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NEVADA STATE HIGHWAY DEPARTMENT

CONT 1587

# FOUNDATION REPORT

TRUCKEE RIVER BR.

AT

LOCKWOOD

B - 1490

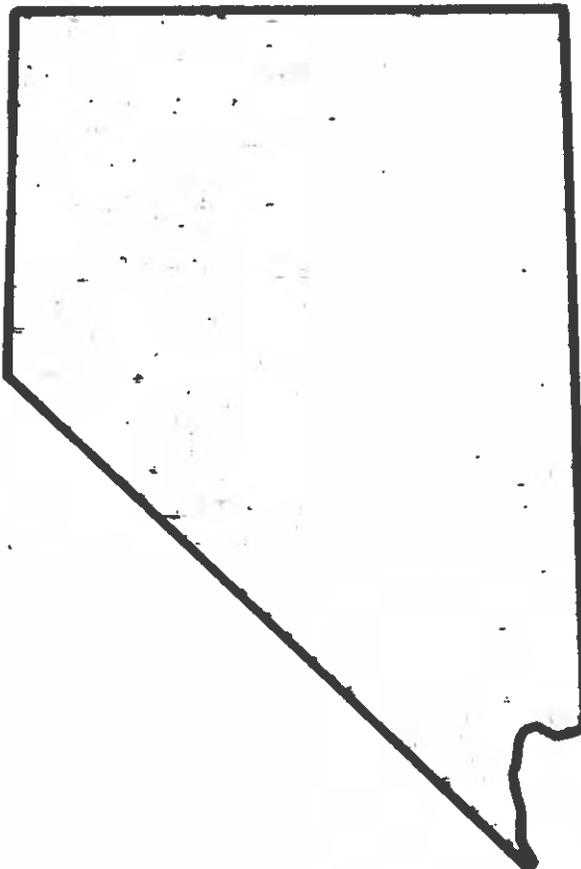
FEBRUARY 1976

PROJECT NO.

BRS · RS · 836 (I)

E.A. NO.

70716



ENGINEERING GEOLOGY & FOUNDATION SECTION

MATERIALS & TESTING DIVISION

TRUCKEE RIVER BRIDGE  
AT  
LOCKWOOD  
B-1490

FEBRUARY 19, 1976

PREPARED BY  
DAVID G. COCHRAN  
ENGINEERING GEOLOGY AND FOUNDATIONS SECTION  
MATERIALS AND TESTING DIVISION

NEVADA STATE HIGHWAY DEPARTMENT  
1263 SOUTH STEWART STREET  
CARSON CITY, NEVADA  
89712

## INTRODUCTION

During December 1975, this Section conducted a foundation investigation at two alternate bridge sites for the crossing of the Truckee River at Lockwood. Four borings were completed using a wet rotary drill and 1.4" split spoon sampler. Borings were completed to bedrock in every case. The foundation study was conducted under the supervision of an Engineering Geologist.

Since the study was conducted it has been decided to locate the new structure on the alignment where the present bridge is located; therefore, this report will deal only with that site.

Borings 2 and 4 were conducted at an alternate site adjacent to the existing site on the downstream side. Data obtained from these borings are considered to be representative of the conditions which exist at the present bridge site. Two additional auger borings were completed January 23, 1976 on the upstream side of the present bridge to further delineate the subsurface bedrock profile.

## GEOLOGY

The alluvial material at the abutments of the site consists of loose to dense silty sand and gravel, gravelly silt and sandy silt. At the north abutment basalt bedrock was encountered at elevation 4348.5 in Boring 2 and at elevation 4345.6 in Boring 6. In the area of the south abutment basalt bedrock was encountered at elevation 4341.0 in Boring 4 and elevation 4341.5 in Boring 5. Although no borings were performed in the river channel, streambed conditions indicate that bedrock either forms the channel bottom or is very near the surface.

