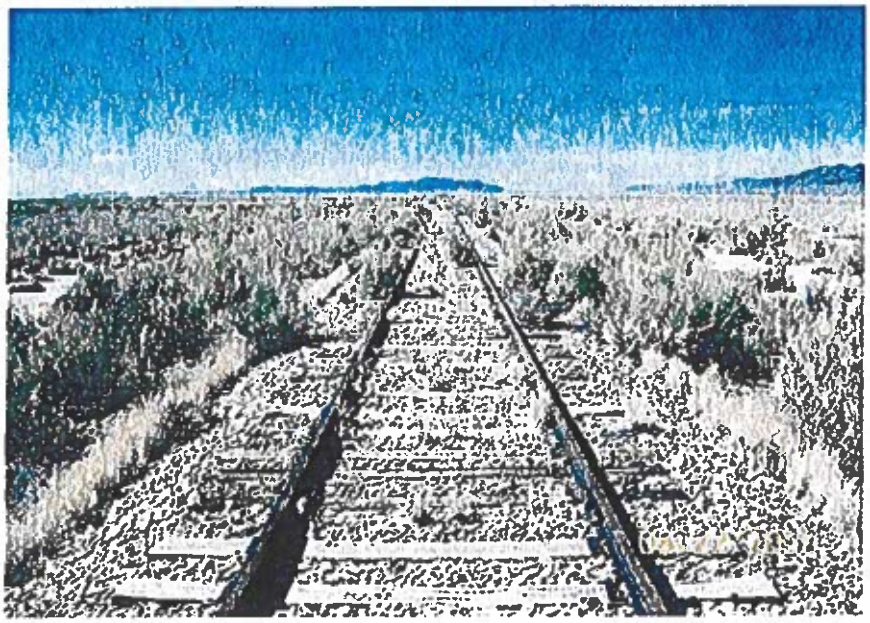


Photo No. 1 Mile Post 29, Looking South Typical Railroad Embankment Showing 60 # Rail, 8 and 8.5 Foot Ties

Photo No. 2 Mile Post 36, Looking South, Note Crushed Tie in Right Foreground

SITE PHOTOS NO. 1 & 2

GEOCON
CONSULTANTS, INC.
1167 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0566 -- FAX 775 267-0725

Rehabilitation of the Nevada Northern Railway

Elko and White Pine Counties
Nevada

R8402-06-01	September 2006	Figure B-1

Photo No. 3 Mile Post 99, LookingSouthwest Wet Area Around Ponds

Photo No. 4 Mile Post 52, Looking South, Typical Side Swales Indicating Borrow Areas Adjacent to Embankment

SITE PHOTOS NO. 3 & 4

GEOCON
CONSULTANTS, INC.
1167 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0566 - FAX 775 267-0728

Rehabilitation of the Nevada Northern Railway

Elko and White Pine Counties
Nevada

R8402-06-01	September 2006	Figure B-2

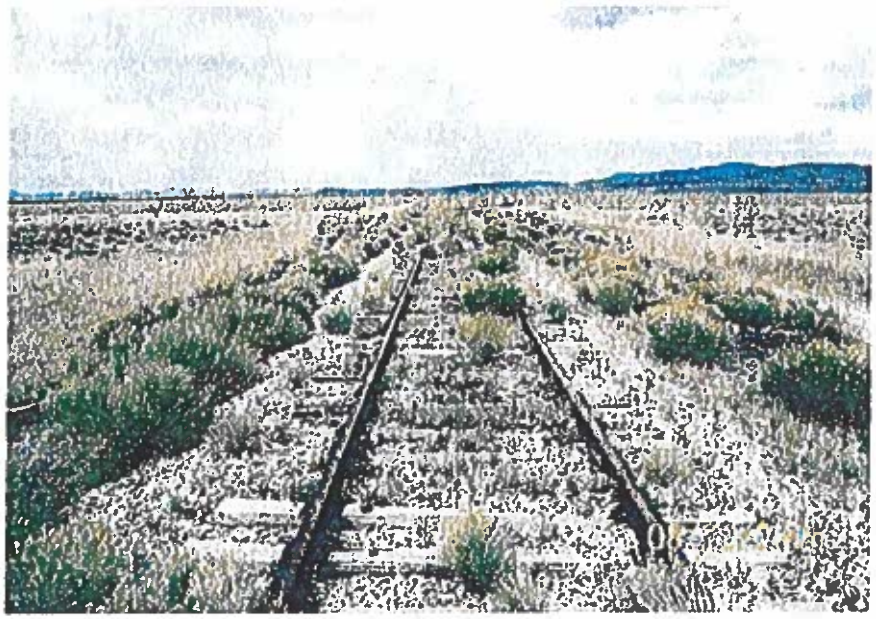


Photo No. 5 Mile Post 72, Looking South, Low Lying Area
Near Goshute Lake, Moderate Rabbitbrush and Native Grasses

Photo No. 6 Mile Post 40.4, Looking South, Dense Growth of Rabbitbrush on Siding

SITE PHOTOS NO. 5 & 6

GEOCON
CONSULTANTS, INC.
1157 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0566 -- FAX 775 267-0723

Rehabilitation of the Nevada Northern Railway

Elko and White Pine Counties
Nevada

R8402-06-01	September 2006	Figure B-3

Photo No. 7 Mile Post 78, Looking South, Low Lying Area

Photo No. 8 Mile Post 80.5, Looking South, Very Dense Vegetation in Wet Area South of Goshute Lake

SITE PHOTOS NO. 7 & 8

GEOCON
CONSULTANTS, INC.
1167 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0566 -- FAX 775 267-0729

Rehabilitation of the Nevada Northern Railway

Elko and White Pine Counties
Nevada

R8402-06-01	September 2006	Figure B-4

Photo No. 9 Mile Post 40.4, Exposed Ties at Edge of Siding

Photo No. 10 Mile Post 63, Looking South, 90# Rail Approaching Curves to South

SITE PHOTOS NO. 9 & 10

GEOCON
CONSULTANTS, INC.
1167 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0566 -- FAX 775 267-0725

Rehabilitation of the Nevada Northern Railway

Elko and White Pine Counties
Nevada

R8402-06-01	September 2006	Figure B-5

Photo No.11 Mile Post 88, Typical Veneer of Pit Run

Photo No. 12 Mile Post 47, Minimal Veneer of Pit Run Showing Native Soil

SITE PHOTOS NO. 11 & 12

GEOCON
CONSULTANTS, INC.
1167 ANNIE COURT - SUITE B - MINDEN, NV 89423
PHONE 775 267-0566 -- FAX 775 267-0728

Rehabilitation of the Nevada Northern Railway

Elko and White Pine Counties
Nevada

R8402-06-01	September 2006	Figure B-6

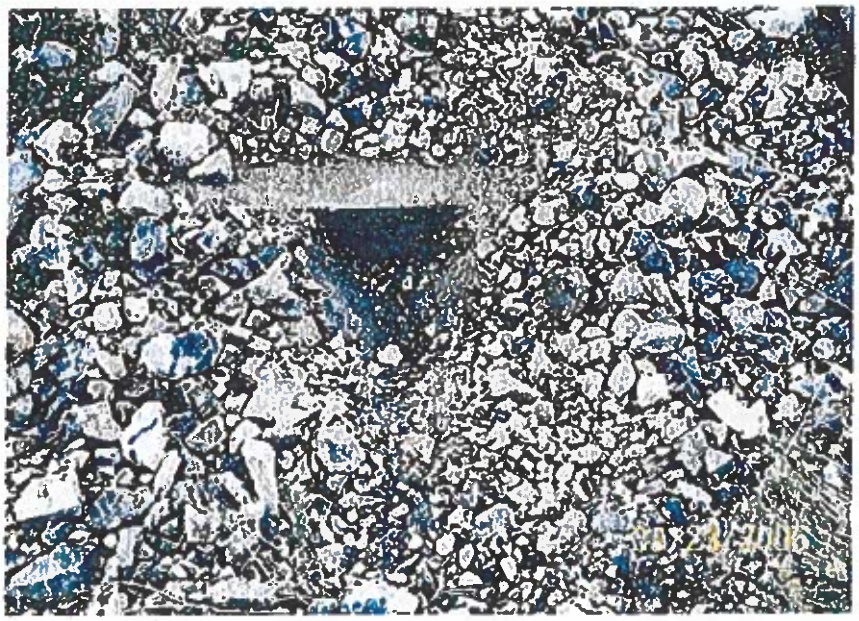


Photo No.13 Mile Post 78, Mine Waste Rock Over Pit Run Veneer, Mine Waste Includes Gossan, Limestone, Dolomite and Pyritic Metamophic Rock

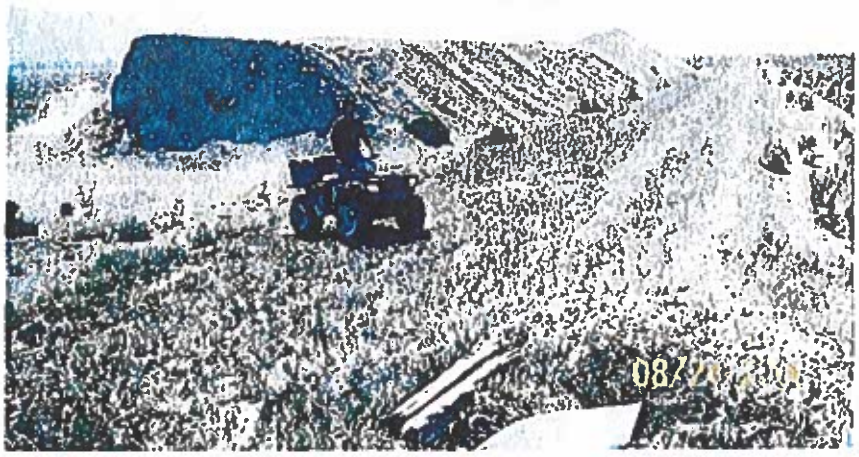
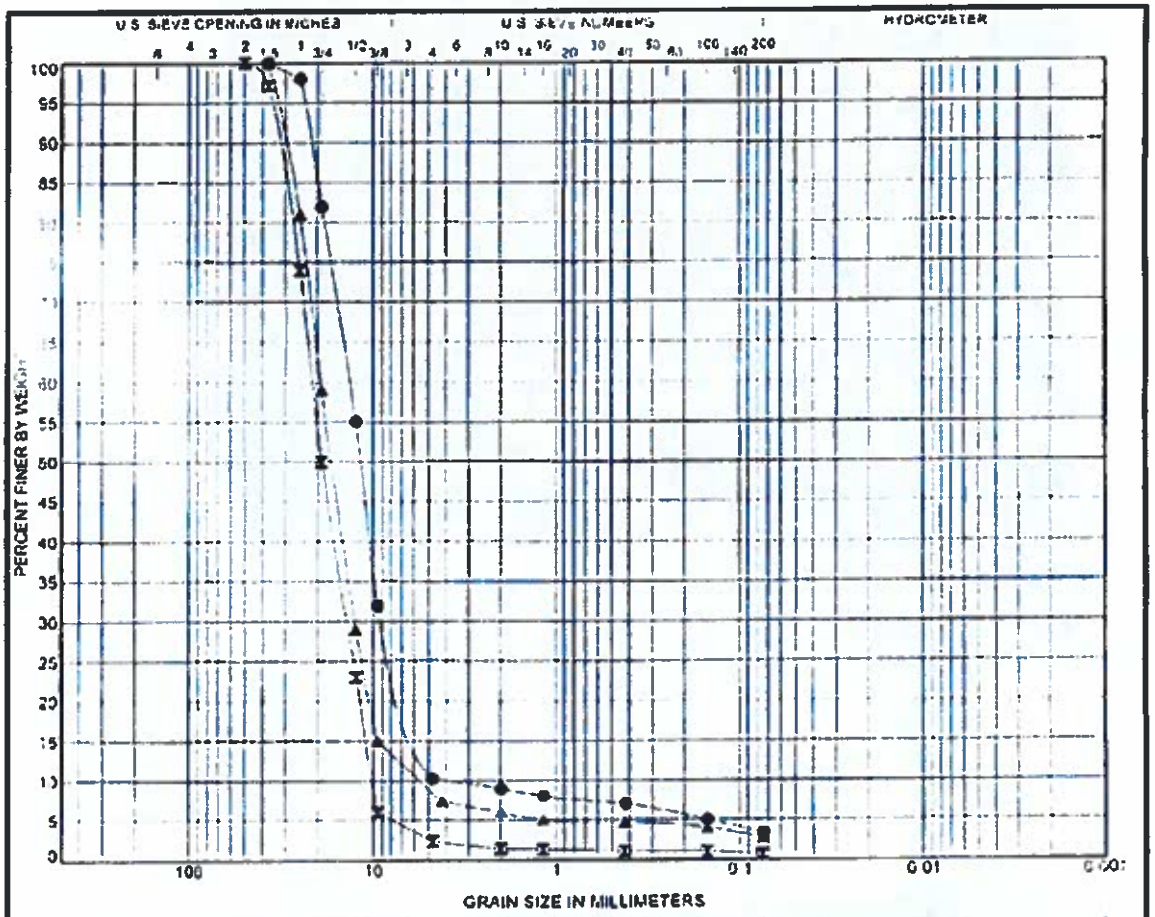


Photo No. 14 Mile Post 96.4, Looking South, Pit Run Stock Pile



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	MP - 30	2.0	PIT RUN (GP)				1.51	3.47
■	MP - 40	2.0	PIT RUN (GP)				0.90	2.10
▲	MP - 50	2.0	PIT RUN (GP)				1.49	3.44

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	MP - 30	2.0	37.5	13.508	8.912	3.89	89.7	7.0	3.3	
■	MP - 40	2.0	50	21.302	13.933	10.134	97.7	1.6	0.7	
▲	MP - 50	2.0	37.5	19.238	12.676	6.596	91.5	5.8	2.7	

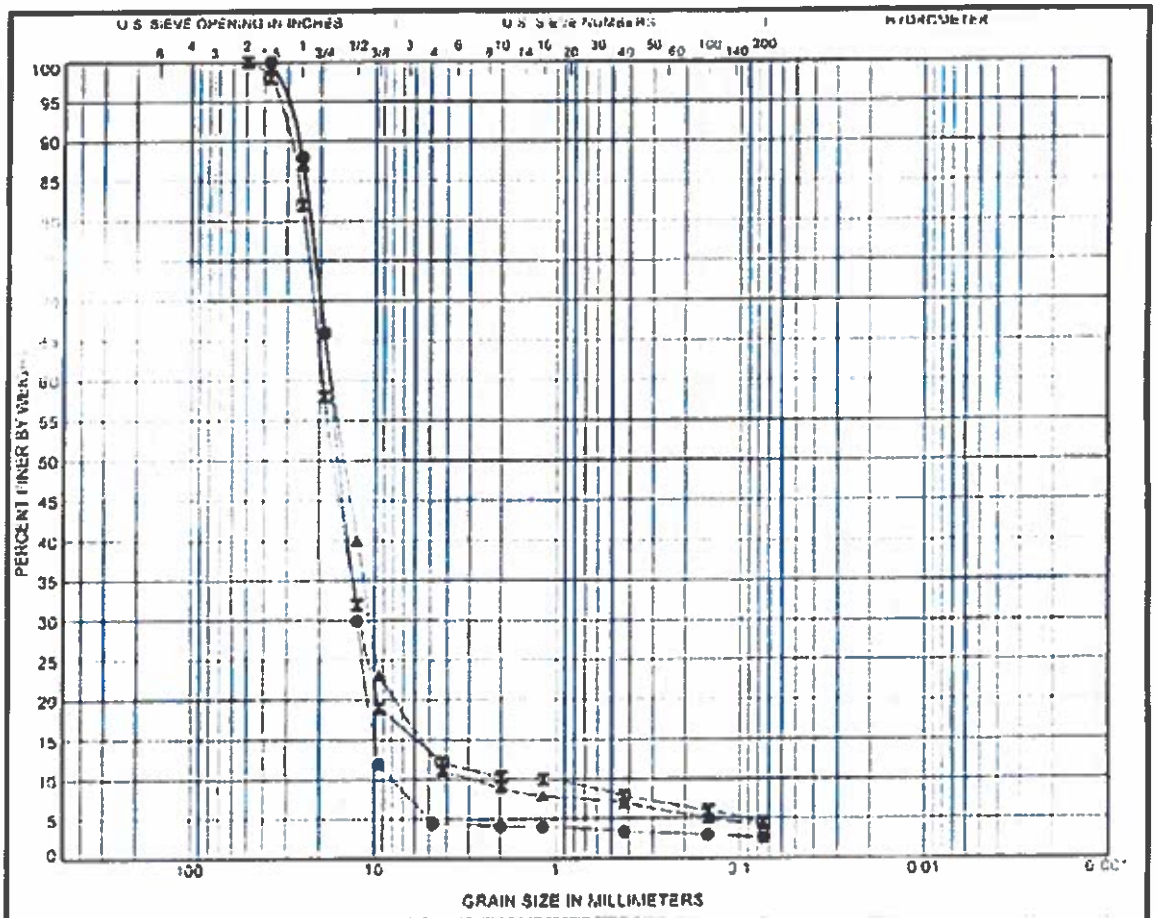
GEOCON
Geocon Consultants, Inc
1167 Annie Court, Suite B
Minden, Nevada 89423
Telephone 775 267 0566
Fax 775 267 0728

GRAIN SIZE DISTRIBUTION

Project: Nevada Northern Railway

Location Northern NV

Number R8402-06-01



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

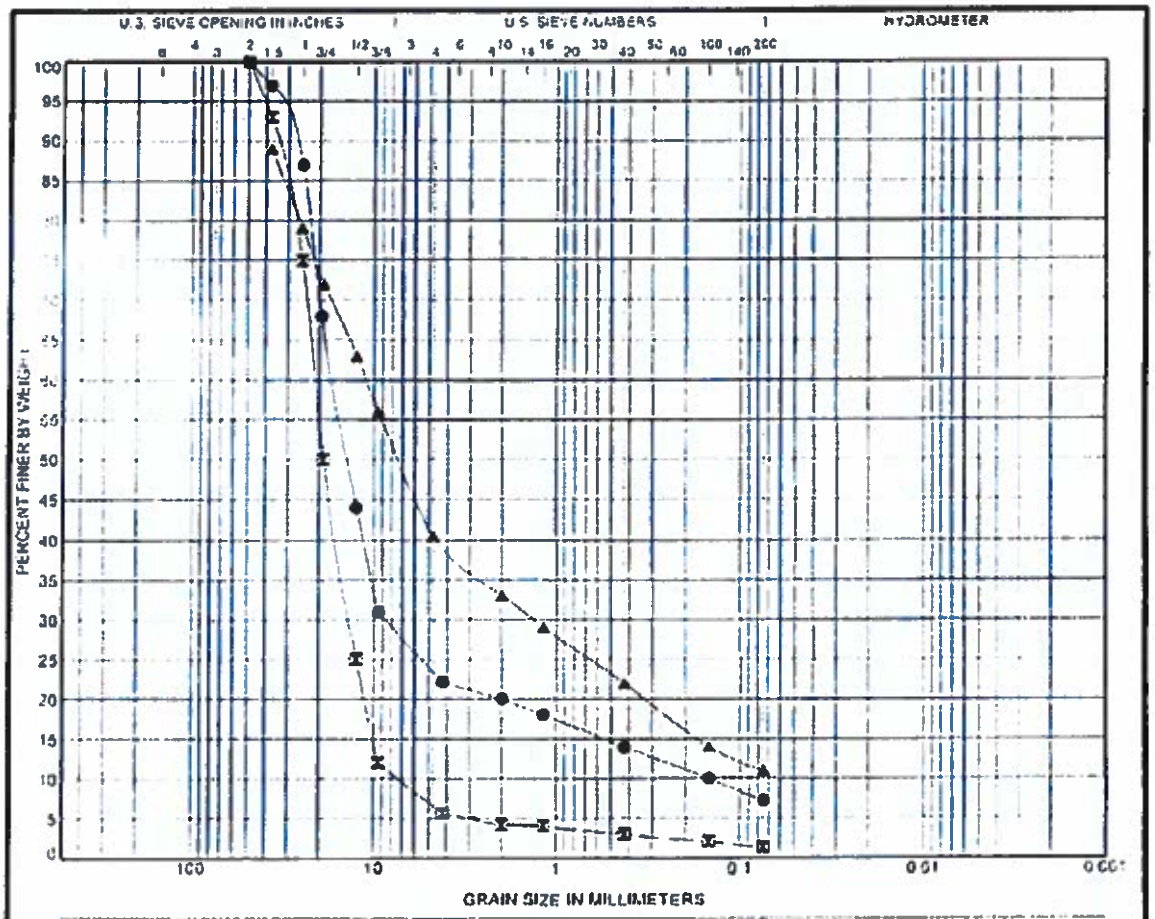
Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● MP - 64	2.0	PIT RUN (GP)				1.12	2.24
⧗ MP - 70	2.0	PIT RUN (GP)				6.26	16.47
▲ MP - 82	2.0	PIT RUN (GW)				2.25	5.92

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● MP - 64	2.0	37.5	17.719	12.5	7.897	95.5	1.9	2.6	
⧗ MP - 70	2.0	50	19.44	11.983	1.18	86.9	8.6	4.5	
▲ MP - 82	2.0	50	17.25	10.637	2.915	87.3	8.5	4.2	

