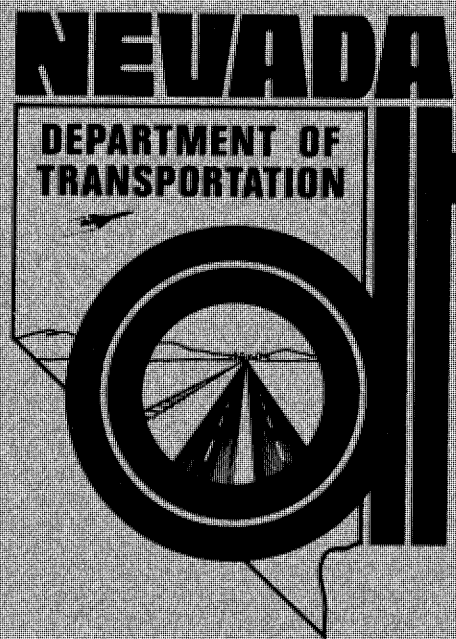


FOUNDATION REPORT

LAKE MEAD BLVD. INTERCHANGE I-1213
VEGAS DRIVE GRADE SEPARATION H-1212
&
SMOKE RANCH ROAD GRADE SEPARATION H-1214



NEVADA
DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTING DIVISION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
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FOUNDATION REPORT

LAKE MEAD BLVD. INTERCHANGE I-1213
VEGAS DRIVE GRADE SEPARATION H-1212
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SMOKE RANCH ROAD GRADE SEPARATION H-1214

E.A. 71478-1, STRUCTURES I-1213 & H-1212
E.A. 71592-1, STRUCTURE H-1214

December 19, 1988

Report By: J. Mark Salazar
J. Mark Salazar
Engineering Geologist II

Approved By: David G. Cochran
David G. Cochran
Highway Engineer IV

Introduction

This report discusses the geology and foundation recommendations for three proposed structures located on the West Leg of US 95 in Las Vegas at the intersections of Vegas Drive, Lake Mead Blvd., and Smoke Ranch Rd. Only information concerning the bridge structures is addressed.

Investigative Scope

During the months of September and October, 1988 the Geotechnical Section of the Materials and Testing Division conducted subsurface investigations at the proposed structure locations mentioned above. A total of five borings were completed to augment geologic information gathered for the freeway alignment in 1976 (2), and from existing geological maps and reports listed in the Reference. Soil samples were obtained and classified from each boring utilizing standard penetration testing procedures. However, due to the very dense gravelly nature of the soils encountered, the split spoon sampler generally did not retrieve enough material for further physical testing. Complete boring logs and boring location maps have been included within.

Geology

A. Lake Mead Diamond Interchange Site

This site is located on alluvium, late Pleistocene/early Holocene in age which is described as inactive alluvium Qal by Matti et al (3). However, after reviewing the boring logs, I believe the material encountered is better described by unit Qoa denoted as older alluvium of the Red Rock fan (3). Three borings generally encountered dense silty sandy gravel to depths of up to 17 feet. Boring B1R encountered very dense sandy silt from

17 to 24 feet. Very dense caliche was also logged within the upper gravel section in two of the exploratory borings. In particular, a very dense two foot thick caliche layer was found between elevations 2346 and 2344 in boring BlR. No groundwater was encountered in any of the borings.

B. Vegas Drive Grade Separation Site

This site is located on alluvium, late Pleistocene/early Holocene in age and is described as older alluvium of the Red Rock fan (3). One boring (LV-1) was drilled near the proposed center pier location of the overpass structure. This boring encountered very dense silty to clayey sand and gravel to a depth of approximately 23 feet. Much of the material is caliche cemented and pure caliche lenses and layers are probably present locally within the gravel section. No ground water was encountered.

C. Smoke Ranch Road Grade Separation

The site is located on material described as older gravel deposits Qog (3). One boring was completed to a depth of 12.5 feet near the proposed location of the center pier of the overpass. At this depth the 8 inch hollow stem auger bit was refused by what I suspect to be a very dense layer of caliche. Due to time constraints and equipment problems, no attempt was made to wet drill through this horizon. In addition to this boring, I observed a construction trench excavation at approximately Station "B" 635+20, 115 feet left. This trench was approximately 10 feet deep and exhibited similar materials logged in boring SmR-1. Material logged in boring SmR-1 consisted of very dense silty sand and gravel to 12.5 feet. In addition, a very hard section of caliche was found between Elevations 2032.3' and 2031.1'. No groundwater was encountered.