## FOUNDATION RECOMMENDATIONS

Spread footings and steel HP 10 x 57 piles are recommended for structure support. Spread footings with design loads up to and including 1.5 TSF, founded at or below elevation 4355 are recommended for support of the north abutment. Piers 1 and 2 may be supported by spread footings at or below elevation 4337 with design loads up to and including 5 TSF. These footings should be poured neat against bedrock and may require the use of a tremie seal. It is also recommended that the footing be tied into the bedrock by anchor bolts. Anchor bolts should extend 5 feet into rock below the footing and be grouted. It is intended that pier footings be founded at least 5 feet below the surface of the bedrock. Since no borings were performed in the channel the bedrock surface has not been positively determined; therefore, some adjustment in pier footing depth may be necessary. The south abutment may be supported by driven HP 10 x 57 steel piles with reinforced tips. Pile tips are specified to a minimum tip elevation of 4340 with design tip elevation of 4335.

Foundation recommendations are also shown on the following tabular summary sheet.

Respectfully submitted,

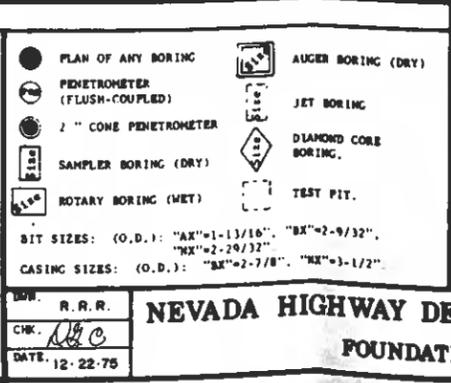
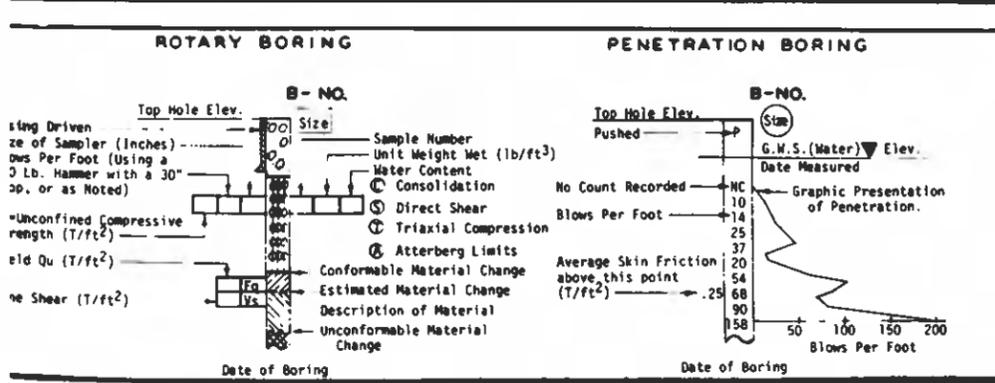
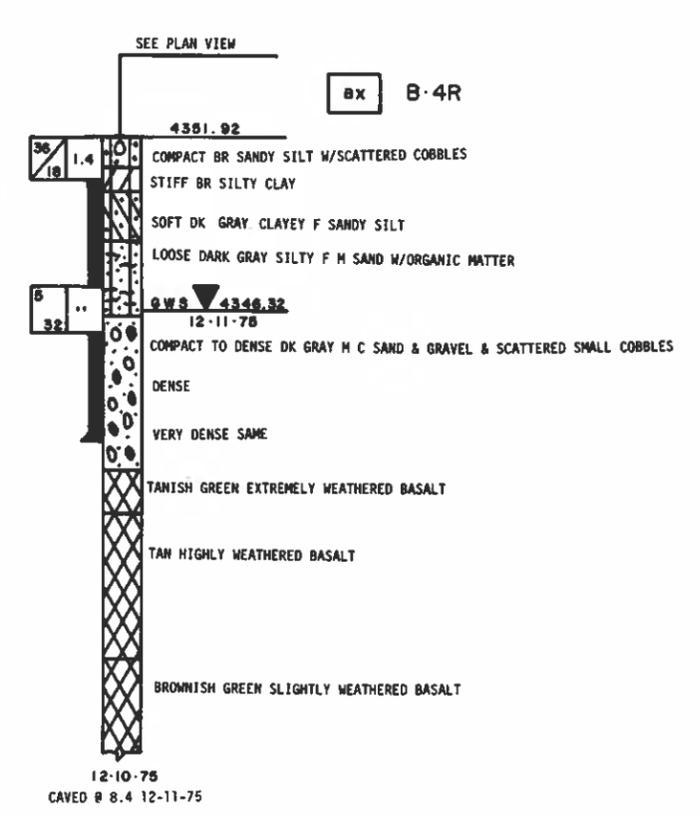
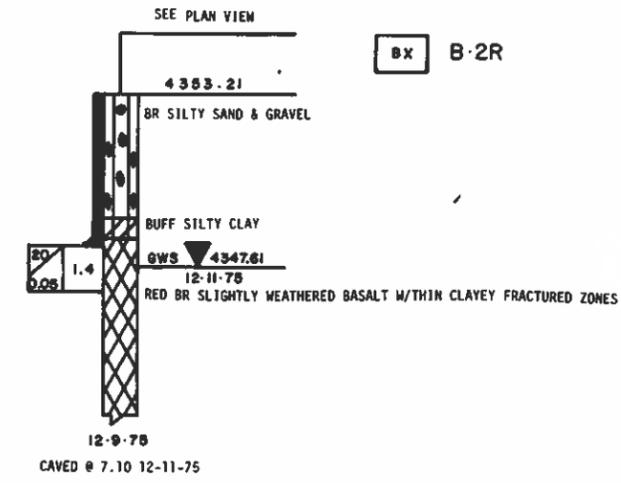
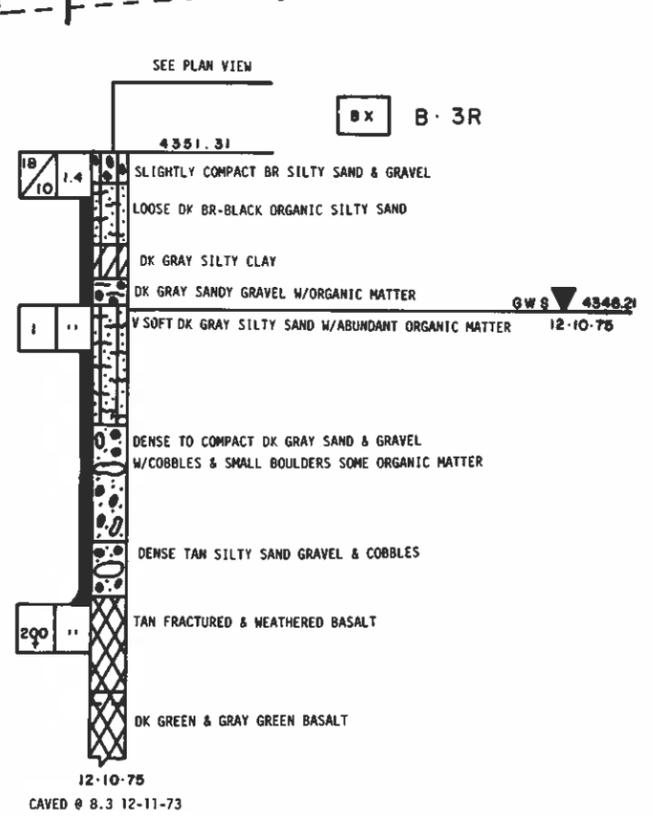
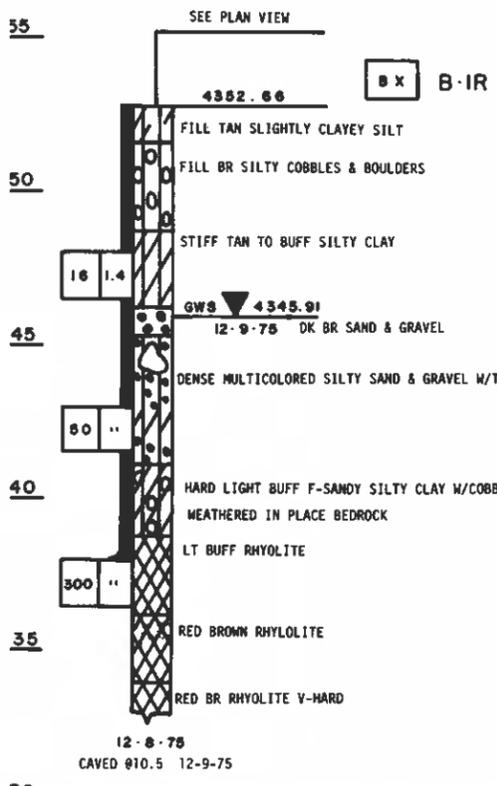
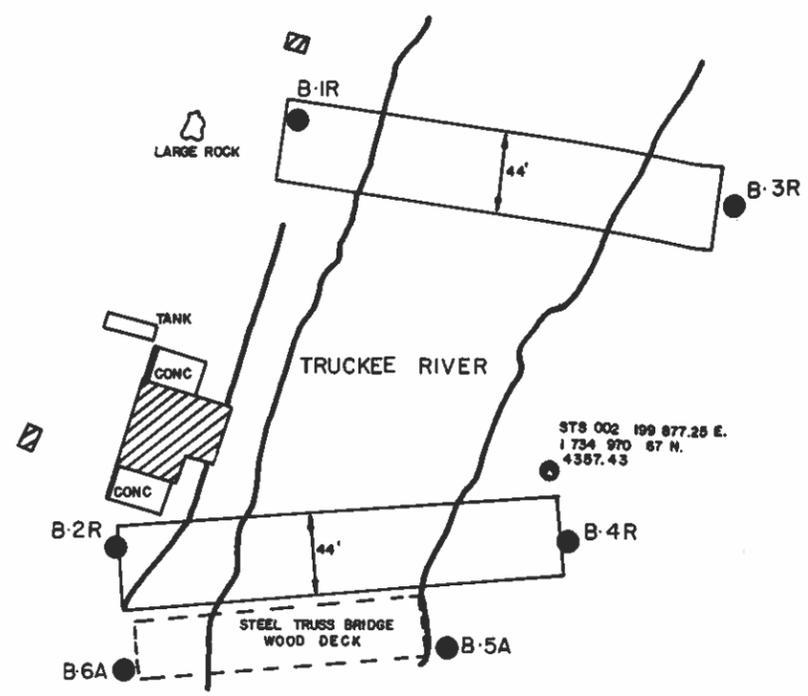