GEOCON
Geocon Consultants, Inc
1167 Annie Court, Suite B
Minden, Nevada 89423
Telephone 775.267.0566
Fax 775.267.0728

GRAIN SIZE DISTRIBUTION

Project Nevada Northern Railway
Location Northern NV
Number R8402-06-01



Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● MP - 86	1.2	PIT RUN (GW)				29.87	112.09
⧗ MP - 86	2.0	PIT RUN (GP)				1.18	2.88
▲ MP - 95	2.0	PIT RUN (GW - GM)				2.66	181.20

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● MP - 86	1.2	50	16.814	8.679	0.15	76.7	16.1	7.2	
⧗ MP - 86	2.0	50	21.205	13.692	7.369	93.4	5.3	1.3	
▲ MP - 95	2.0	37.5	11.113	1.346		48.5	29.6	10.9	

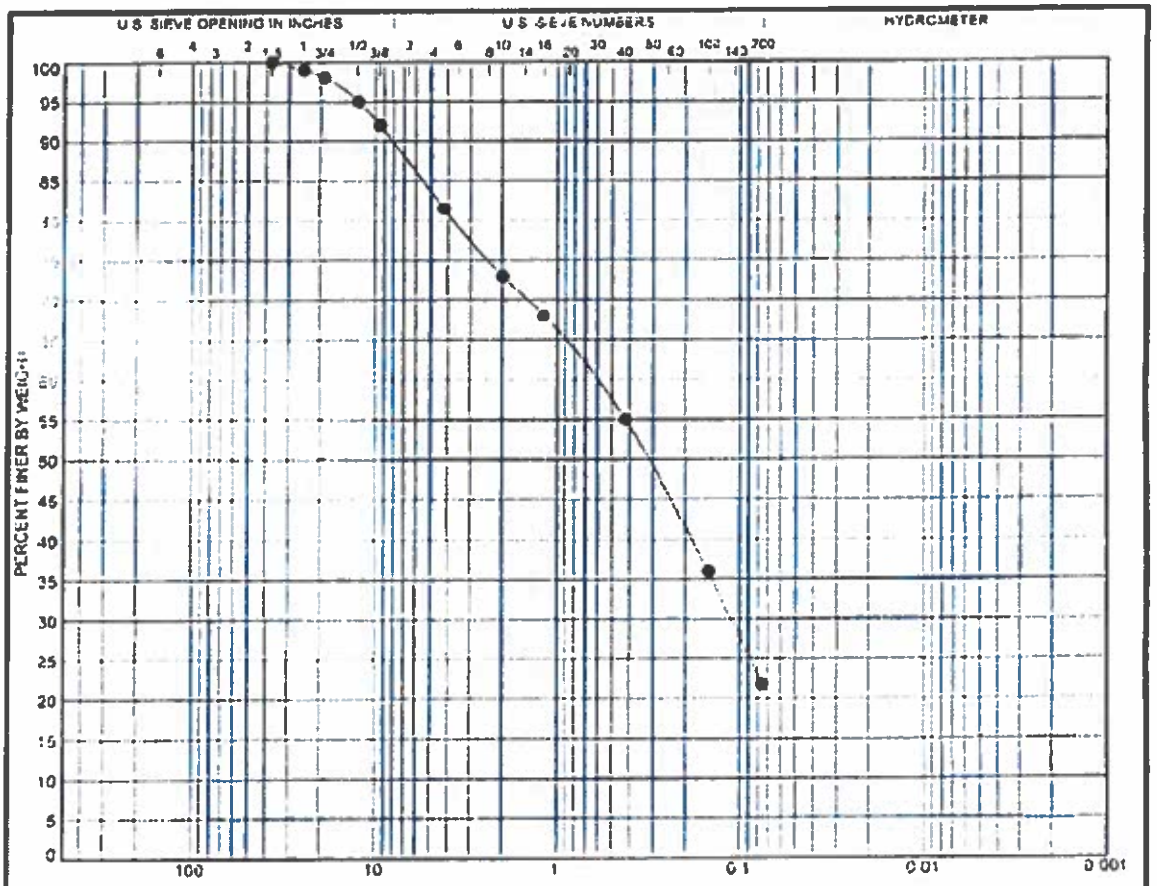
GEOCON
Geocon Consultants, Inc.
1167 Annie Court, Suite B
Minden, Nevada 89423
Telephone: 775.267.0586
Fax: 775.267.0728

GRAIN SIZE DISTRIBUTION

Project: Nevada Northern Railway

Location: Northern NV

Number: R8402-06-01



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● MP-102	2.0	PIT RUN (SM)					

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● MP-102	2.0	50	0.629	0.112		17.0	61.2	21.8	

GEOCON

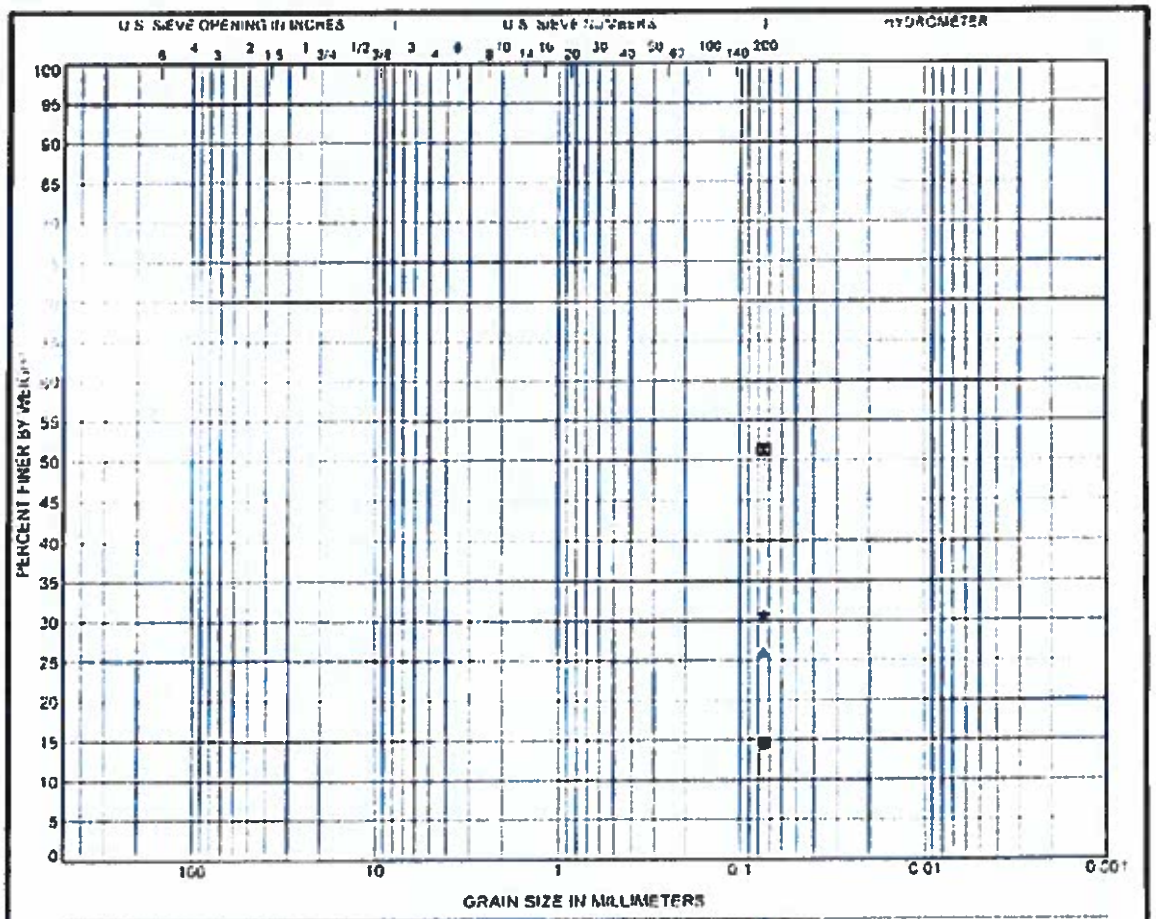
Geocon Consultants Inc.
1167 Annie Court, Suite B
Minden, Nevada 89423
Telephone 775.267.0566
Fax 775.267.0728

GRAIN SIZE DISTRIBUTION

Project Nevada Northern Railway

Location Northern NV

Number R8402-06-01



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	MP - 30	4.0	SILTY SAND (SM)					
■	MP - 40	4.0	SANDY LEAN CLAY (CL)	26	17	9		
▲	MP - 50	4.0	SILTY SAND (SM)					
★	MP - 70	4.0	CLAYEY SAND (SC)	35	24	11		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	MP - 30	4.0	0.075						14.6	
■	MP - 40	4.0	0.075						51.3	
▲	MP - 50	4.0	0.075						26.0	
★	MP - 70	4.0	75						30.8	

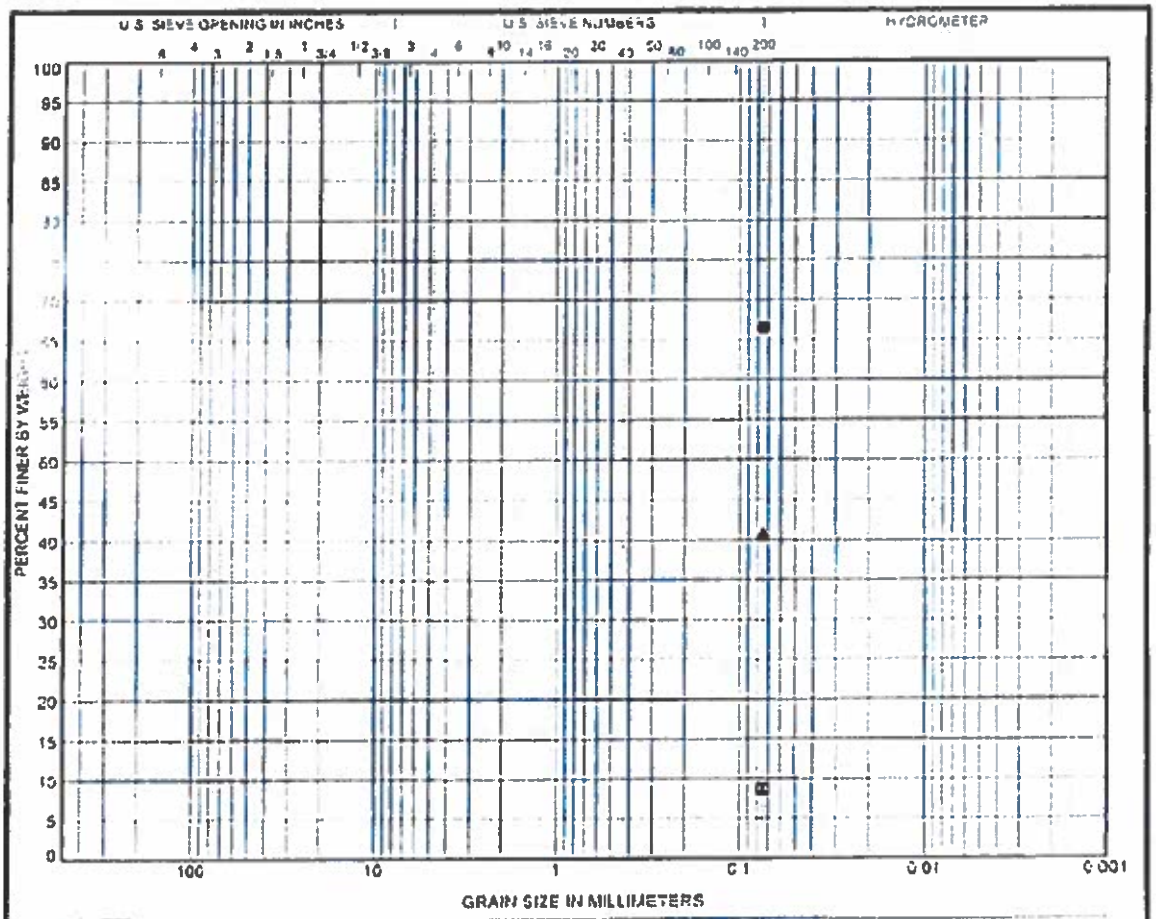
GEOCON
Geocon Consultants Inc
1167 Annie Court Suite B
Minden, Nevada 89423
Telephone: 775.267.0566
Fax: 775.267.0728

GRAIN SIZE DISTRIBUTION

Project: Nevada Northern Railway

Location: Northern NV

Number: R8402-06-01



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	MP - 82	4.0	SANDY, CLAYEY SILT (ML)	37	25	12		
⧗	MP - 95	4.0	SAND WITH CLAY (SC)	23	15	8		
▲	MP-102	4.0	CLAYEY SAND (SC)	63	46	17		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	MP - 82	4.0	75						66.5	
⧗	MP - 95	4.0	0.075						8.8	
▲	MP-102	4.0	75						40.8	

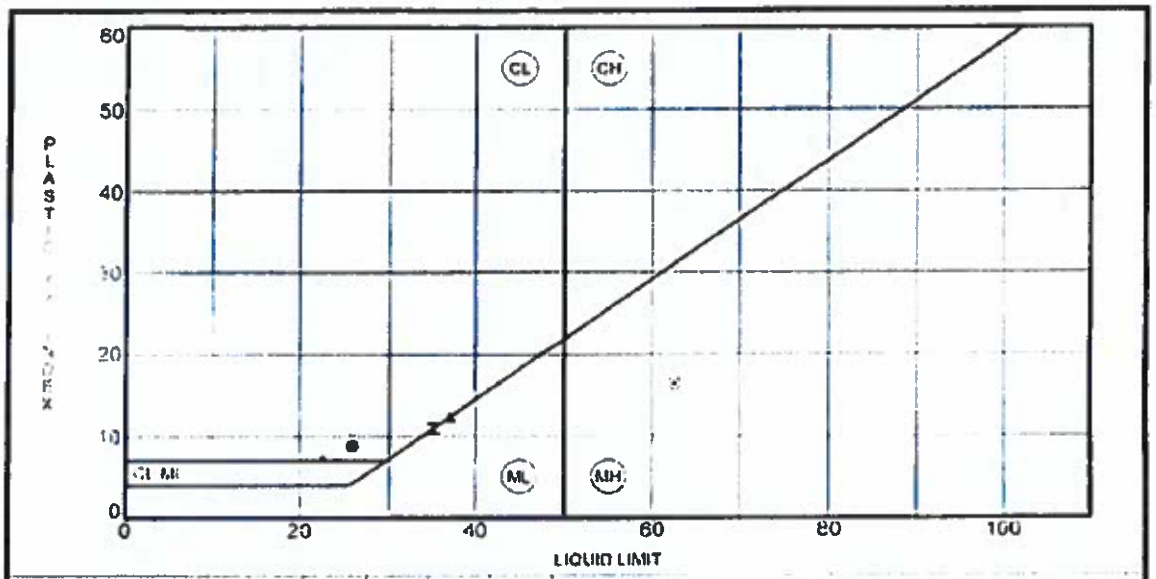
GEOCON
Geocon Consultants, Inc
1187 Annie Court, Suite B
Minden, Nevada 89423
Telephone: 775.267 0566
Fax: 775 267 0728

GRAIN SIZE DISTRIBUTION

Project: Nevada Northern Railway

Location: Northern NV

Number: R8402-06-01



	Specimen Identification		LL	PL	PI	Fines	Classification
●	MP - 40	4.0	26	17	9	61	SANDY LEAN CLAY (CL)
⧗	MP - 70	4.0	35	24	11	31	CLAYEY SAND (SC)
▲	MP - 82	4.0	37	25	12	67	SANDY, CLAYEY SILT (ML)
★	MP - 95	4.0	23	15	8	9	SAND WITH CLAY (SC)
⊕	MP-102	4.0	63	46	17	41	CLAYEY SAND (SC)

GEOCON

Geocon Consultants, Inc
1167 Annie Court, Suite B
Minden, Nevada 89423
Telephone 775 267 0566
Fax 775.267.0728

ATTERBERG LIMITS' RESULTS

Project Nevada Northern Railway

Location Northern NV

Number R8402-06-01

GEOCON
INCORPORATED
GEOTECHNICAL CONSULTANTS

L. A. Abrasion Test

Source: Nevada Northern Rail Job #: 2-2402-06-01

Date: 9/5/06 Tested By: P.T.

ASTM C131

Method: B Sampled ITP-30

A.	Original Sample Wt.:	5000
B.	Wt. After 100 Revolutions:	4756
	Difference: (A - B)	244
	% Wear : $\frac{A-B}{A}$	4.9%

A.	Original Sample Wt.:	5000
B.	Wt. After 500 Revolutions:	3914
	Difference: (A - B)	1086
	% Wear : $\frac{A-B}{A}$	21.7%

ASTM C535

Method:

A.	Original Sample Wt.:	
B.	Wt. After 200 Revolutions:	
	Difference: (A - B)	
	% Wear : $\frac{A-B}{A}$	

A.	Original Sample Wt.:	
B.	Wt. After 1000 Revolutions:	
	Difference: (A - B)	
	% Wear : $\frac{A-B}{A}$	

Remarks:

GEOCON
INCORPORATED
GEOTECHNICAL CONSULTANTS

L. A. Abrasion Test

Name: Nevada Southern Railboard Job #: 28402-06-01

Date: 7/5/06 Tested By: PR.

ASTM C131

Method: A Sample-MP-95

A.	Original Sample Wt.:	5000
B.	Wt. After 100 Revolutions:	4737
	Difference: (A - B)	263
	% Wear : $\frac{A-B}{A}$	5.3%

A.	Original Sample Wt.:	5000
B.	Wt. After 500 Revolutions:	3771
	Difference: (A - B)	1229
	% Wear : $\frac{A-B}{A}$	24.6%

ASTM C535

Method:

A.	Original Sample Wt.:	
B.	Wt. After 200 Revolutions:	
	Difference: (A - B)	
	% Wear : $\frac{A-B}{A}$	

A.	Original Sample Wt.:	
B.	Wt. After 1000 Revolutions:	
	Difference: (A - B)	
	% Wear : $\frac{A-B}{A}$	

Remarks: _____

GEOCON
INCORPORATED
GEOTECHNICAL CONSULTANTS

L. A. Abrasion Test

Project: Canadian Northern Railboard Job #: R2402-06-01

Date: 7/5/06 Tested By: P.J.

ASTM C131

Method: A Sampled MP-64

A.	Original Sample Wt.:	5000
B.	Wt. After 100 Revolutions:	4734
	Difference: (A - B)	266
	% Wear: $\frac{A-B}{A}$	5.3%

A.	Original Sample Wt.:	5000
B.	Wt. After 500 Revolutions:	3840
	Difference: (A - B)	1160
	% Wear: $\frac{A-B}{A}$	23.2%

ASTM C535

Method:

A.	Original Sample Wt.:	
B.	Wt. After 200 Revolutions:	
	Difference: (A - B)	
	% Wear: $\frac{A-B}{A}$	

A.	Original Sample Wt.:	
B.	Wt. After 1000 Revolutions:	
	Difference: (A - B)	
	% Wear: $\frac{A-B}{A}$	

Remarks:

Proposal No. LR-06-56
September 26, 2006

Mr. Luke Papez
Project Associate
LS Power Development, LLC
523 Citadel Way
Reno, NV 89503

Subject: NEVADA NORTHERN RAILWAY REHABILITATION
WHITE PINE AND ELKO COUNTIES, NEVADA
PROPOSAL FOR DESIGN-LEVEL
GEOTECHNICAL INVESTIGATION

Dear Mr. Papez:

In accordance with your request, we are pleased to present this proposal to perform a design-level geotechnical investigation for your Nevada Northern Railway (NNR) Rehabilitation Project. The project is located in White Pine and Elko Counties, Nevada and consists of approximately 85 miles of existing alignment. At this time, we have completed the Phase I Preliminary Geotechnical Investigation as outlined in our proposal dated August 4, 2006 (Proposal No. LR-06-44). The primary conclusions of our Phase I Preliminary Geotechnical Investigation were:

- Materials previously referred to as "ballast" by other investigators are actually "pit run" materials that are sub-rounded to angular and contain excessive fines; therefore, they do not meet "ballast" specifications.
- Native subgrade and embankment soils are predominantly fine-grained varieties and are anticipated to have low support characteristics as determined by the California Bearing Ratio (CBR) test.
- Ballast sections are likely to be relatively thick.
- Widening of the existing track bed, if required, will be relatively labor intensive due to the need to key fills into the existing embankment, and the logistics relating to mining or importation of suitable fill materials.
- Existing pit run materials (including stockpiles) may be processed to be used as subballast, or blended with native soils to improve the support characteristics of native soils.