Faults

There is no evidence of a fault trending through any of the three structure sites from information gathered by the sub-surface investigations or existing

maps and reports. The nearest fault scarp shown on maps (1) is north-south trending feature located approximately 1 mile to the east of all three project sites. This escarpment is one of a series of north-south trending faults found in the Plio-Pleistocene basin fill of the Las Vegas Valley. The original cause of these faults has been somewhat controversial. Cases have been built for and against both tectonic and differential compaction theories (1). It is quite probable tectonic movements and prehistoric natural differential consolidation due to climatically induced dewatering could both be responsible for these geologic structures. Regardless, it is a known fact that subsidence has occurred throughout the Las Vegas Valley basin for at least 55 years (1). NDOT along with the Nevada Bureau of Mines and Geology began conducting a study in 1978 to study and measure these events (4). Results from this study have directly linked differential subsidence of fault-bounded blocks of sediment to man-caused dewatering of aquifers by pumping operations. There has been speculation (4) that a local subsidence basin as far as 2 miles away may control this movement along the fault in question. In any case, vertical displacements are shown to be accommodated by warping and extension over wide zones (up to 2000 linear feet) rather than rupturing of surficial sediments.

Foundation Recommendations

Spread footing supports are recommended for each structure. Preliminary plans indicate that abutments for each structure will be supported by spread footings in engineered embankment fills. This is acceptable for loadings up to 2 tons/ft². Each embankment should be compacted to 95% relative density to avoid differential settlement problems. Calculations indicate that allowable loadings up to 10 tons/ft.² can be supported by original ground at each of the three project sites. Settlements of less than 0.5 inches can be expected. Any settlements due to embankment or structural loadings can be expected to take place during construction and cause no problems. Calculations were made

assuming a minimum footing embedment equal to 3 feet assuming a 13 foot square concrete footing. It is possible that continual dewatering of aquifers in this area could cause differential settlement problems in the future. However, these settlements are normally associated with abrupt physical grain size differences in adjacent sediments (i.e., fine grain grained sediments grading abruptly into coarse grained sediments) (1). Evidence gathered by borings and existing geologic information indicate that these conditions do not exist at any of these project sites. Excavation for the center pier supports on these structures may encounter very hard caliche, especially at the Lake Mead Blvd. and Smoke Ranch Road sites. Caliche was encountered at approximately four feet in both boring SmR-1 and B1R.

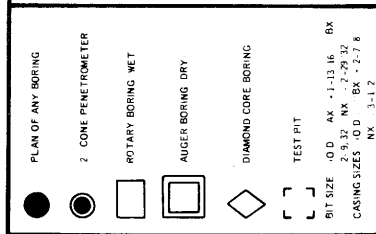
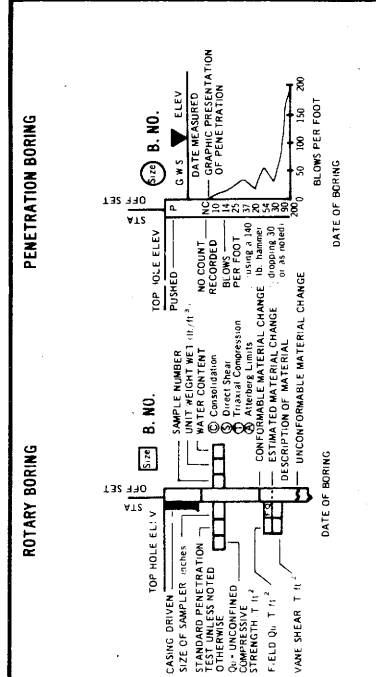
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Enclosures