David G. Cochran  
Engr. Geol. III

TABULAR SUMMARY OF FOUNDATION RECOMMENDATIONS

SUPPORT	SUPPORT STATION	RECOMMENDED SUPPORT TYPE	BASE OF FOOTING OR PILE TIP ELEVATION	SAFE ALLOWABLE DESIGN LOAD	ALTERNATE SUPPORT TYPE AND SAFE ALLOWABLE DESIGN LOAD	ALTERNATE SUPPORT BASE OF FOOTING OR PILE TIP ELEVATION	SPECIAL CONSIDERATIONS
N. Abut	Sta "A <sub>1</sub> " 1 + 65.64	Spread Footings	At or below elev 4355	Up to & including 1.5 TSF	--	--	
Pier 1	Sta "A <sub>1</sub> " 2 + 20.64	Spread Footings	* At or below elev 4337	Up to & including 5.0 TSF	--	--	*1. Tremie seal may be necessary. 2. Should be anchored to bedrock. 3. Footing elev. may have to be adjusted to allow for irregular bedrock surface. 4. Footing is intended to be 5' below bedrock surface.
Pier 2	Sta "A <sub>1</sub> " 2 + 90.64	Spread Footings	* At or below elev 4337	Up to & including 5.0 TSF	--	--	
S. Abut.	Sta "A <sub>1</sub> " 3 + 45.64	* Steel HP 10 x 57	Minimum 4340 Design 4335	70 Ton Design Load	--	--	*shall have reinforced tips.