BACKGROUND

To aid in preparing this proposal, we have completed a Preliminary Geotechnical Investigation (Phase I), discussed the project with you and reviewed the following documents:

- *Nevada Northern Railroad Project Engineering Study and Cost Estimate,* R. L. Banks & Associates, July 15, 2002
- *Nevada Northern Railroad Track Evaluation,* Railroad Industries Incorporated, April 19, 2004
- *White Pine Energy Associates, LLC, 115 Mile Rehabilitation Study of the Nevada Northern Railway, Rehabilitation Plan*, Caldwell, Richards, Sorensen and Mountain States Contracting, August 25, 2005
- *Soils Report for White Pine County Area, Nevada,* USDA,
- *Soils Report for Elko County Area, Nevada,* USDA,
- *Bulletin 85, Geology and Mineral Resources of White Pine County, Nevada,* Nevada Bureau of Mines and Geology, 1976
- *Bulletin 101, Geology of Elko County, Nevada,* Nevada Bureau of Mines and Geology, 1987

The rehabilitation project is necessary as part of the larger White Pine Energy Station project. The project plan calls for the construction of a 1,600 Mega Watt pulverized coal-fired electric generating facility. The rehabilitated railway will primarily be utilized for the delivery of coal to the plant. Preliminary plans are for the railway to be upgraded to FRA Class 3 Standards. Only minor changes to the railway grade and alignment are currently planned with the exception of a new spur and related track at the plant site. Two 10,000 linear foot sidings are planned at the time of this proposal; one near Currie and one near Cherrie Creek. Two alternative plant sites are being considered just north of the town of Mc Gill, Nevada (Mile posts MP-103 & MP-115). The preferred site is located at Mile Post 103 and is assumed to be the likely location.

SCOPE OF SERVICES

Based on the above discussion, we propose to complete the second Phase of geotechnical investigation. Phase II would include testing and analysis to provide recommended ballast sections, grading recommendations, identification of potential geologic hazards and related mitigation recommendations, erosion control, concrete slabs-on-grade, earthwork specification recommendations, and seismic hazards analysis.

We propose the following scope of services for Phase II:

Pre-Field Activities

- Perform additional geologic literature review to aid in determining the geologic conditions present along the existing alignment with emphasis on possible borrow sources.
- Review available historical data on alignment improvements and maintenance records.
- Stake locations of proposed test pits in the field.
- Call Underground Service Alert at least 48 hours prior to field activities to obtain utility clearances.

Field Investigation

The proposed field work is estimated to take approximately two weeks to complete. Excavation is anticipated to be performed with a rubber-tired backhoe or tracked excavator as necessary.

- Excavate backhoe test pits at approximately 20 locations along the existing embankments. Field log the test pits and recover representative bulk samples for gradation and engineering properties analysis including CBR.
- Excavate an additional 20 test pits along the proposed new siding alignments. Log and sample test pits for additional analysis.
- Excavate 5 to 10 test pits in areas identified as possible borrow sources for preliminary suitability evaluations.
- Representative samples from the exploration excavations will be submitted to our geotechnical laboratory for testing.

Laboratory Testing Program

Subgrade classification tests will be run for the representative soils samples. Potential borrow source samples will be tested for ballast and subballast properties.

We anticipate the following laboratory tests:

Native Soils
- Gradation, ASTM C117, C131, C136, C535, and D422
- Moisture Content, ASTM 2216
- Maximum Dry Density, ASTM D1557
- California Bearing Ratio, ASTM D1883

Possible Ballast or Subballast
- Gradation, ASTM C117, C131, C136, C535, and D422
- Specific Gravity and Absorption, ASTM C127
- Clay Lumps and Friable Particles, ASTM C142
- Degradation, ASTM C535
- Soundness (Sodium Sulfate), ASTM C88
- Flat and Elongated Particles US ACE CRD-C119-53

It should be noted that where gradation tests on potential ballast or subballast materials indicate substantial variance from gradation requirements, the remaining tests will not be performed.

Engineering Analysis/Report Preparation

We will analyze the field investigation and laboratory data and prepare a report summarizing the suitability of native soils for use as borrow, recommended track section design (ballast

section) and possible sources for borrow, subballast or ballast. Our report will include (but not be limited to) the following:

- Summary of published or unpublished data relating to generalized alignment geology and soils distributions
- Preliminary identification of areas with potential geologic hazards including weak soils, expansive or collapsible soils
- Site plan showing the sample locations
- Thickness measurement of the ballast at each sample location
- Laboratory test result reports
- Conclusions and recommendations regarding the following:
  - Track Section Design Alternatives
  - General Grading Recommendations for Embankment Construction/Modification
  - Existing Embankment Materials Handling and Use
  - Erosion Control Recommendations
  - Seismic Design Parameters
  - Geologic Hazards and Mitigation Alternatives

Five bound copies of our report will be submitted to the client.

PROPOSED FEES AND CONDITIONS

We propose to perform the Phase II geotechnical investigation on a time and materials basis not-to-exceed $71,000.00 in accordance with our current fee schedule. Any "extra work" including meetings or other work outside this scope of work will be completed in accordance with our current fee schedule. Written authorization will be required to exceed the amount stated above. It is important to note, that at the time of this proposal no layout of the Plant site was available and investigation relative to track structures at that location are not addressed under the scope of work presented herein.

Geocon can start the work immediately after authorization. It is assumed that the client will provide a right of access, and any historic or current right-of-way, grading or other improvement plans if available.

This fee is valid for a period of 60 days from the date of this proposal. Our services and any additional services required will be provided in accordance with the enclosed *2006 Schedule of Fees for Geotechnical & Materials Testing Services*. A final invoice will be submitted following delivery of the report. If unanticipated field conditions are encountered which require an increase to the not-to-exceed amount, we will not proceed with a modified scope of services amount without obtaining your verbal (and subsequent written) authorization.

EXECUTION OF CONTRACT

Please carefully review the contents of this proposal and the enclosed *2006 Schedule of Fees for Geotechnical & Materials Testing Services* and *Terms for Geotechnical Engineering Services* (Terms). If they meet with your approval, execute both copies of the Terms and return both copies to our office. We will then endorse the documents and return one fully

executed copy to you. Alternatively, a contract of your choosing, which is mutually acceptable to both parties can be substituted for Geocon's contract.

LIMITATIONS

The proposed scope of services does not include the evaluation or identification of the potential presence of corrosive or hazardous materials on the site. Construction testing and observation is also excluded from this scope of work. We can provide a proposal for those services when final plans are completed.

Should you have any questions regarding this proposal, our schedule or if we may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

Gary Luce, PE
Senior Engineer

(1) Addressee

Enclosures: 2004 Schedule of Fees for Geotechnical & Materials Testing Services
Terms for Geotechnical Engineering Services (2 copies)

APPENDIX E:

NRCG COST ESTIMATION / RAILROAD RESTORATION COST TABLES AND NOTES

Table Number One

NNRY COST TO CURE SUMMARY

ITEM	Description	QTY	Unit	Unit Price	Total Est. Cost	Notes
1	Preliminary Work - NEPA	1	LS	$72,000.00	$72,000.00	Preliminary NEPA and Management Work
2	Detailed Engineering	1	LS	$245,000.00	$245,000.00	
3	Categorical Exclusion	1	LS	$55,250.00	$55,250.00	NEPA Process C.E.
4	Mainline Rail	1	LS	$24,217,327.95	$24,217,327.95	Refer to "Rail" Worksheet
5	Mainline Tie Replacement	97,887	Ea	$150.00	$14,683,087.88	Refer to "Tie Condition" Worksheet, Used Ties - Replace every fourth tie
6	Tie Plugs	3,039,709	Ea	$0.06	$182,382.52	Eight plugs per cross tie
7	Siding Rail	1	LS	$197,690.78	$197,690.78	Refer to "Sidings" Worksheet, Relocation Cost
8	Lay Siding Rail	16,637	LF	$55.00	$915,035.00	Cost to lay sidings
9	Turnouts (Relay)	24	Ea	$17,764.64	$426,351.36	
10	Turnout Tie Kits	24	Ea	$40,971.00	$983,304.00	
11	Tie Plates	784,399	Ea	$8.77	$6,879,179.23	Assumes Used Spike Plates
12	Spikes	19,610	KGS	$94.02	$1,843,729.85	New @ 120/Keg, 6 spikes per tie
13	Unit Anchors	784,399	Ea	$2.10	$1,647,237.90	New, drive on
14	Jointed Rail	30,862	Ea	$167.21	$5,160,368.14	Assumes 40 foot rail lengths
15	Culvert Replacements	1	LS	$475,500.00	$475,500.00	Refer to "Culverts" Worksheet
16	Install Rail	617,232	LF	$77.00	$47,526,864.00	Mobilize + Spiker, Anchor Applicator, Etc.
17	Ballast Required	671,933	Tons	$22.00	$14,782,521.13	
18	Dump Ballast	671,933	Tons	$3.00	$2,015,798.34	
19	Surface Railroad	117	Miles	$9,000.00	$1,052,100.00	
20	Crossing Replacement	1	LS	$537,100.00	$537,100.00	
21	Crossing Signalization	2	LS	$755,220.00	$1,510,440.00	
22	Cattle Guards	1	LS	$187,000.00	$187,000.00	Refer to "Fences" Worksheet, Installed Cost
23	Mobilization / Demobilization	1	LS	$3,500,000.00	$3,500,000.00	Insurance, Bonds, Workforce, Etc.
24	Grant Management	1	LS	$755,000.00	$755,000.00	

Subtotal	**$129,850,268.08**
Contingency (3%)	$3,895,508.04
Total Est. Project Cost:	**$133,745,776.12**

Table Number Two

Main Line Rail Inventory

N. MP	S. MP	Type	Length (Mi)	Remarks	Weight of Rail	Total Tonnage	Unit Cost	Material Cost
18.5	19.5	85 lb ARA	1	Save for Sidings	131	230.56	$898.52	$207,162.77
19.5	63.6	60 lb ARA	44.1	Liquidate	131	10,167.70	$898.52	$9,135,878.21
63.6	66.3	90 lb ARA	2.7	Save for Sidings	131	622.51	$898.52	$559,339.48
66.3	128.4	60 lb ARA	62.1	Liquidate	131	14,317.78	$898.52	$12,864,808.09
128.4	135.4	70 lb ARA	7.00	Save for Sidings / Relay	131	1,613.92	$898.52	$1,450,139.40
			116.9			26,952.46		$24,217,327.95

Table Number Three
Siding Rail Inventory

Milepost	Name	Length	Capacity	Side of Track	Remarks	Unit Cost	Material Cost (Transport)	Notes
18.5	Shafter	3087	51	East	90 lb rail	$0.00	0	Keep
18.5	Shafter	2500	41	East	90 lb rail	$0.00	0	Keep
18.5	Shafter	772	12	East	90 lb rail	$0.00	0	Keep
31	Decoy	0	0	West		$150.00	$0.00	Removed
40.5	Dolly Varden	983	16	East		$150.00	$4,423.50	
52.9	Mizpah	909	15	West		$150.00	$4,090.50	
63	Currie	1968	32	East	Main Line Siding	$898.52	$77,215.21	
63.2	Currie	1568	26	East	Wye Track	$898.52	$61,521.07	
71	Goshute	2005	33	West		$150.00	$9,022.50	
80.4	Greens	720	12	West		$150.00	$3,240.00	
91.35	Cherry Creek	2141	35	East		$150.00	$9,634.50	
91.35	Cherry Creek	0	0	West		$0.00	$0.00	Remove
100	Raiff	2499	41	East		$150.00	$11,245.50	
107.8	Warm Springs	760	12	West		$150.00	$3,420.00	
120.2	Glenn	1500	25	West		$150.00	$6,750.00	
127.4	McGill Jct	1584	26	East	50% of Material Missing	$150.00	$7,128.00	
		22996					$197,690.78	

Table Number Four

Main Line Tie Conditions

N. MP	S. MP	Miles	Defective %	Ties/Mile	Defective Ties
18.5	74.0	55.5	22.50%	3335	41,646
74.0	128.4	54.4	31.00%	3335	56,241
128.4	135.7	7.3	0.00%	3335	0
					97,887

Table Number Five
Culverts

Milepost	Type	Dia. or Dims. (In.)	Length (Ft)	Remarks	Status	Cost/LF	Material Cost
50.1	Corrugated Metal Pipe	30	24	Double Barrel	Replace	$450.00	$10,800.00
54.15	Triangular Concrete	21x17.5	24	Triangular	Replace	$450.00	$10,800.00
58.6	Wooden Box Culvert	24x18	24	Potentially Triangular	Replace	$450.00	$10,800.00
58.6	Triangular Concrete	21x17.5	24		Replace	$450.00	$10,800.00
58.95	Triangular Concrete	24x28	24		Replace	$450.00	$10,800.00
64.1	Concrete Box Culvert	36x96	20		Marginal	$450.00	$9,000.00
64.8	Corrugated Metal Pipe	30	32	Deteriorating	Replace	$450.00	$14,400.00
80.7	Corrugated Metal Pipe	36	18		Replace	$450.00	$8,100.00
80.9	Triangular Steel	21x17.5	24		Replace	$450.00	$10,800.00
83	Concrete Box Culvert	36x96	18	Sidewalls Deteriorating	Marginal	$450.00	$8,100.00
83.3	Concrete Box Culvert	40x96	24	Inside Deteriorating	Marginal	$450.00	$10,800.00
98.3	Cast Iron Pipe	6	24		Replace	$450.00	$10,800.00
98.7	Corrugated Metal Pipe	6	30		Replace	$450.00	$13,500.00
114.4	Concrete Box Culvert	36x144	24	16" Wide Center Post - Duck Creek	Marginal	$14,000.00	$336,000.00
40.7	Corrugated Metal Pipe	24	20	Parallel to Railroad	Serviceable		0
55.9	Corrugated Metal Pipe	24	24		Serviceable		0
56.3	Corrugated Metal Pipe	72	25	Double Barrel	Serviceable		0
58	Concrete Box Culvert	62x124	20	Built 1916	Serviceable		0
58.6	Corrugated Metal Pipe	53x61	24		Serviceable		0
58.65	Corrugated Metal Pipe	53x61	24	Elliptical	Serviceable		0
58.9	Corrugated Metal Pipe		24	Elliptcal: 38x52	Serviceable		0
58.9	Corrugated Metal Pipe	53x31	24		Serviceable		0
59.05	Concrete Pipe	24	24	Three (3) 24" Pipes	Serviceable		0
61.4	Steel Pipe	24	24		Serviceable		0
64.7	Corrugated Metal Pipe		25	Elliptcal: 28x36	Serviceable		0
64.7	Corrugated Metal Pipe	30	26		Serviceable		0
68.35	Corrugated Metal Pipe	30	24		Serviceable		0
69.1	Corrugated Metal Pipe	36	24		Serviceable		0
69.6	Corrugated Metal Pipe	24	24		Serviceable		0
71.3	Corrugated Metal Pipe	24	36	Remove Large Rock	Serviceable		0
71.4	Corrugated Metal Pipe	24	22		Serviceable		0
72.2	Corrugated Metal Pipe	30	24		Serviceable		0
72.3	Corrugated Metal Pipe	24	24		Serviceable		0
73.2	Corrugated Metal Pipe	42	28		Serviceable		0
75.2	Corrugated Metal Pipe	30	24		Serviceable		0
77.7	Concrete Box Culvert	36x96	20		Serviceable		0
77.8	Concrete Box Culvert	30x124	24		Serviceable		0
77.8	Concrete Box Culvert	36x96	24		Serviceable		0
77.9	Concrete Box Culvert	36x97	24		Serviceable		0
78.6	Corrugated Metal Pipe	24	24		Serviceable		0
80.5	Corrugated Metal Pipe	18	24		Serviceable		0
81.6	Corrugated Metal Pipe	24	24		Serviceable		0
81.66	Corrugated Metal Pipe	24	24		Serviceable		0
81.67	Corrugated Metal Pipe	24	24		Serviceable		0
81.7	Corrugated Metal Pipe	24	24		Serviceable		0
83	Concrete Box Culvert	36x96	24		Serviceable		0
83.35	Concrete Box Culvert	42x96	24		Serviceable		0
83.7	Corrugated Metal Pipe	42	26		Serviceable		0
83.7	Corrugated Metal Pipe	42	24		Serviceable		0
83.8	Corrugated Metal Pipe	42	26		Serviceable		0
83.9	Corrugated Metal Pipe	30	24		Serviceable		0
85.7	Corrugated Metal Pipe	24	28	Double Barrel	Serviceable		0
94.8	Corrugated Metal Pipe	24	24		Serviceable		0
97.1	Corrugated Metal Pipe	24	24		Serviceable		0
98.1	Corrugated Metal Pipe	24	24		Serviceable		0
98.2	Corrugated Metal Pipe	24	24		Serviceable		0
101.6	Corrugated Metal Pipe	24	24		Serviceable		0
106.8	Steel Pipe	24	24		Serviceable		0
108.1	Corrugated Metal Pipe	24	24		Serviceable		0
108.75	Corrugated Metal Pipe	24	24		Serviceable		0
109.8	Corrugated Metal Pipe	24	26		Serviceable		0
110.6	Corrugated Metal Pipe	24	24		Serviceable		0
110.8	Corrugated Metal Pipe	24	24		Serviceable		0
111.6	Corrugated Metal Pipe	30	24		Serviceable		0
111.7	Corrugated Metal Pipe	24	24		Serviceable		0
112.1	Corrugated Metal Pipe	24	24		Serviceable		0
112.4	Corrugated Metal Pipe	30	24		Serviceable		0
112.5	Steel Pipe	12	24		Serviceable		0
113	Corrugated Metal Pipe	24	24		Serviceable		0
113.1	Corrugated Metal Pipe	30	24		Serviceable		0
113.3	Corrugated Metal Pipe	30	24		Serviceable		0
113.9	Corrugated Metal Pipe	24	24		Serviceable		0
120.2	Corrugated Metal Pipe	18	40	Also under siding	Serviceable		0
121	Corrugated Metal Pipe	24	24		Serviceable		0
123.4	Concrete Pipe	25	38	Double Barrel	Serviceable		0
						Subtotal Cost:	$475,500.00

Table Number Six

Main Line Ballast Calculations

N. MP	S. MP	Miles	Lift (In.)	Tons Required		Remarks
18.5	82.8	64.3	8	316,870		
82.8	128.4	45.6	12	337,075		
128.4	135.7	7.3	12	17,987		
				671,933	Tons	

Table Number Seven
Road Crossings

Milepost	Type	Access	Length (Ft)	Place Name	DOT #	Cost/LF	Replacement Cost
18.5	Dirt	Public	12		855858G	$630.00	$7,560.00
18.7	Dirt	Private	12		855859N	$630.00	$7,560.00
19.5	Dirt	Private	12			$630.00	$7,560.00
25.8	Dirt	Private	12			$630.00	$7,560.00
30.85	Dirt	Private	12		855860H	$630.00	$7,560.00
34.3	Dirt	Private	12			$630.00	$7,560.00
39.8	Dirt	Private	12			$630.00	$7,560.00
40.4	Dirt	Private	12			$630.00	$7,560.00
40.74	Dirt	Private	12		855861P	$630.00	$7,560.00
48.96	Dirt	Private	12			$630.00	$7,560.00
52.5	Dirt	Private	12			$630.00	$7,560.00
58.4	Dirt	Private	12		855863D	$630.00	$7,560.00
60.85	Dirt	Private	12		855864K	$630.00	$7,560.00
62.2	Dirt	Private	12		855865S	$630.00	$7,560.00
63.02	Dirt	Private	12		855867F	$630.00	$7,560.00
63.07	Asphalt	Public	30	Currie	855866Y	$3,550.00	$106,500.00
64.07	Dirt	Private	20			$630.00	$12,600.00
65.74	Dirt	Private	12	Cordano Ranch Rd.	855868M	$630.00	$7,560.00
67.3	Dirt	Private	12			$630.00	$7,560.00
71.02	Dirt	Private	12			$630.00	$7,560.00
80.9	Dirt	Private	12			$630.00	$7,560.00
81.07	Dirt	Private	12		855869U	$630.00	$7,560.00
81.96	Dirt	Private	16		855870N	$630.00	$10,080.00
87.1	Dirt	Private	12			$630.00	$7,560.00
91.2	Asphalt	Public	24	Cherry Creek	855871V	$3,550.00	$85,200.00
94.4	Dirt	Private	12			$630.00	$7,560.00
96.3	Asphalt	Public	24	Shelburne	855872C	$1,550.00	$37,200.00
106.7	Dirt	Private	12			$630.00	$7,560.00
108	Asphalt	Public	20	Warm Spring	855873J	$1,550.00	$31,000.00
110.7	Dirt	Private	12		855874R	$630.00	$7,560.00
113.5	Dirt	Private	12			$630.00	$7,560.00
114.2	Dirt	Private	12			$630.00	$7,560.00
117.1	Dirt	Private	12			$630.00	$7,560.00
118.6	Dirt	Private	12		855875X	$630.00	$7,560.00
120.5	Dirt	Private	12			$630.00	$7,560.00
121.1	Dirt	Private	12			$630.00	$7,560.00
123	Dirt	Public	16	Bassett Road		$630.00	$10,080.00
127.6	Dirt	Private	12			$630.00	$7,560.00
128	Dirt	Public	16	McGill Jct		$630.00	$10,080.00
129.18	Concrete	Public	24	Great Basin Hwy	855878T	$0.00	0
		Length:	562			**Subtotal Cost:**	**$537,100.00**

Table Number Eight

Fences / Cattle Guards

Milepost	Remarks	QTY	Cost/Unit	Material Cost
19.5	Fence and Cattle Guard	1	$8,500.00	$8,500.00
28.6	Fence and Cattle Guard	1	$8,500.00	$8,500.00
49.6	Fence	1	$8,500.00	$8,500.00
56.9	Fence and Cattle Guard	1	$8,500.00	$8,500.00
63	Fence and Cattle Guard	1	$8,500.00	$8,500.00
63.1	Fence and Cattle Guard	1	$8,500.00	$8,500.00
74.4	Fence	1	$8,500.00	$8,500.00
80.4	Fence and Cattle Guard	1	$8,500.00	$8,500.00
81	Fence	1	$8,500.00	$8,500.00
81.7	Fence	1	$8,500.00	$8,500.00
101	Fence and Cattle Guard	1	$8,500.00	$8,500.00
106.3	Fence and Cattle Guard	1	$8,500.00	$8,500.00
106.8	Fence and Cattle Guard	1	$8,500.00	$8,500.00
107.3	Fence and Cattle Guard	1	$8,500.00	$8,500.00
107.6	Fence and Cattle Guard	1	$8,500.00	$8,500.00
109.3	Fence and Cattle Guard	1	$8,500.00	$8,500.00
111.4	Fence and Cattle Guard	1	$8,500.00	$8,500.00
114.2	Fence and Cattle Guard	1	$8,500.00	$8,500.00
114.8	Fence and Cattle Guard	1	$8,500.00	$8,500.00
117.1	Fence	1	$8,500.00	$8,500.00
128	Fence	1	$8,500.00	$8,500.00
128.1	Fence	1	$8,500.00	$8,500.00
		22		$187,000.00

NEVADA NORTHERN RAILWAY REHABILITATION
DETAILED PRELIMINARY ENGINEERING MAPS

May 20, 2024

INTRODUCTION

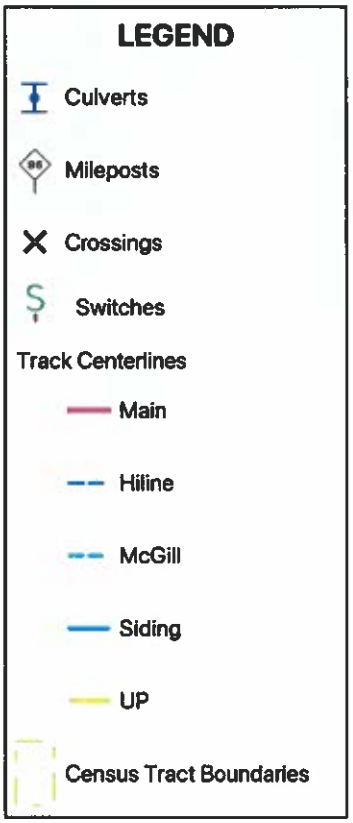
FMW SOLUTIONS LLC d/b/a the NATIONAL RAIL CONSULTING GROUP ("NRCG") was retained by the CITY OF ELY (Nevada) and the NEVADA NORTHERN RAILWAY FOUNDATION ("Foundation") to assist those clients in determining the economic viability of returning the NEVADA NORTHERN RAILWAY ("NNRY") to operational condition ("NNRY Project"). This document includes detailed maps of the subject rail corridor as it exists today to accompany a CRISI Grant application submission to the FEDERAL RAILROAD ADMINISTRATION ("FRA").