References

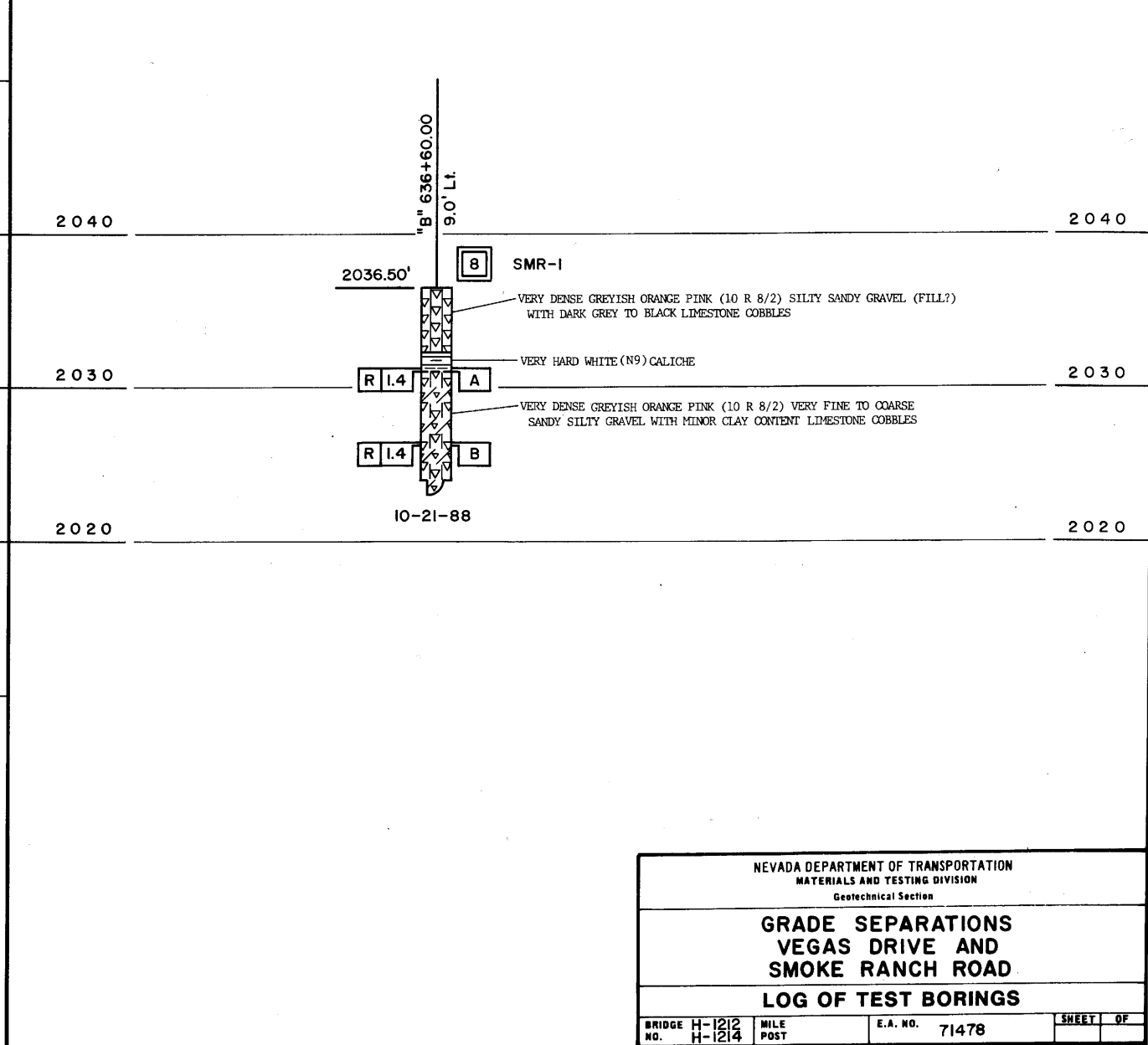
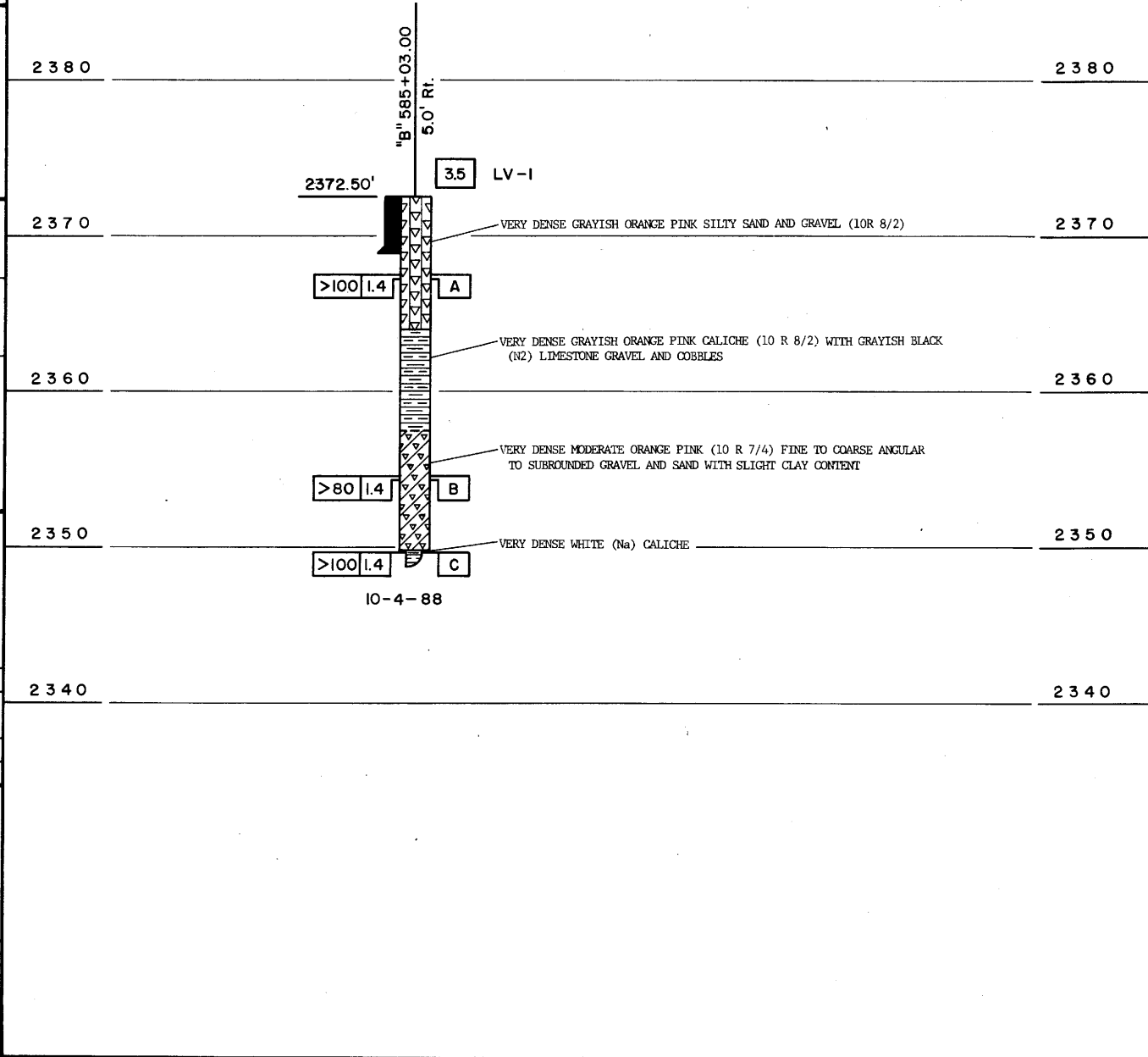
1. Bell, John W., "Bulletin 95 - Subsidence in Las Vegas Valley", Nevada Bureau of Mines and Geology, Reno, Nevada, 1981
2. Converse Davis Dixon Associates, "Alluvial Material Evaluation -- Rainbow Boulevard Between Vegas Drive and Smoke Ranch Road, Las Vegas, Nevada", Las Vegas, Nevada, 1976
3. Matti, Jonathan C. et al, "Map 3Dg -- Geologic Map of Las Vegas NW Quadrangle", Nevada Bureau of Mines and Geology, Reno, Nevada 1987.
4. Varnum, Nick C., "Open File Report 87-7 - Results of Leveling Across Fault Scarps in the Las Vegas Valley, Nevada", Reno, Nevada, 1987