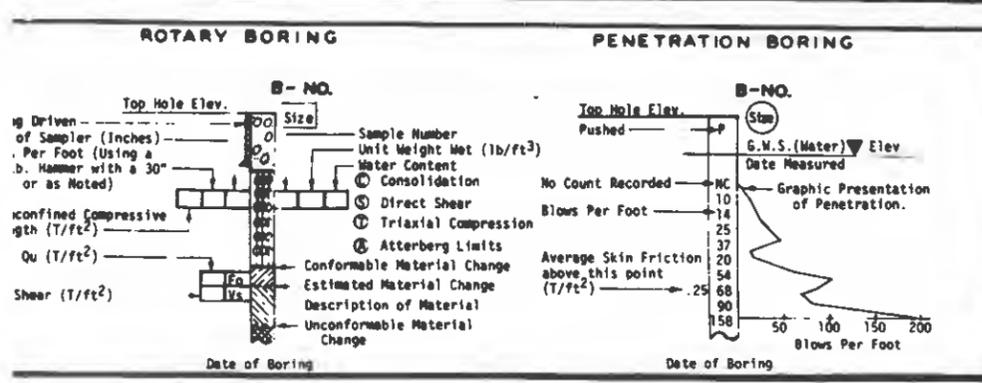
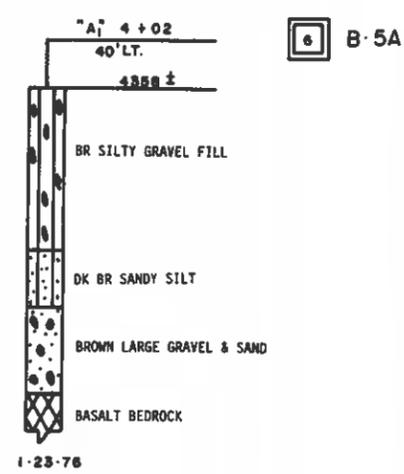
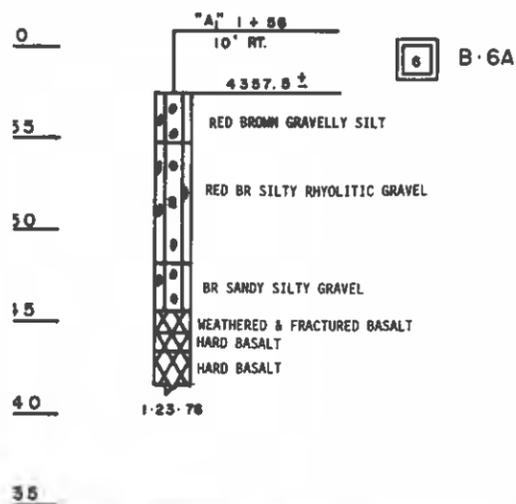
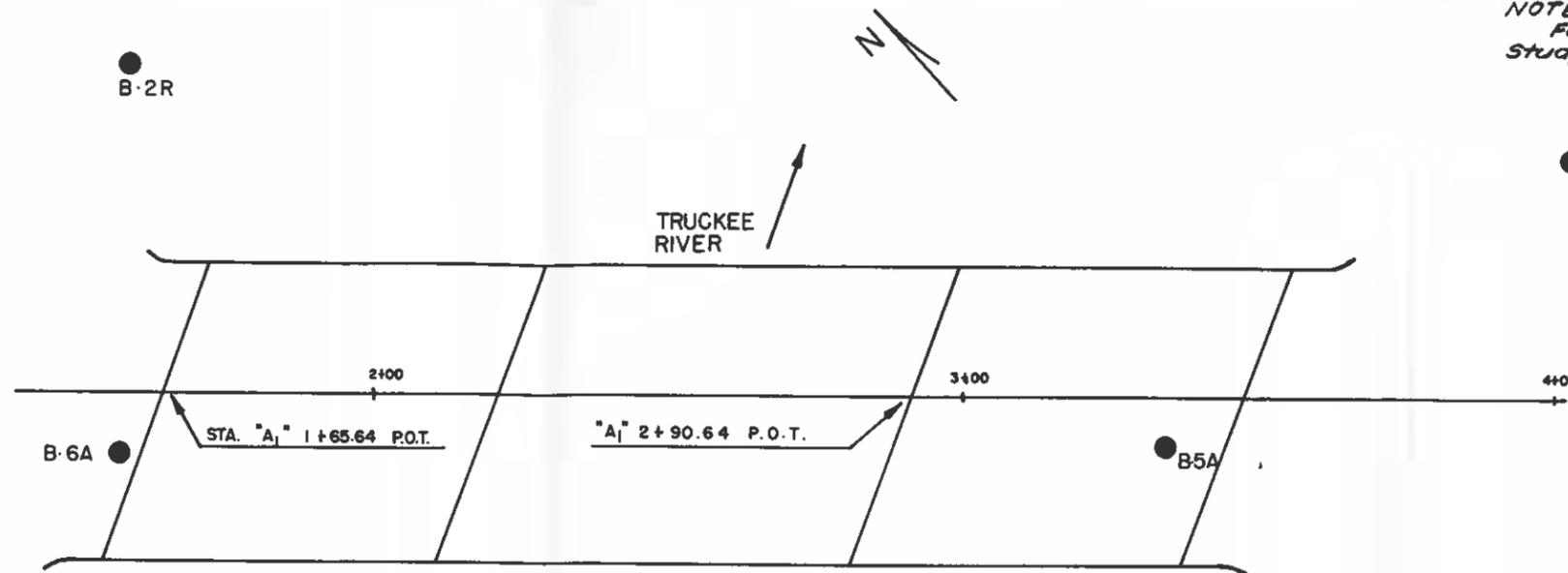
NOTE:  
Foundation Report Available For Contractors  
Study in District Office & Materials & Testing Div.