When surveyed and engineered in the early 1900s, the rail line was laid across the middle of two valleys in the "Great Basin" region of Nevada, a region where precipitation flows neither to the Pacific nor the Atlantic. This high desert region is unique in the U.S., and it has the benefit of minimizing the size of flowing water to nothing more than creeks. The railroad is largely tangent, with the only notable curvature occurring just south of Currie where the railroad navigates terrain between Steptoe and Goshute Valleys.

Likewise, given its remote location, there are very few grade crossings along the 116.9 mile corridor – each of the crossings present in the FRA Grade Crossing inventory are included in these maps – any additional undocumented crossings will be confirmed as part of final engineering and properly documented.

The **LEGEND**, at right, provides a guide to the maps.

Note that NRCG has included census tract boundaries that correspond with the accompanying FRA CRISI Grant Application as it relates to the Climate & Economic Justice Screening Tool (CEJST) and the FRA's Justice40 Rail Explorer Tool.



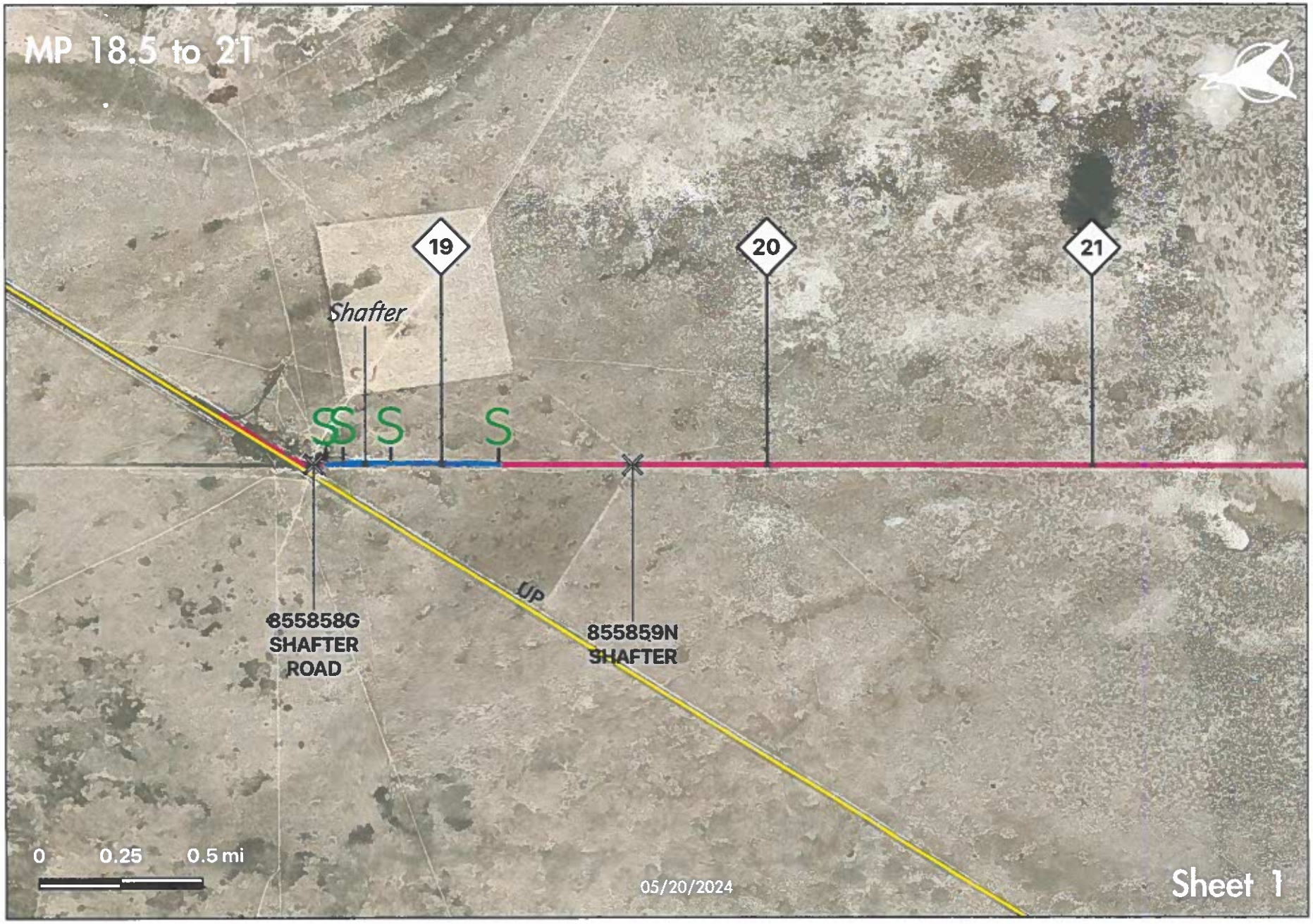
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



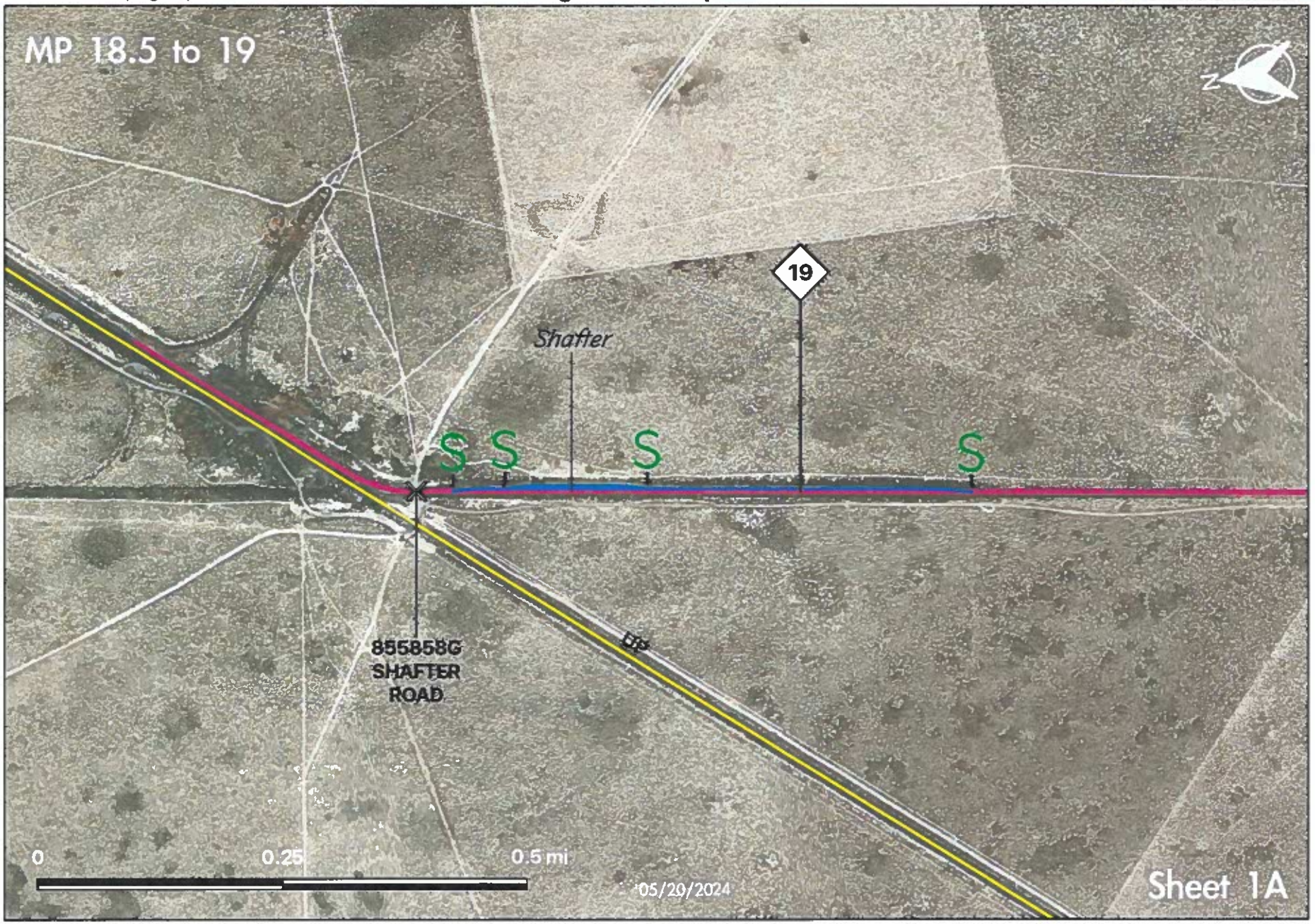
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

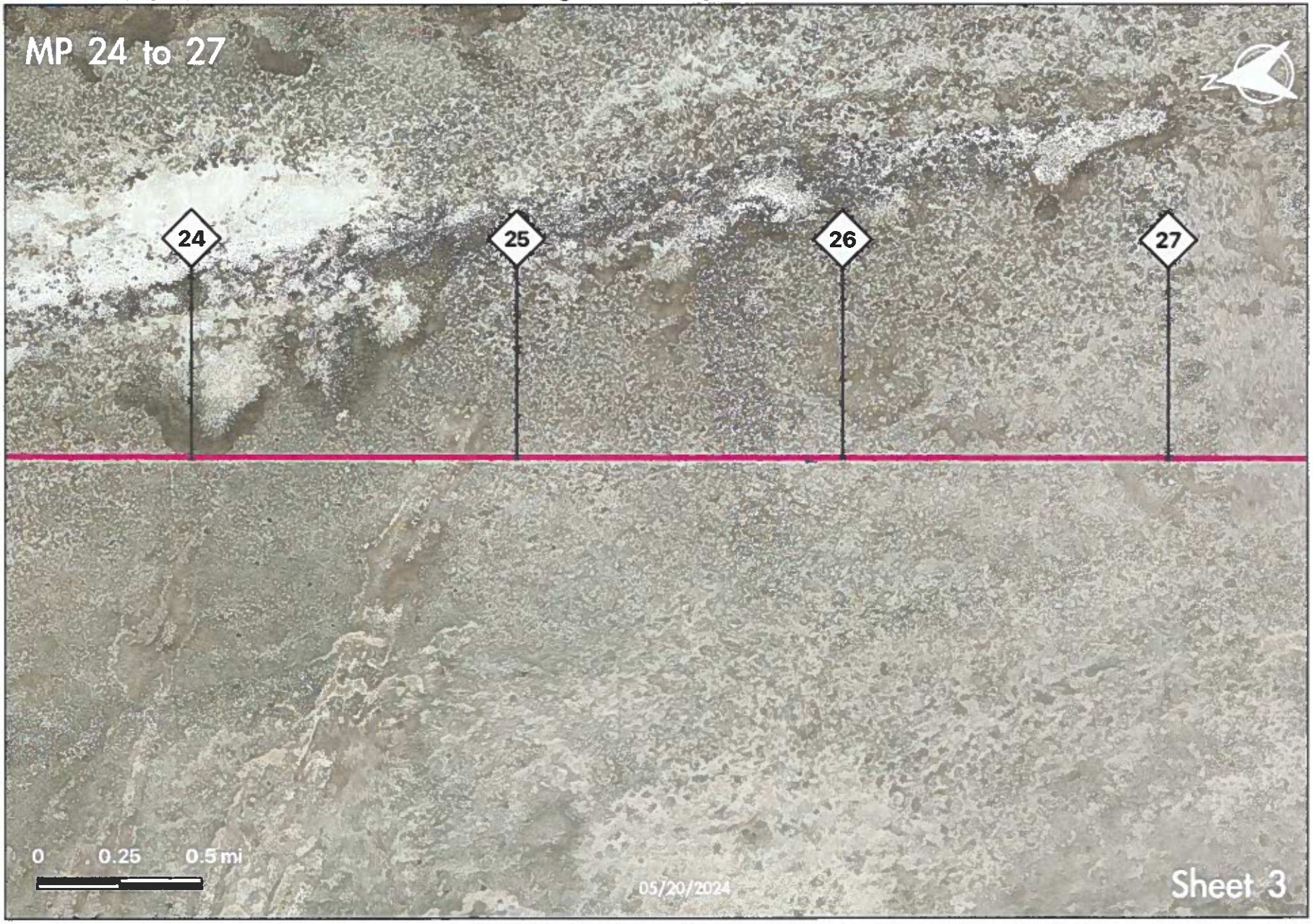
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP

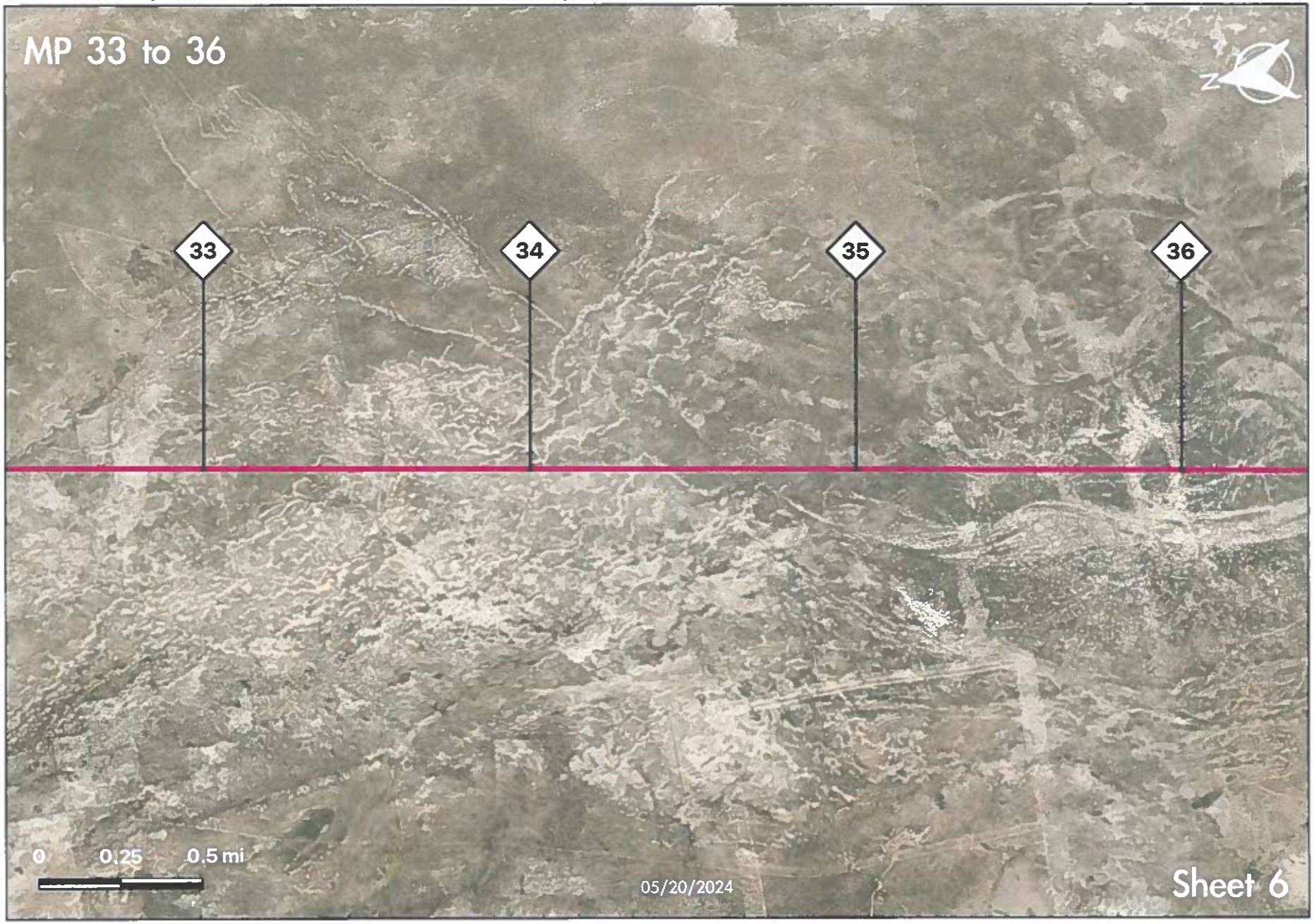
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP

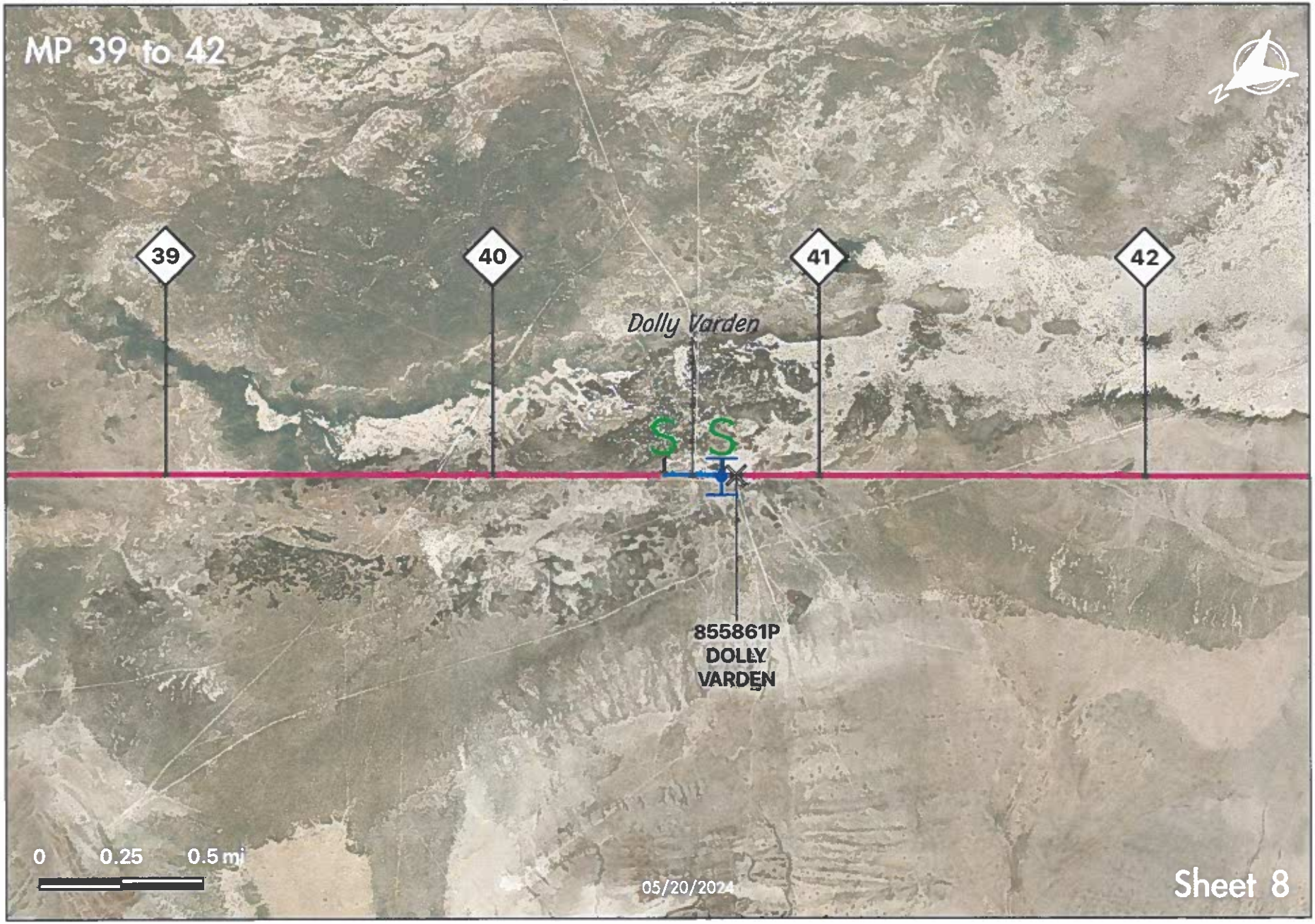
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