E71478-021



STANDARD PENETRATION CLASSIFICATION		CLAYEY SOIL	
GRAVELLY SOIL	CLAYEY SOIL	BLOWS/FT. * CONSISTENCY	
0-4	0-1	VERY LOOSE	VERY SOFT
5-10	2-4	LOOSE	SOFT
11-24	5-8	MEDIUM DENSE	MEDIUM STIFF
25-50	9-15	DENSE	STIFF
51-100	16-30	VERY DENSE	VERY STIFF
101-150	31-60	HARD	HARD
151-200	OVER 60	VERY HARD	VERY HARD

THE UNIFIED SOIL CLASSIFICATION SYSTEM		DESCRIPTION	
LETTER SYM	LETTER SYM	MAJ. DIV.	DESCRIPTION
ML	ML	SILTS AND CLAYS LL < 50	INORGANIC SILT AND VERY FINE SAND WITH SLIGHT PLASTICITY
CL	CL	SILTS AND CLAYS LL > 50	CLAYEY SILT AND SILTY CLAY
OL	OL	FINE GRAINED MATERIAL	ORGANIC SILT AND ORGANIC SILTY CLAY OF LOW PLASTICITY
MH	MH		INORGANIC SILT, MICACEOUS OR SILTY SILT, OR SILTY CLAY OF HIGH PLASTICITY
CH	CH		ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY
OH	OH		PEAT AND OTHER HIGHLY ORGANIC SOILS
PT	PT		PEAT AND OTHER HIGHLY ORGANIC SOILS
CE	CE		CALICHE



FED. RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA		CLARK	BL-

NOTE: FOUNDATION REPORT AVAILABLE FOR CONTRACTORS STUDY IN DISTRICT OFFICE AND MATERIALS & TESTING DIVISION

NEVADA DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTING DIVISION
Geotechnical Section

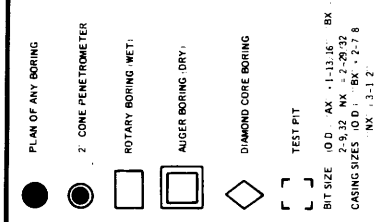
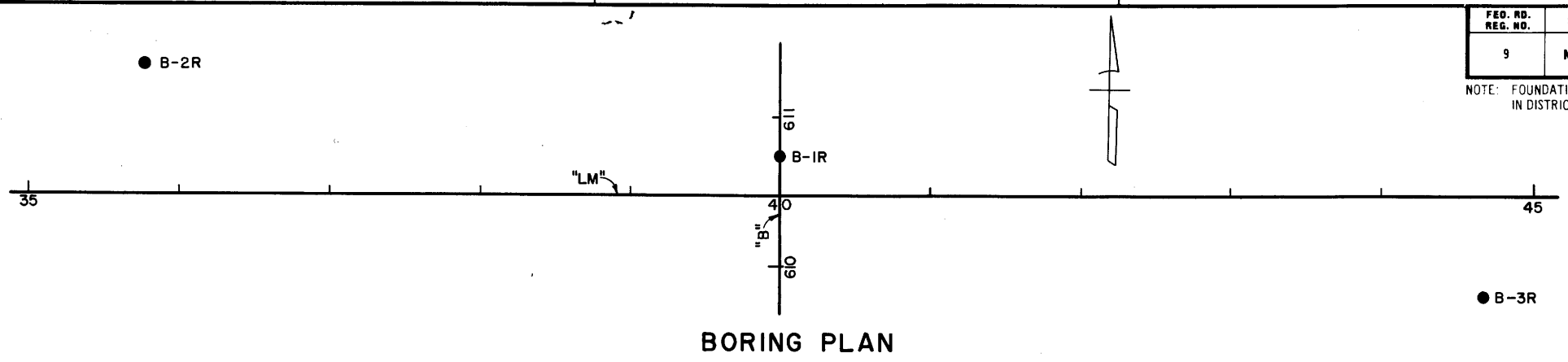
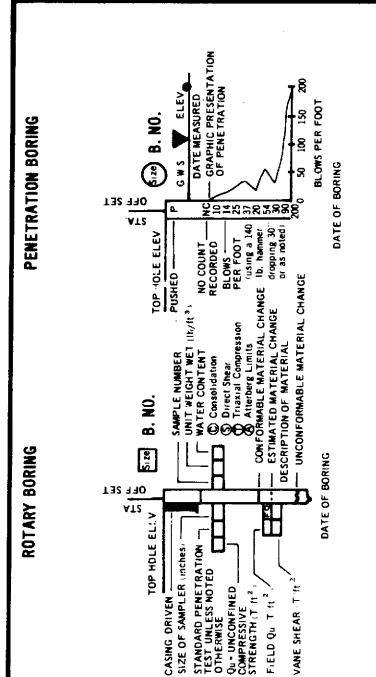
**GRADE SEPARATIONS
VEGAS DRIVE AND
SMOKE RANCH ROAD**