THE UNIFIED SOIL CLASSIFICATION SYSTEM					
MAJ. DIV.	LETTER SYMBOL	NAME	MAJ. DIV.	LETTER SYMBOL	NAME
Coarse Grained Material	GW	Well-graded gravel or gravel-sand mixtures, little or no fines.	Fine Grained Soil	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or clayey silt with slight plasticity.
	GP	Poorly-graded gravel or gravel-sand mixtures, little or no fines.		CL	Inorganic clay or low to medium plasticity, gravelly clay, sandy clay, silty clay, lean clay.
	GM	Silty gravel, gravel-sand-silt mixtures.		OL	Organic silt and organic silt-clay of low plasticity.
	GC	Clayey gravel, gravel-sand-clay mixtures.		OH	Inorganic clay or high plasticity, fat clay.
Sand and Silty Sand	SW	Well-graded sand or gravelly sand, little or no fines.	CH	Inorganic clay of medium to high plasticity, organic silt.	
	SP	Poorly-graded sand or gravelly sand, little or no fines.	PT	Peat and other highly organic soils.	
	SM	Silty sand, sand-silt mixtures.			
	SC	Clayey sand, sand-clay mixtures.			

ROCK CLASSIFICATION		SOIL CONSISTENCY CLASSIFICATION	
SYMBOL	NAME	CONSISTENCY	BLOWS PER FT.
[Symbol]	IGNOBUS ROCK	GRANULAR	0 to 5
		COHESIVE	5 to 10
[Symbol]	SEDIMENTARY ROCK	Very Loose	0 to 5
		Loose	5 to 10
		Slightly Compact	10 to 20
[Symbol]	METAMORPHIC ROCK	Compact	20 to 35
		Dense	35 to 70
		Very Dense	70

NOTE:  
Foundation Report Available For Contractors  
Study In District Office & Materials & Testing Div.