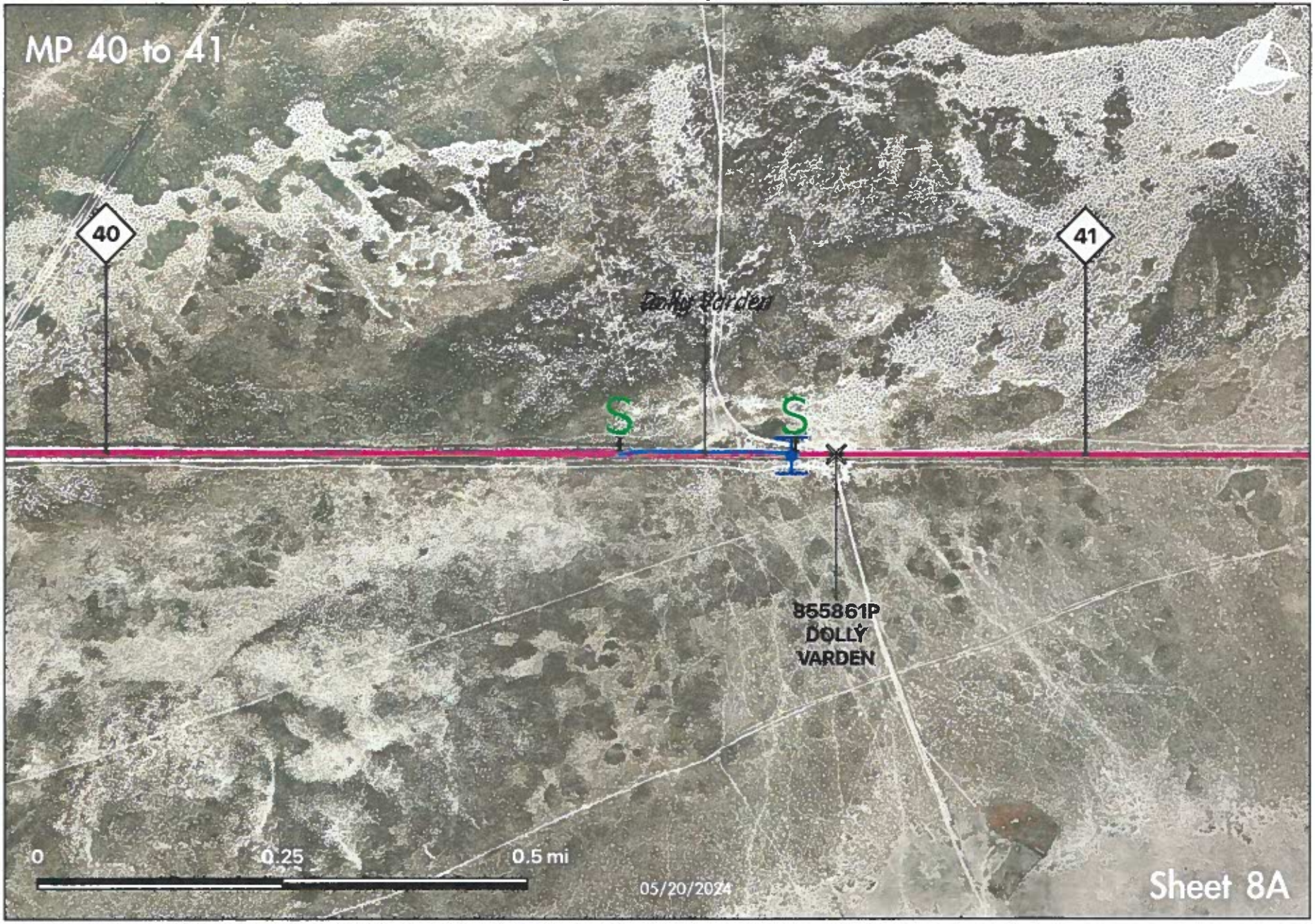
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP



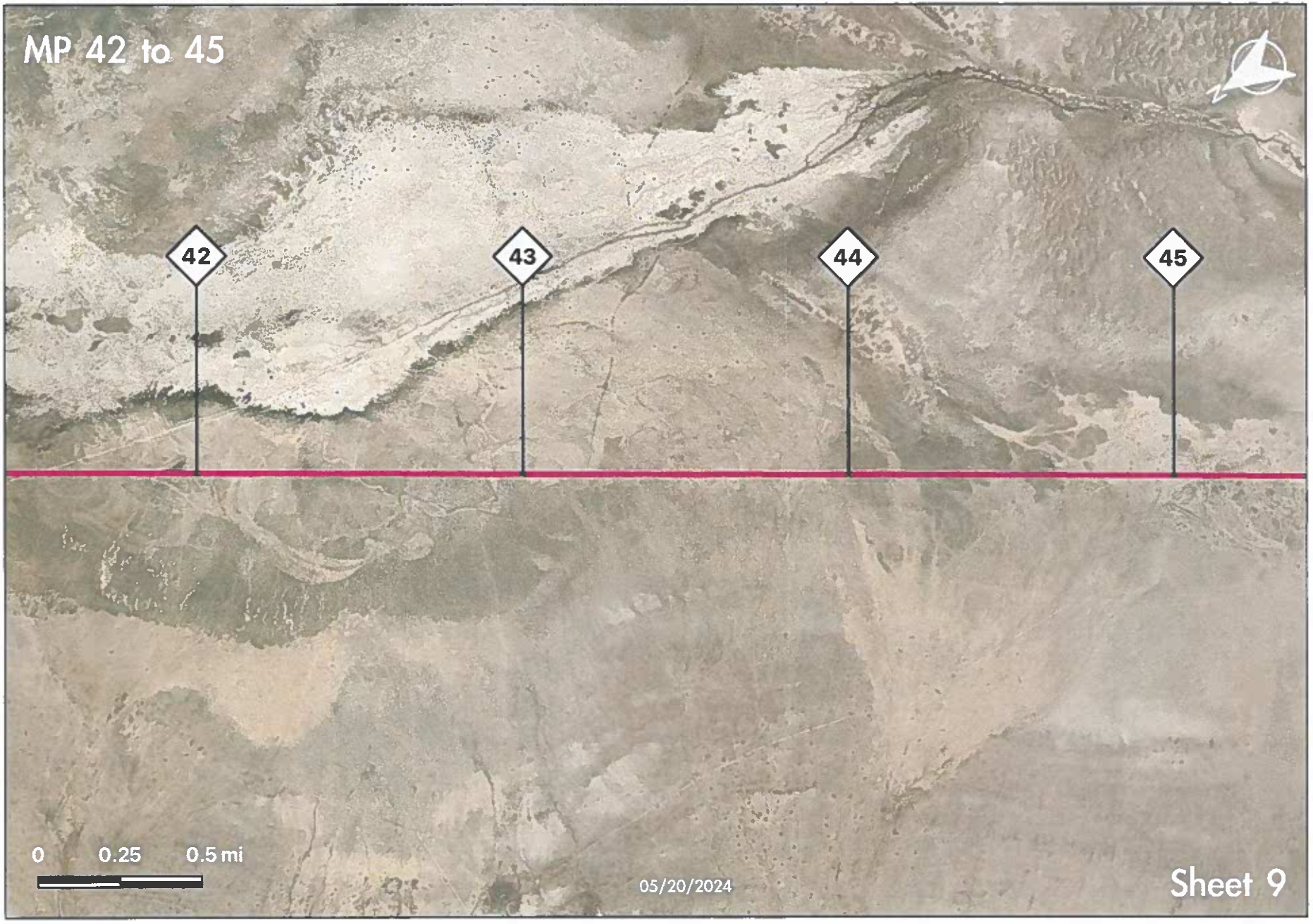
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP

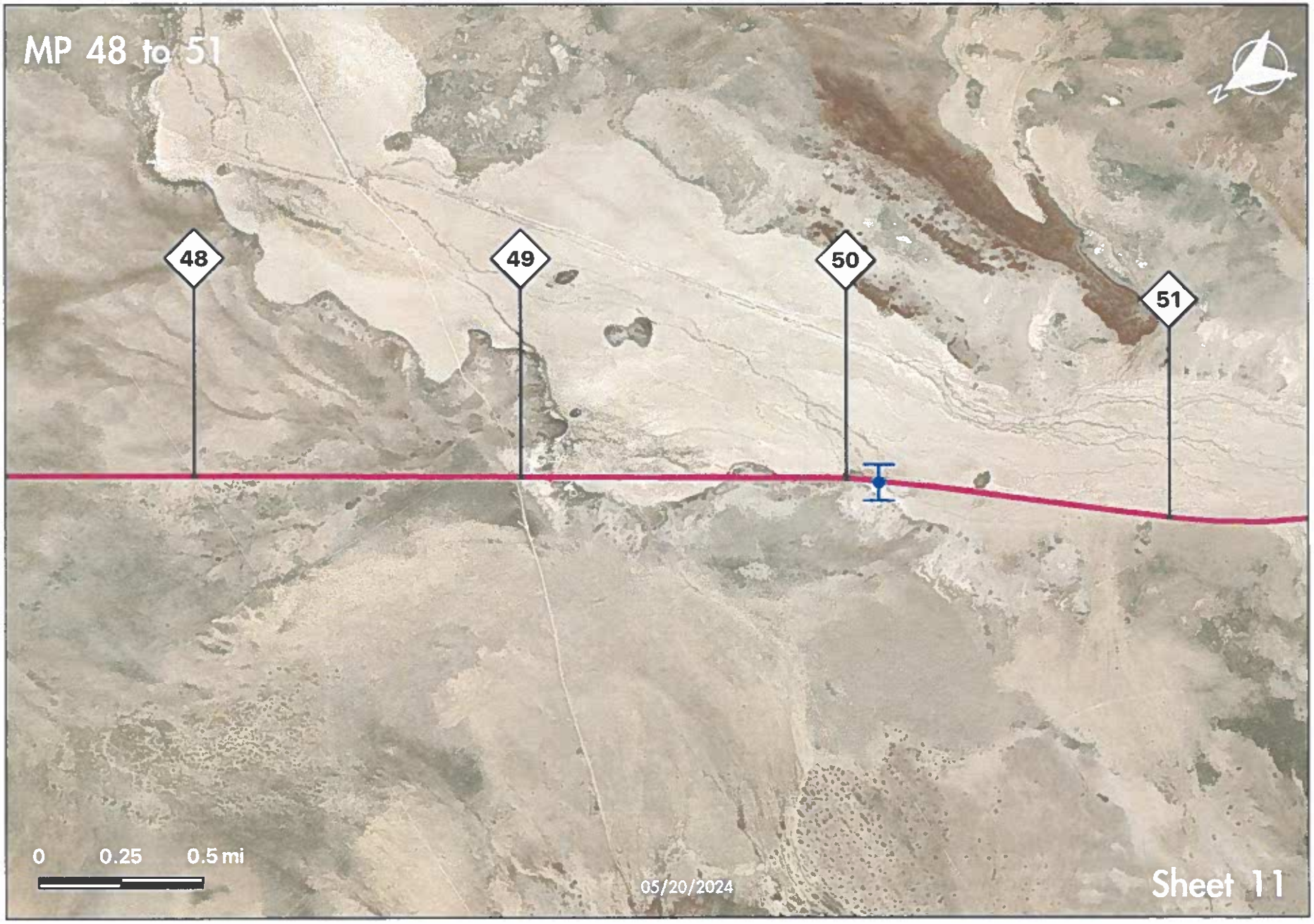
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



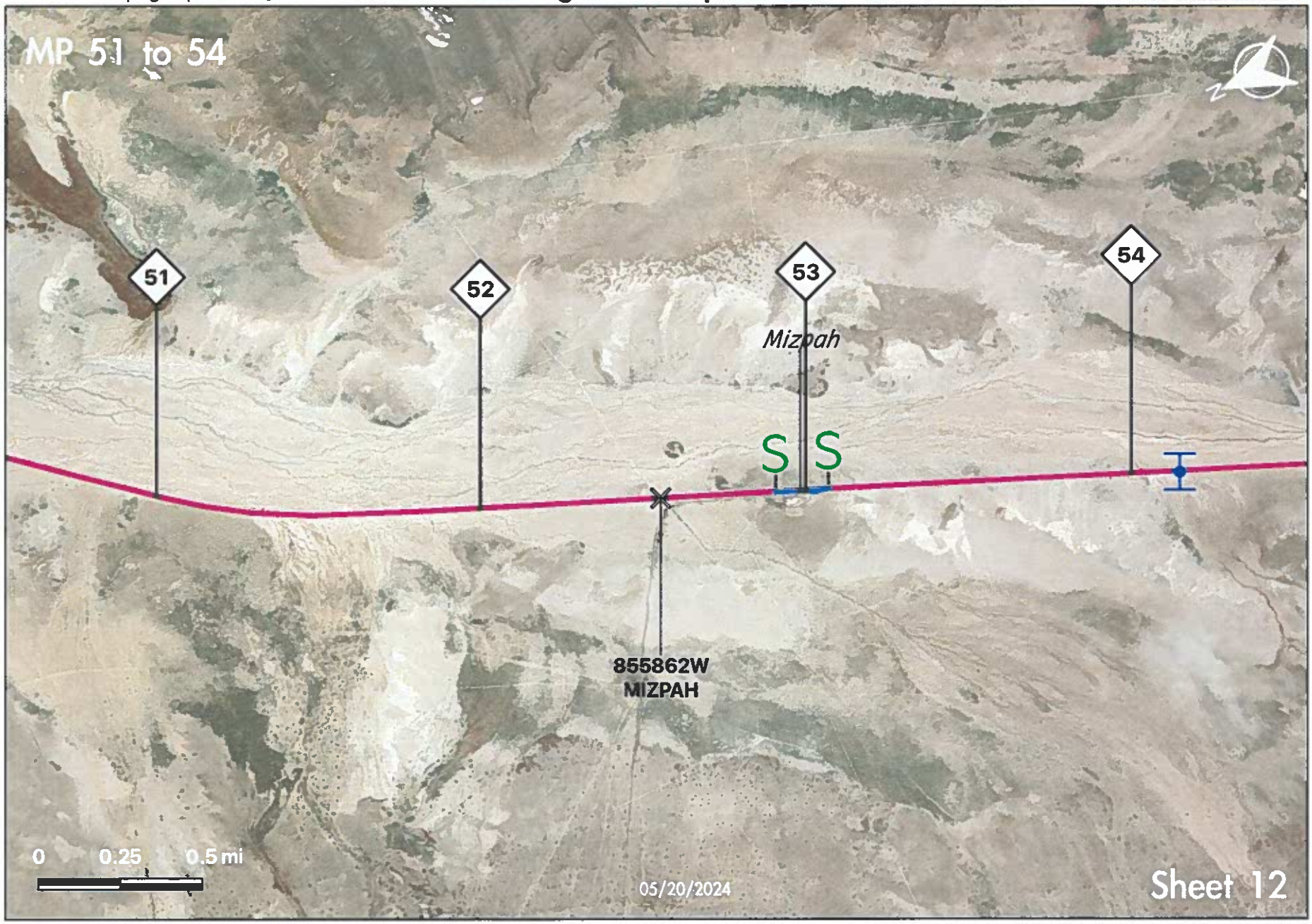
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP



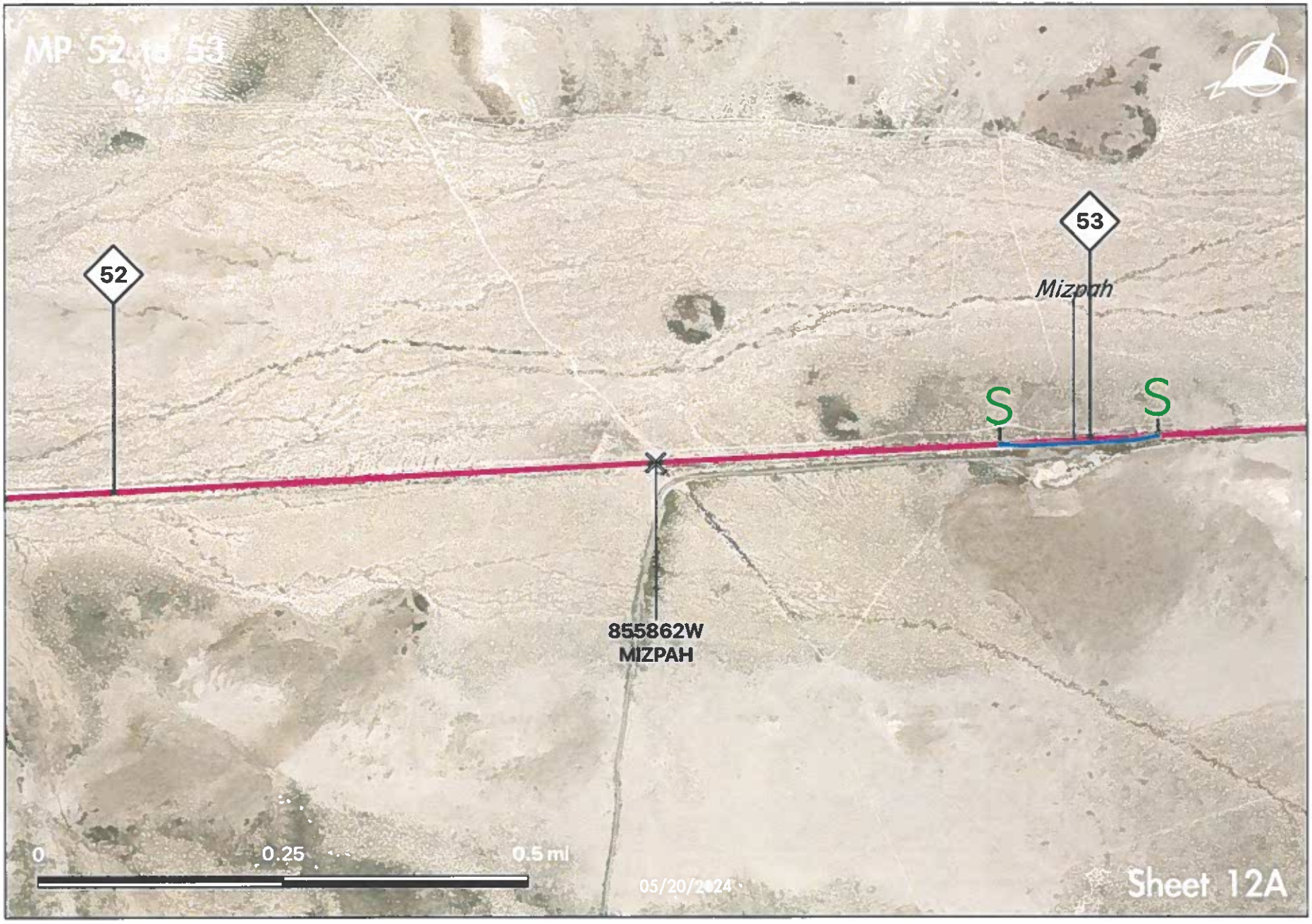
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



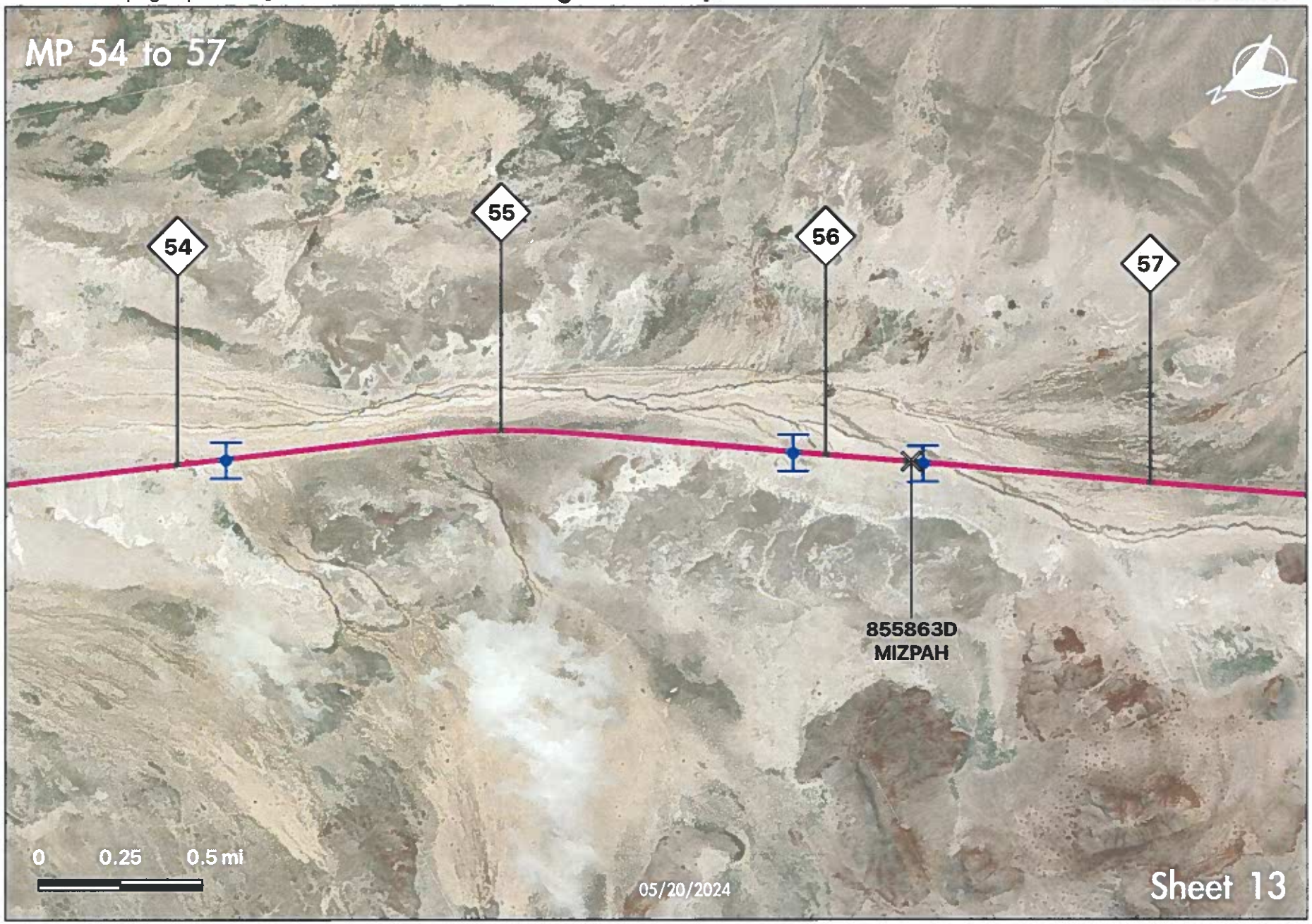
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP

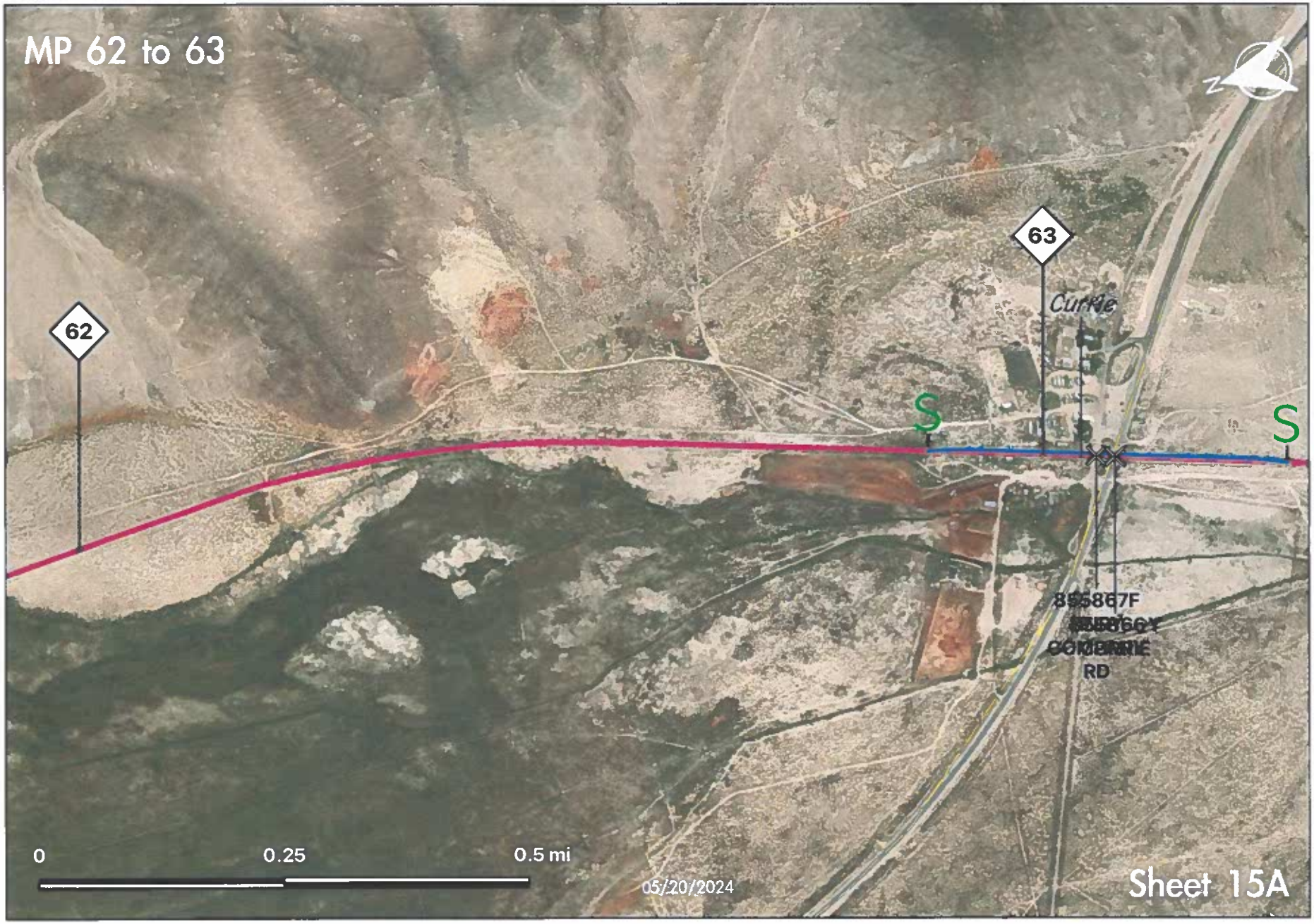
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP



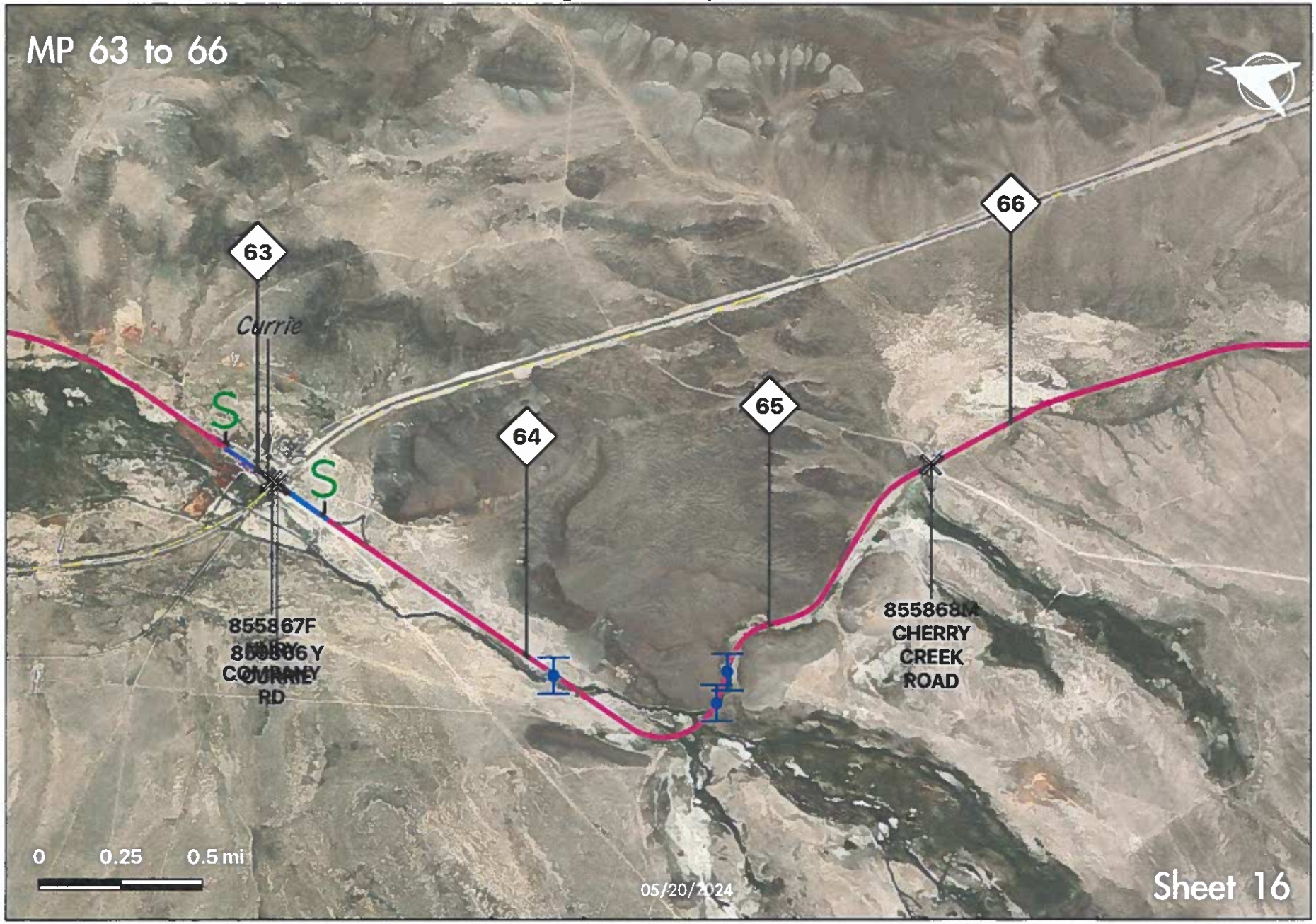
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

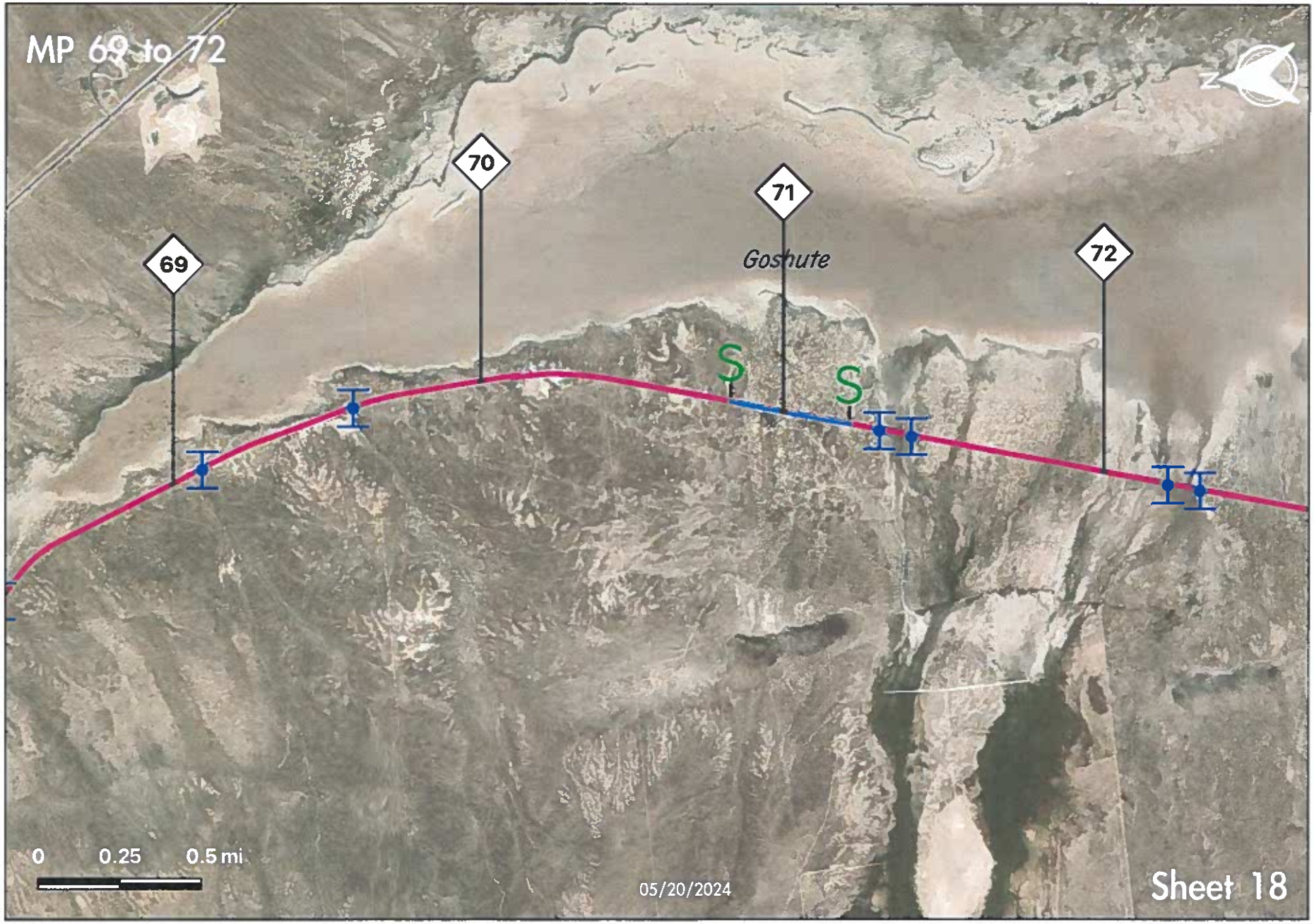
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP

Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

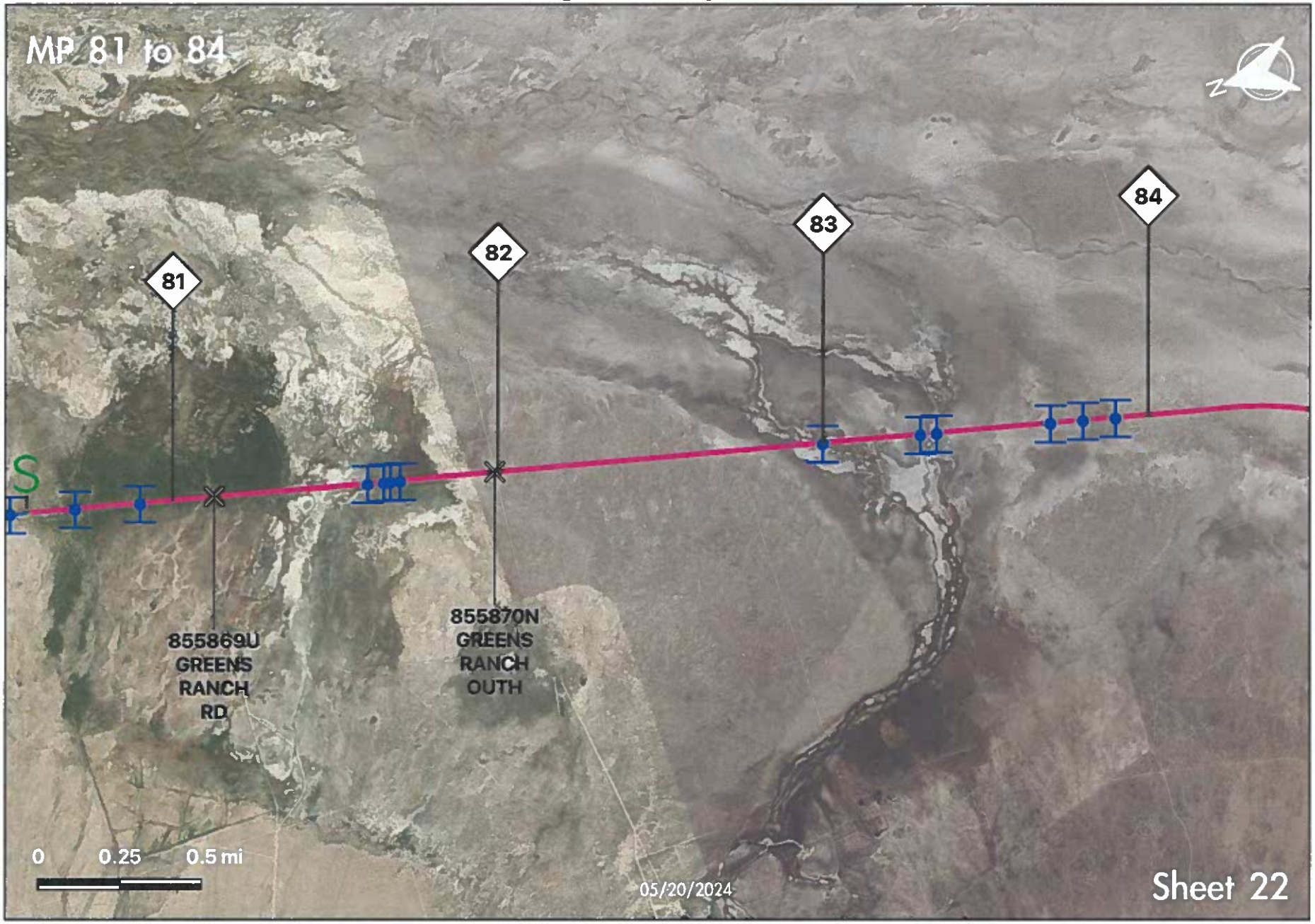
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

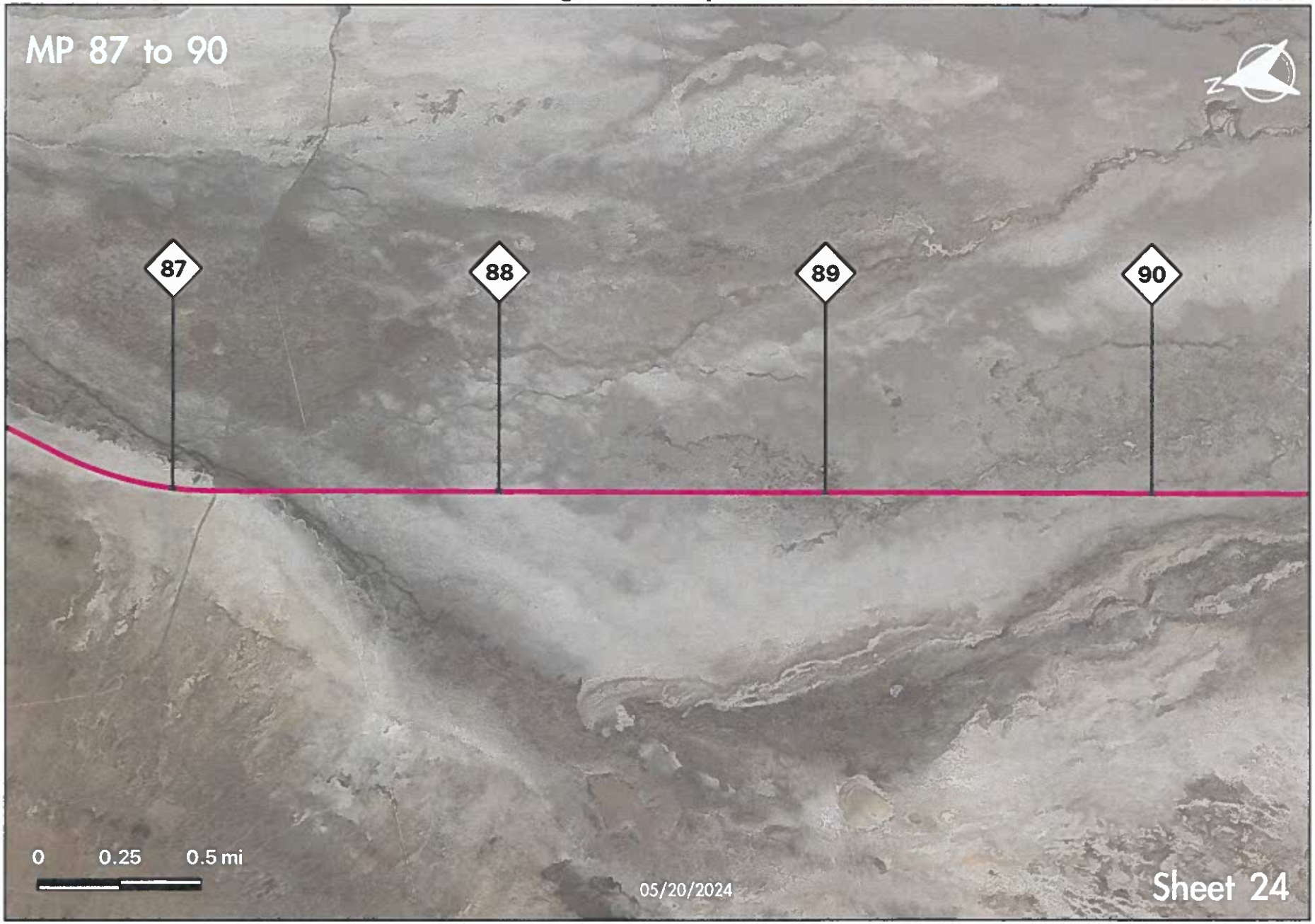
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