- PLAN OF ANY BORING
  - PIEZOMETER (FLUSH-COUPLED)
  - 2" CONE PENETROMETER
  - SAMPLER BORING (DRY)
  - ROTARY BORING (NET)
  - AUGER BORING (DRY)
  - JET BORING
  - DIAMOND CORE BORING
  - TEST PIT
- BIT SIZES: (O.D.): "AK"-1-13/16", "BK"-2-9/32", "MK"-2-29/32"  
CASING SIZES: (O.D.): "BK"-2-7/8", "MK"-1-1/2"

THE UNIFIED SOIL CLASSIFICATION SYSTEM					
MAJ. DIV.	LETTER SYMBOL	NAME	MAJ. DIV.	LETTER SYMBOL	NAME
Coarse Grained Material Gravel and Gravelly Soil	GM	Well-graded gravel or gravel-sand mixtures, little or no fines.	Fine Grained Soil Silt and Silty Soil Clays LL>50	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or clayey silt with slight plasticity.
	GP	Poorly-graded gravel or gravel-sand mixtures, little or no fines.		CL	Inorganic clay or low to medium plasticity, gravelly clay, sandy clay, silty clay, lean clay.
	GM	Silty gravel, gravel-sand-silt mixtures.		OL	Organic silt and organic silt-clay of low plasticity.
	GC	Clayey gravel, gravel-sand-clay mixtures.		MH	Inorganic silt, micaceous or diatomaceous fine sandy or silty soils, elastic silt.
	SM	Well-graded sand or gravelly sand, little or no fines.		CH	Inorganic clay or high plasticity, fat clay.
Sand and Sandy Soil	SP	Poorly-graded sand or gravelly sand, little or no fines.	OH	Organic clay of medium to high plasticity, organic silt.	
	SW	Silty sand, sand-silt mixtures.	PT	Peat and other highly organic soils.	
SC	Clayey sand, sand-clay mixtures.				

ROCK CLASSIFICATION		SOIL CONSISTENCY CLASSIFICATION	
SYMBOL	NAME	CONSISTENCY	BLOWS PER FT.
[Symbol]	IGNEOUS ROCK	Very Loose	0 to 5
		Loose	5 to 10
[Symbol]	SEDIMENTARY ROCK	Slightly Compact	10 to 20
		Compact	20 to 35
[Symbol]	METAMORPHIC ROCK	Dense	35 to 70
		Very Dense	70

NOTE: Classification of earth material shown on this sheet is based upon field inspection unless noted otherwise.

\*(Standard Penetration Test) Blows Per Ft. (140 LB. Hammer, 30" Free-Fall Blow using a 2" O.D. x 1-3/8" I.D. Sampler).

STATE OF NEVADA  
DEPARTMENT OF HIGHWAYS

## MEMORANDUM

To..... Eugene F. Weight, P. E. ....

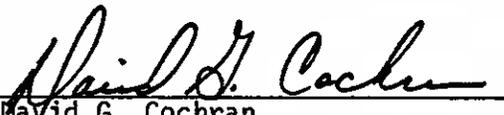
February 23, 1976

From..... David G. Cochran, Engr. Geol. III .....

**Subject:** Truckee River Br at Lockwood B-1490,  
E. A. 70716, Revised Foundation Rec-  
ommendations at the N. Abutment.

This memo is in response to a meeting between Frank Taylor and myself Feb. 20, 1976. We discussed the possibility of lowering the footing elevation of the north abutment as shown on the preliminary drawing dated Jan. 26, 1976 in order to increase footing design load.

A projection of the bedrock profile at the abutment between borings B-2 and B-6A indicate that the bedrock surface varies lineally from elevation 4347+ on the downstream side of the abutment to elevation 4345+ on the upstream side. A spread footing with design loads up to and including 5.0 TSF may be used at the north abutment, providing it is founded on bedrock. Attached is a drawing showing the assumed bedrock surface and a possible footing plan. If after excavation of the overburden, the bedrock is found to be competent with a fairly smooth surface, the footing could be founded directly on this surface. However, the bedrock can be excavated and stepped as shown on the attached drawing, this would tend to key the footing to the bedrock more, especially if the footing were poured neat against the bedrock.

  
David G. Cochran  
Engr. Geol. III

DGC:mlf

Attach.

4360

4355

4350

4345

4340

N. ABUT. LOCK WOOD BR

LOOKING UP STATION

ASSUMED  
BEDROCK  
PROFILE

FOOTING ELEVATIONS