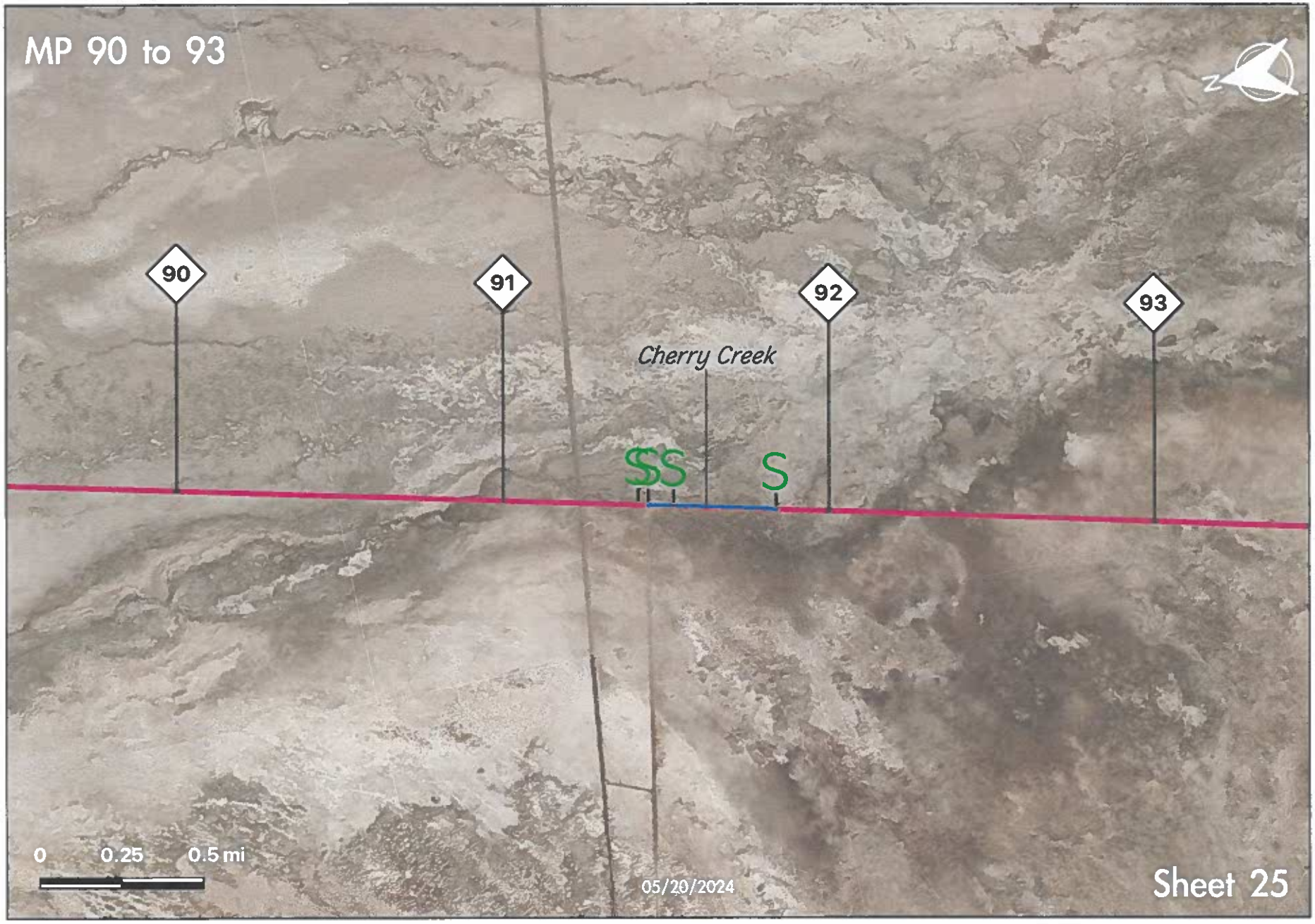
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL
CONSULTING GROUP

Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

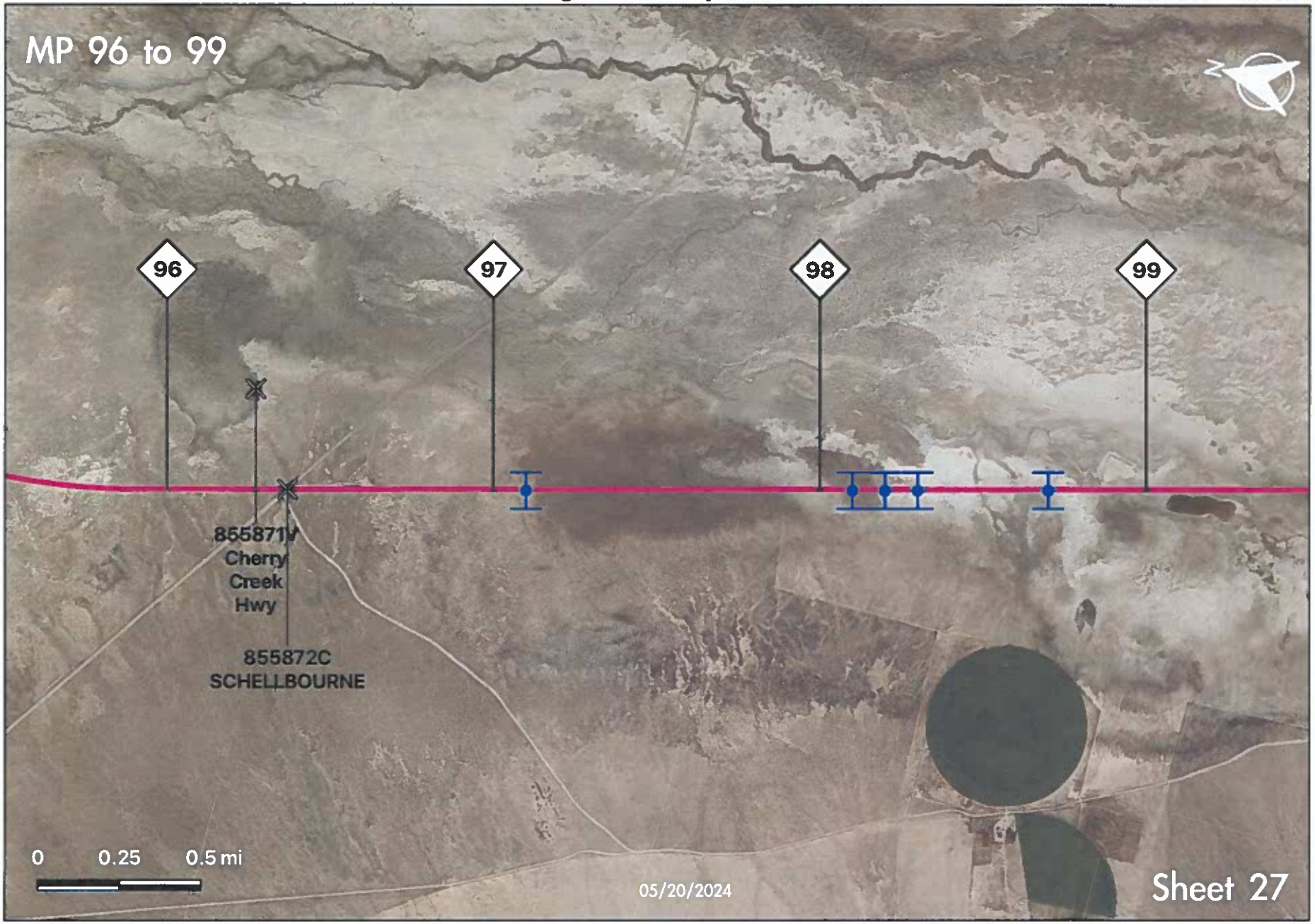
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



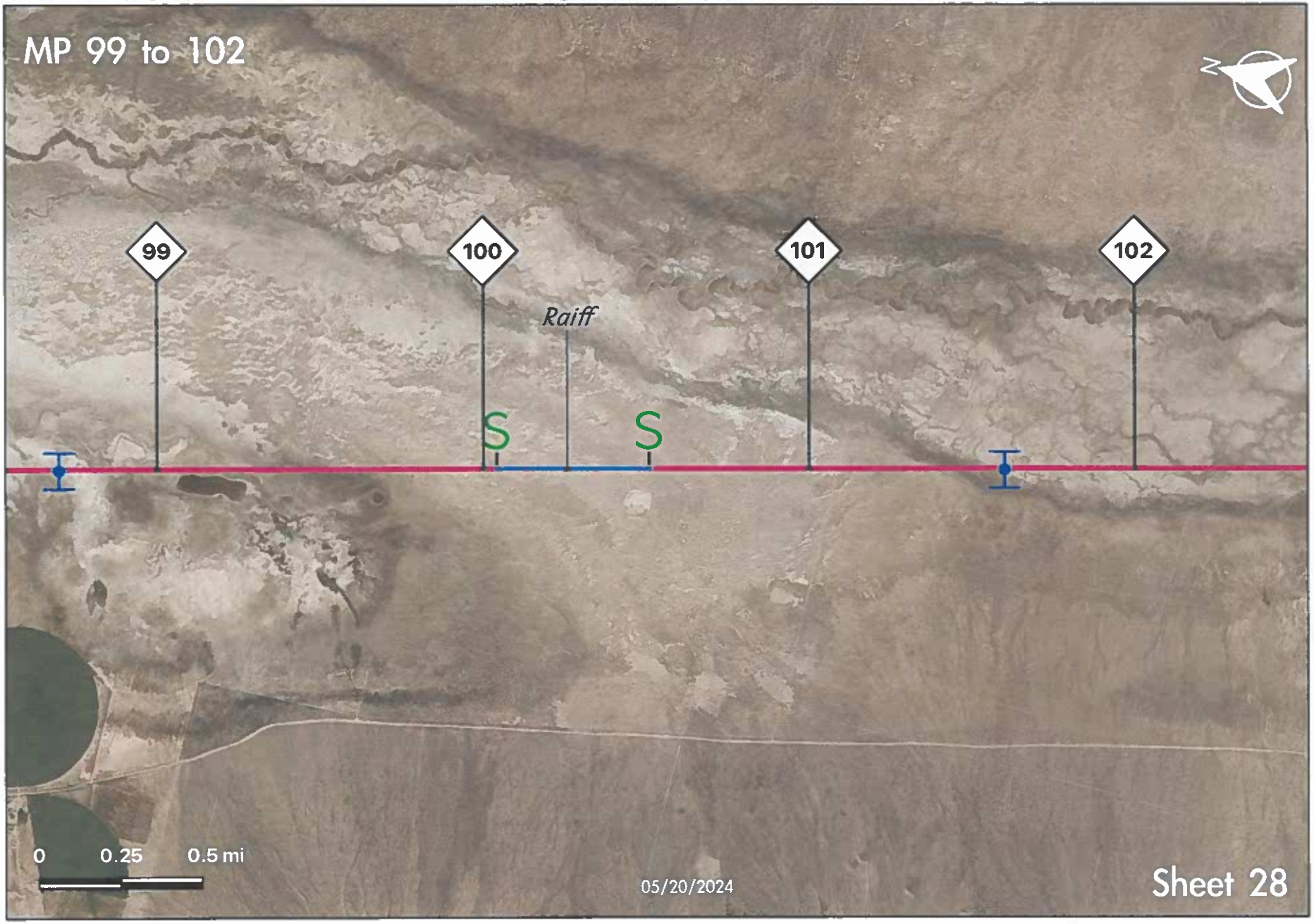
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



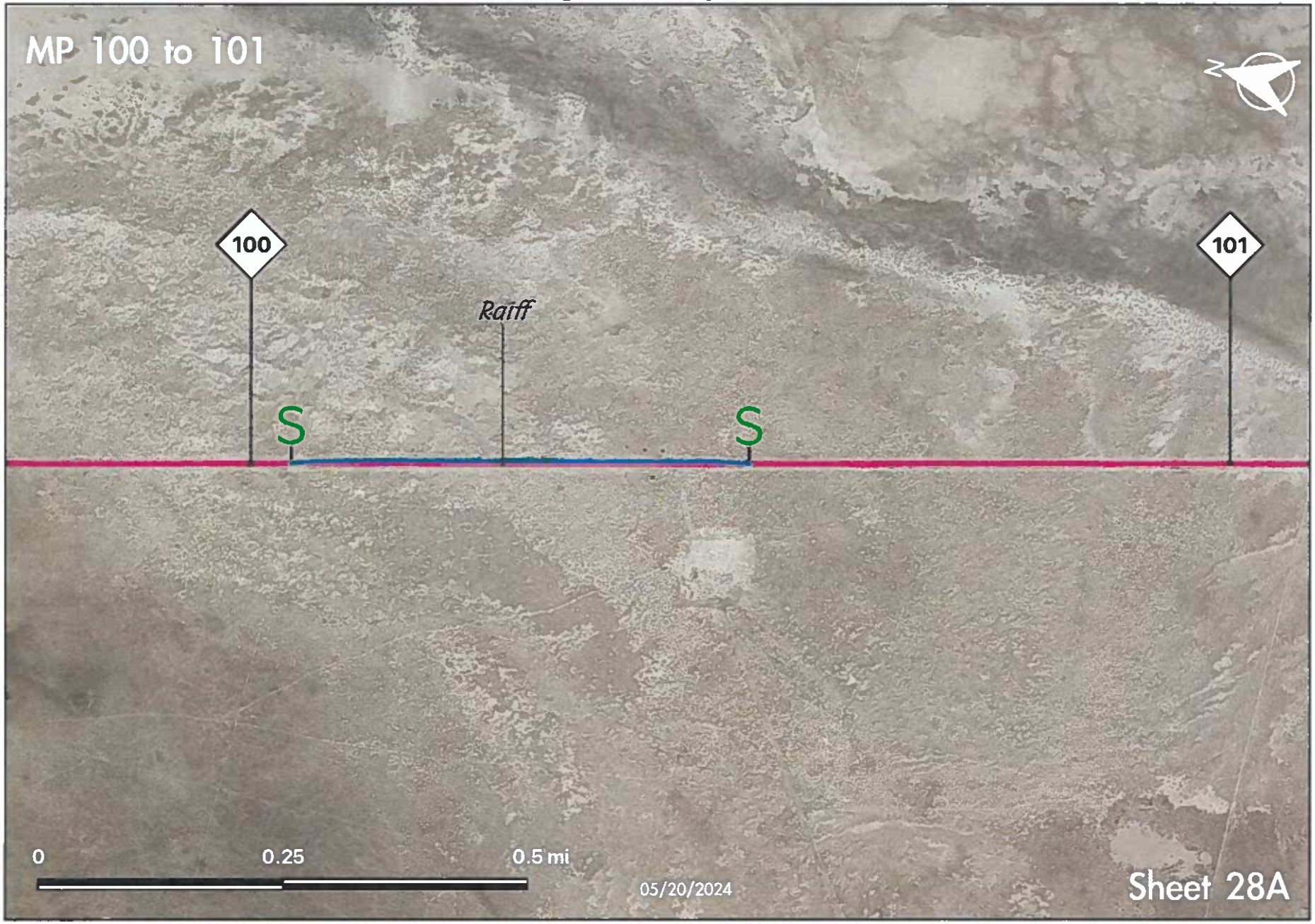
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



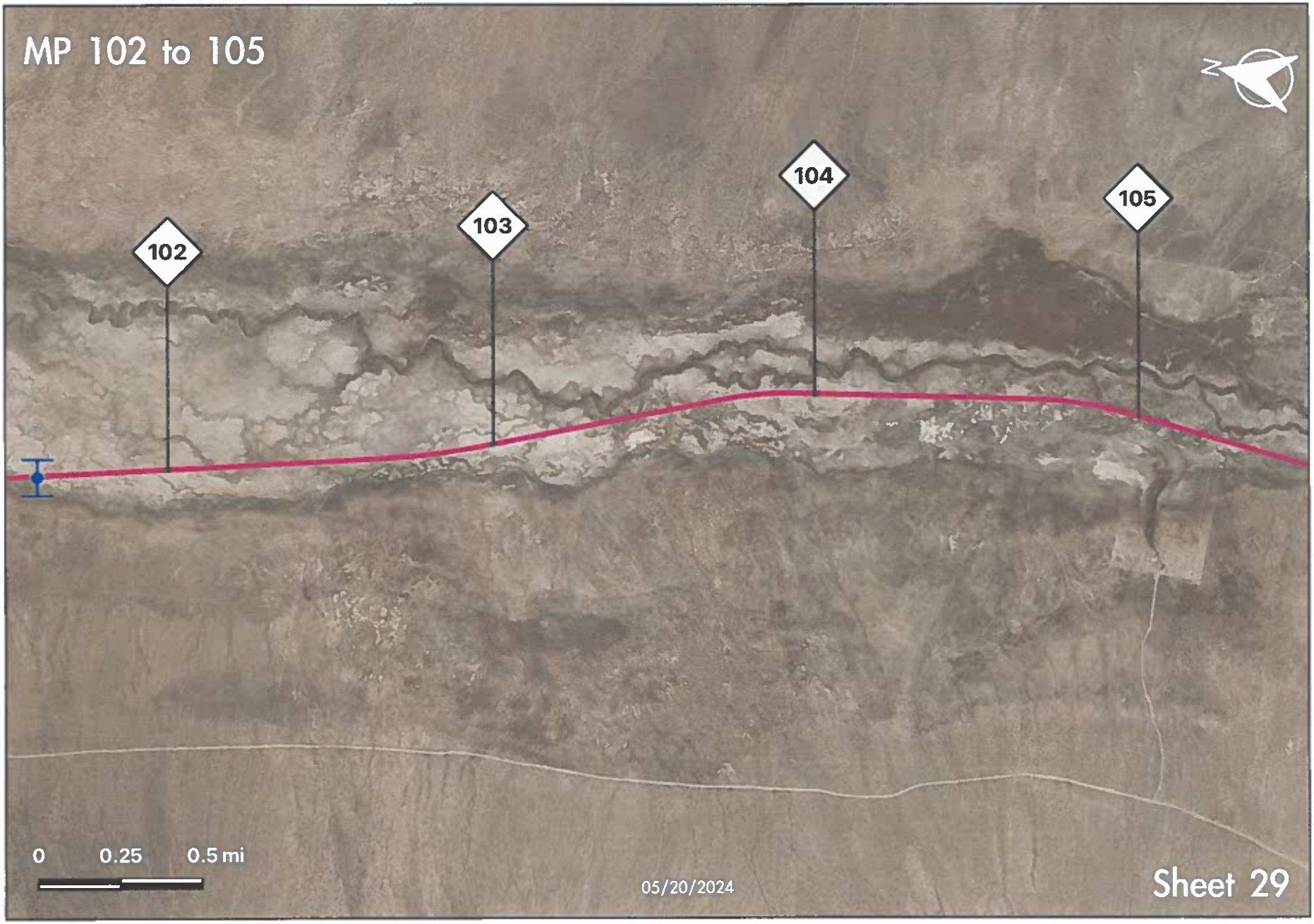
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



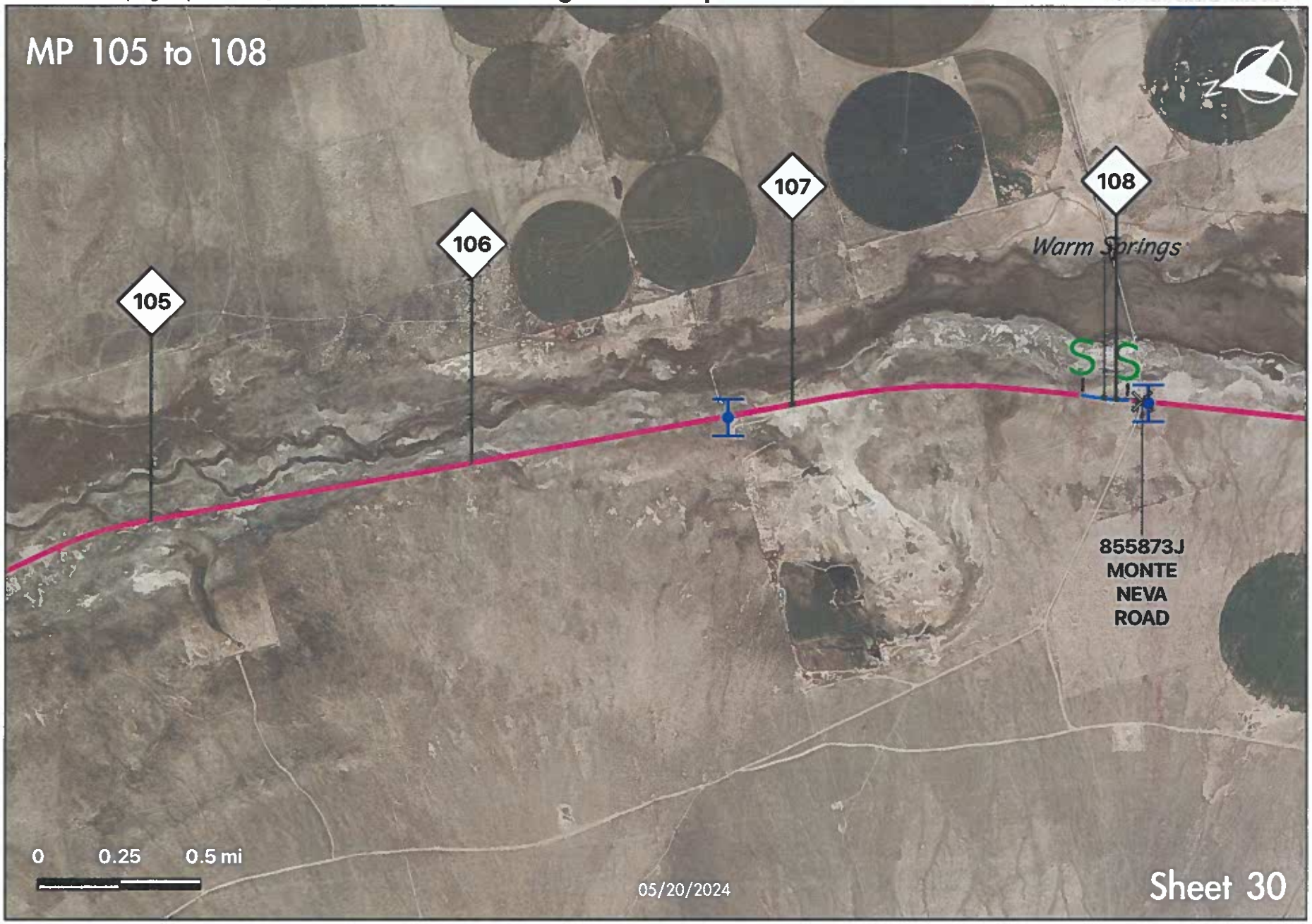
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



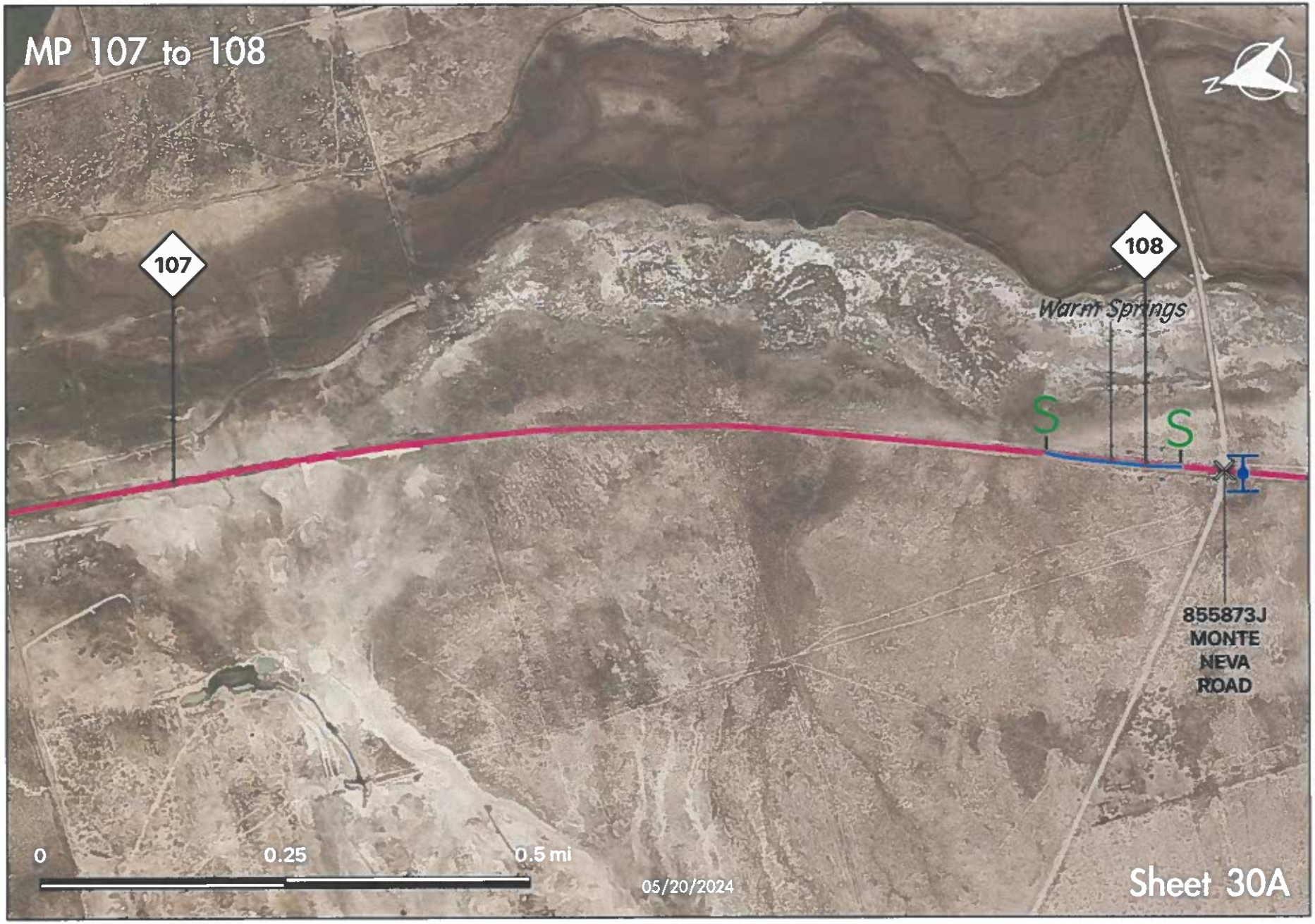
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



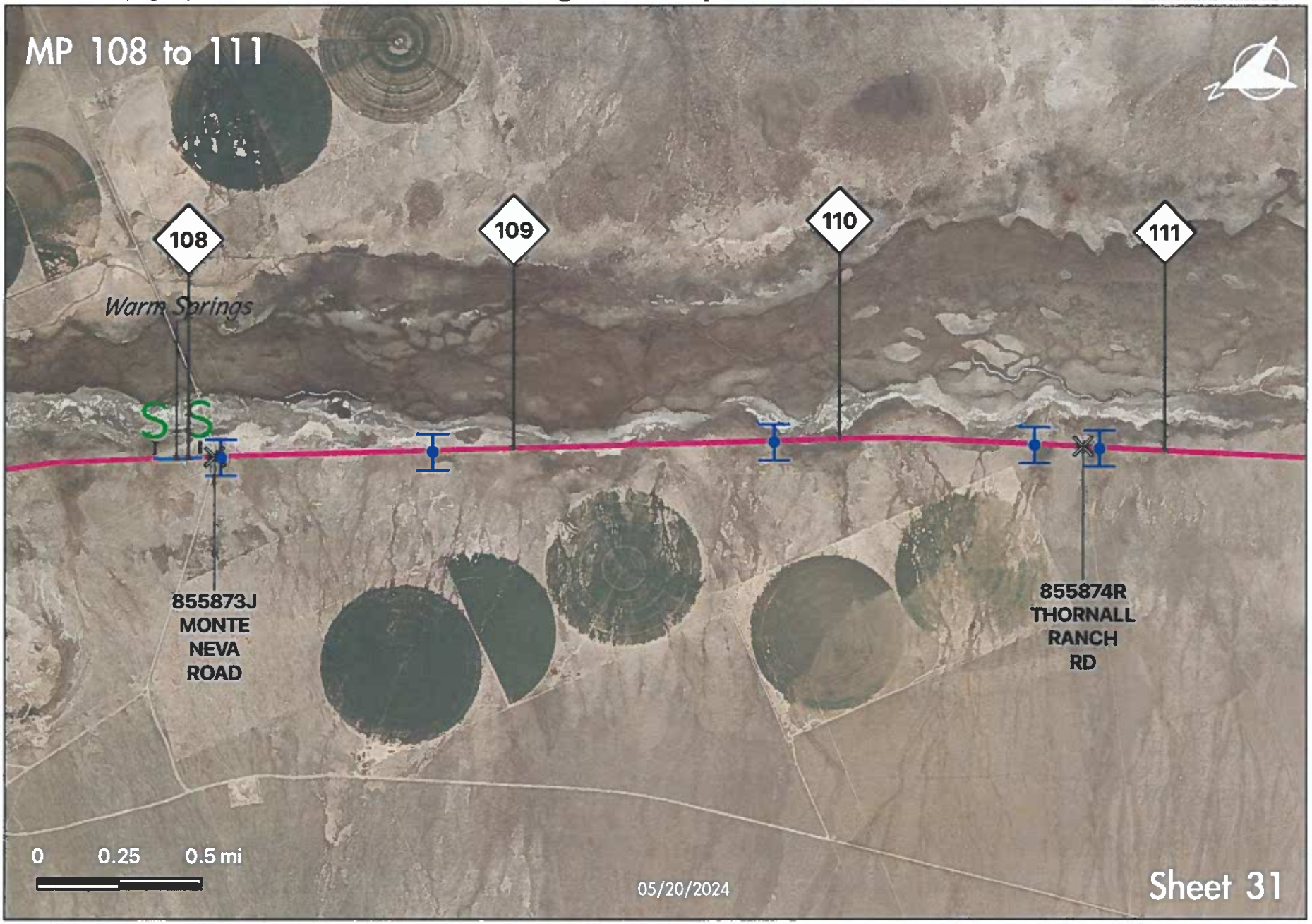
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



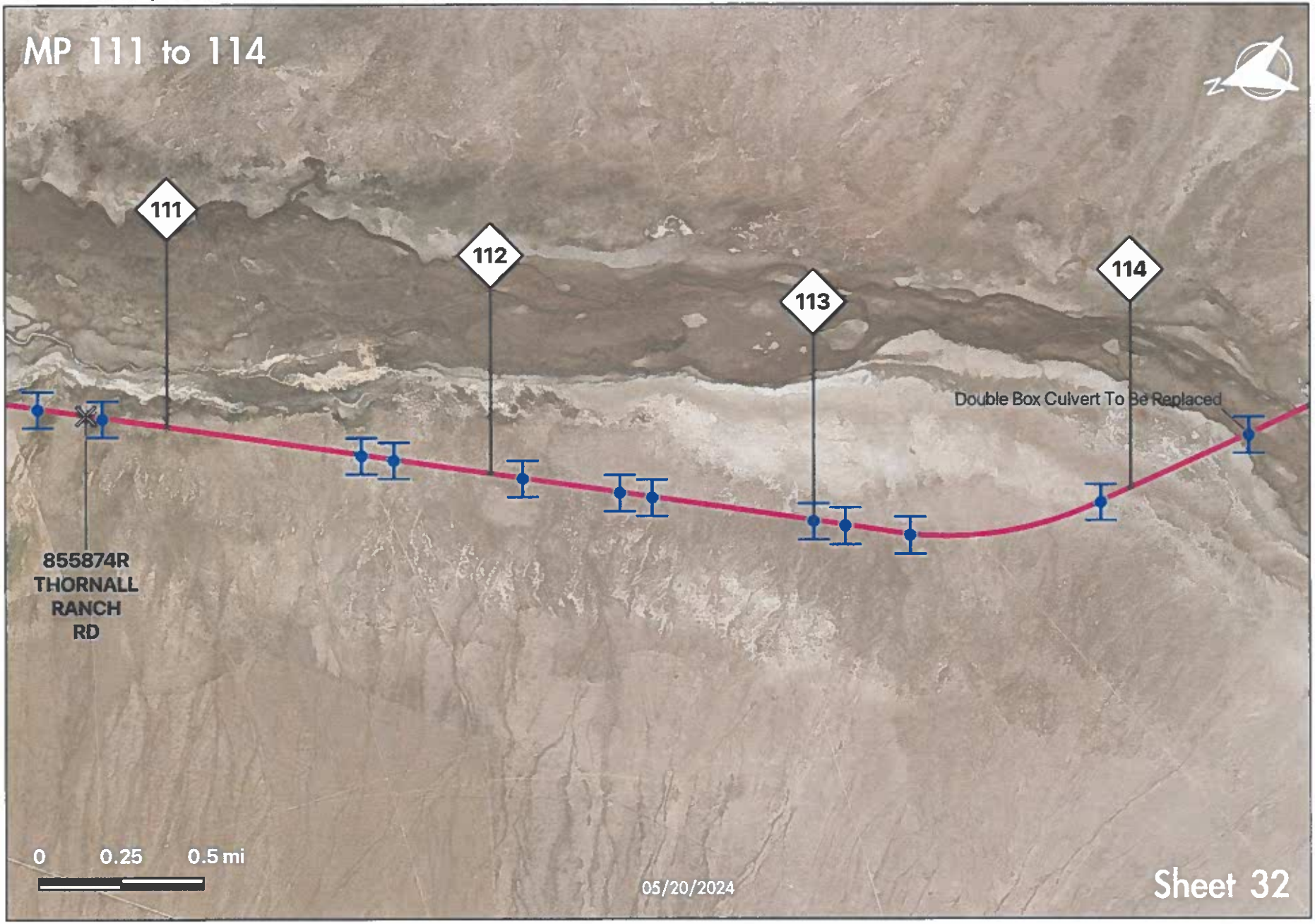
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

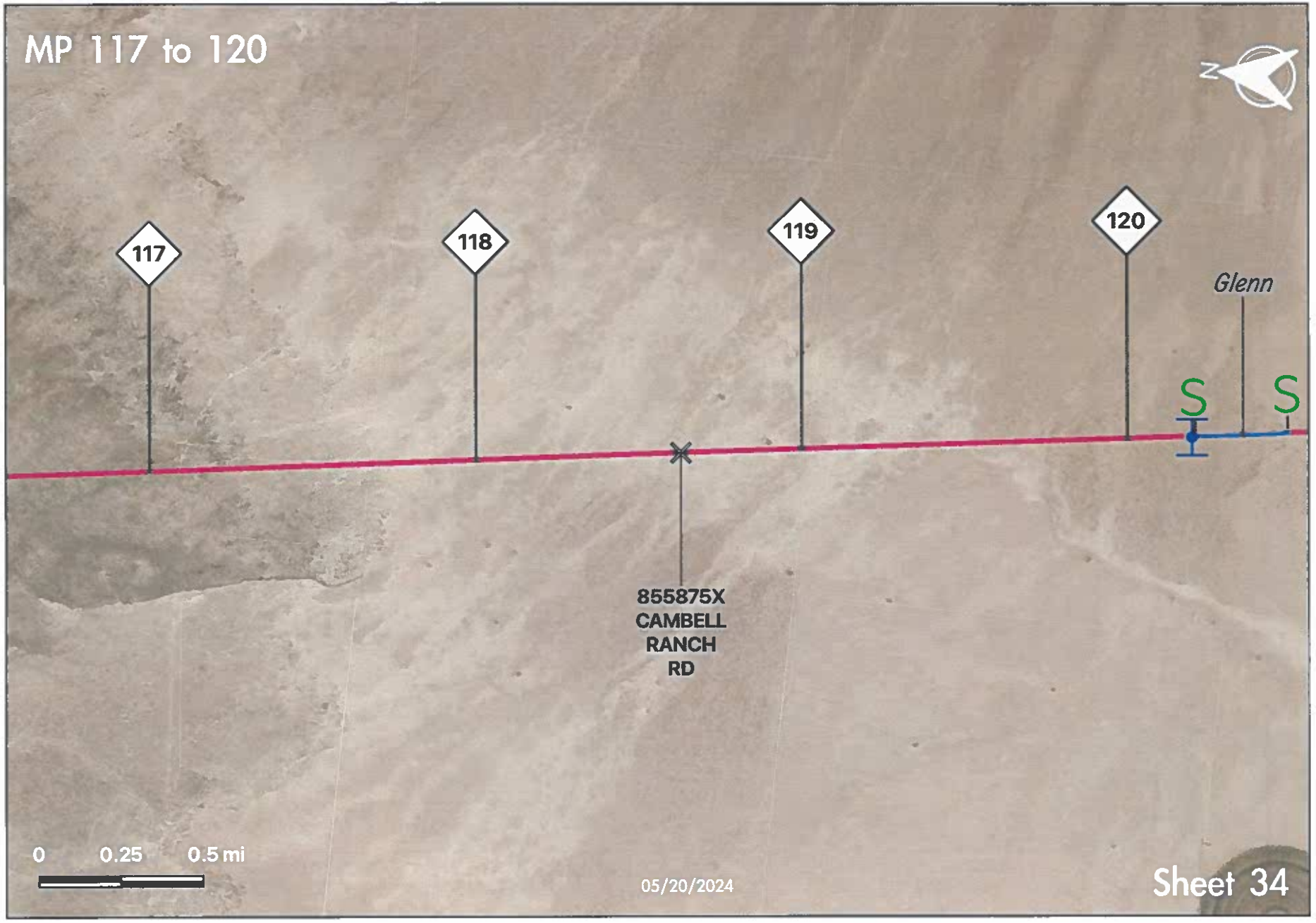
Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP



Nevada Northern Railway
CRISI Grant Scoping Maps

Preliminary Engineering Drawing for
Program Maintenance

Alignment Map

Map created by FMW Solutions LLC
d/b/a National Rail Consulting Group

NATIONAL RAIL CONSULTING GROUP

PCL XL error

Subsystem: IMAGE

Error: ExtraData

Operator: ReadImage

Position: 862466

USDOT Grade Crossing Inventory #	Proposed Improvement	Rail Operator	Railroad Owner	RR MP	Latitude	Longitude
855858G	New timbers, new signage	NNRY/GBNR	City/Fndn	18.5	40.85374	-114.44405
855859N	New timbers, new signage	NNRY/GBNR	City/Fndn	18.7	40.83979	-114.44737
	New timbers, new signage	NNRY/GBNR	City/Fndn	19.5		
	New timbers, new signage	NNRY/GBNR	City/Fndn	25.8		
855860H	New timbers, new signage	NNRY/GBNR	City/Fndn	30.85	40.67919	-114.48564
	New timbers, new signage	NNRY/GBNR	City/Fndn	34.3		
	New timbers, new signage	NNRY/GBNR	City/Fndn	39.8		
	New timbers, new signage	NNRY/GBNR	City/Fndn	40.4		
855861P	New timbers, new signage	NNRY/GBNR	City/Fndn	40.74	40.54345	-114.537
855862W	New timbers, new signage	NNRY/GBNR	City/Fndn	48.96	40.40109	-114.66069
	New timbers, new signage	NNRY/GBNR	City/Fndn	52.5		
855863D	New timbers, new signage	NNRY/GBNR	City/Fndn	58.59	40.35357	-114.69298
855864K	New timbers, new signage	NNRY/GBNR	City/Fndn	60.85	40.32742	-114.71501
855865S	New timbers, new signage	NNRY/GBNR	City/Fndn	62.2	40.29661	-114.73749
855867F	New timbers, new signage	NNRY/GBNR	City/Fndn	63.02	40.26666	-114.74778
855866Y	Concrete Panels, Signalization	NNRY/GBNR	City/Fndn	63.07	40.2664	-114.74789
	New timbers, new signage	NNRY/GBNR	City/Fndn	64.07		
855868M	New timbers, new signage	NNRY/GBNR	City/Fndn	65.75	40.23865	-114.7366
	New timbers, new signage	NNRY/GBNR	City/Fndn	67.3		
	New timbers, new signage	NNRY/GBNR	City/Fndn	71.02		
	New timbers, new signage	NNRY/GBNR	City/Fndn	80.9		
855869U	New timbers, new signage	NNRY/GBNR	City/Fndn	81.07	40.02822	-114.7518
855870N	New timbers, new signage	NNRY/GBNR	City/Fndn	81.96	40.01608	-114.75575
	New timbers, new signage	NNRY/GBNR	City/Fndn	87.1		
855871V	Repave (Asphalt), new signage	NNRY/GBNR	City/Fndn	91.2	39.82284	-114.82351
	New timbers, new signage	NNRY/GBNR	City/Fndn	94.4		
855872C	Repave (Asphalt), new signage	NNRY/GBNR	City/Fndn	96.3	39.82045	-114.82868
	New timbers, new signage	NNRY/GBNR	City/Fndn	106.7		
855873J	Repave (Asphalt), new signage	NNRY/GBNR	City/Fndn	108.04	39.65509	-114.80049
855874R	New timbers, new signage	NNRY/GBNR	City/Fndn	110.68	39.61943	-114.81987
	New timbers, new signage	NNRY/GBNR	City/Fndn	113.5		
	New timbers, new signage	NNRY/GBNR	City/Fndn	114.2		
	New timbers, new signage	NNRY/GBNR	City/Fndn	117.1		
855875X	New timbers, new signage	NNRY/GBNR	City/Fndn	118.59	39.50962	-114.83266
	New timbers, new signage	NNRY/GBNR	City/Fndn	120.5		
	New timbers, new signage	NNRY/GBNR	City/Fndn	121.1		
855876E	New timbers, new signage	NNRY/GBNR	City/Fndn	123.11	39.4445	-114.82637
	New timbers, new signage	NNRY/GBNR	City/Fndn	127.6		
855877L	New timbers, new signage	NNRY/GBNR	City/Fndn	128.02	39.37807	-114.80313
855878T	Confirm Signalization	NNRY/GBNR	City/Fndn	129.18	39.36231	-114.79852