LOG OF TEST BORINGS

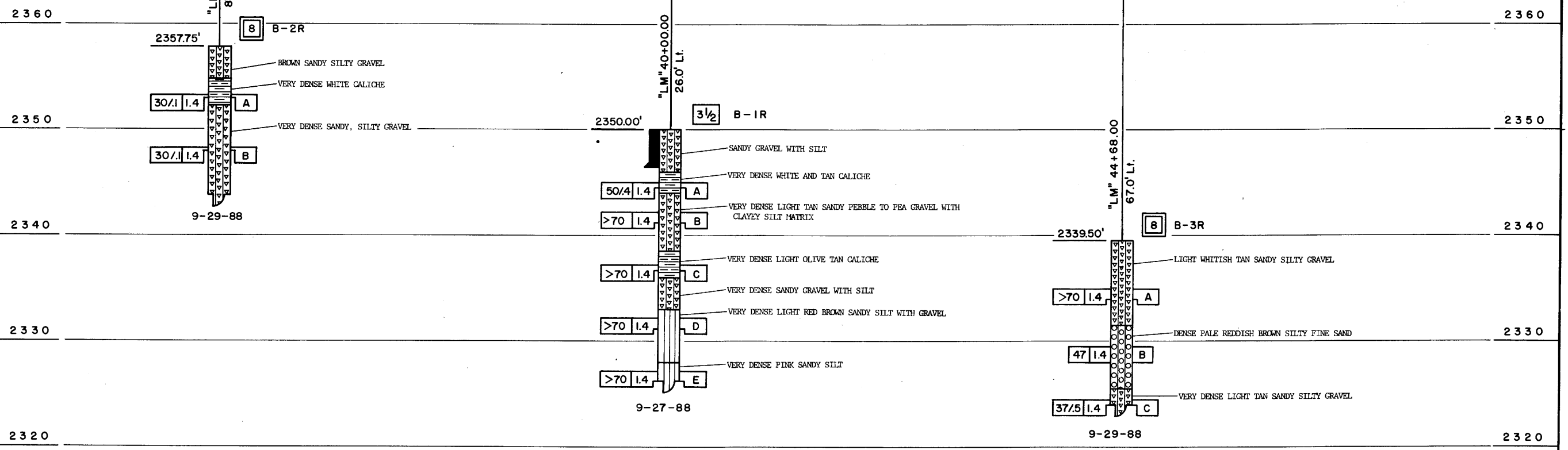
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FED. RD. REG. NO.	STATE	PROJECT NO.	COUNTY	SHEET NO.
9	NEVADA		CLARK	BL-

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THE UNIFIED SOIL CLASSIFICATION SYSTEM		STANDARD PENETRATION CLASSIFICATION		CLAYEY SOIL	
LETTERSYM	DESCRIPTION	LETTERSYM	DESCRIPTION	BLOWS/FT. *	CONSISTENCY
ML	INORGANIC SILT AND VERY FINE SAND	CL	CLAYEY SILT	0-1	VERY SOFT
CL	CLAYEY SILT	OL	ORGANIC SILT	2-4	SOFT
OH	ORGANIC SILT AND CLAYEY SILT	MH	MEDIUM STIFF CLAYEY SILT	5-8	MEDIUM STIFF
CH	CLAYEY SILT	CH	CLAYEY SILT	9-15	STIFF
OH	ORGANIC SILT	OH	ORGANIC SILT	16-30	VERY STIFF
PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	31-60	HARD
CE	CLAYEY SILT	CE	CLAYEY SILT	OVER 60	VERY HARD



NEVADA DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTING DIVISION
Geotechnical Section

LAKE MEAD INTERCHANGE

LOG OF TEST BORINGS

BRIDGE NO. I-1213	MILE POST	E.A. NO. 71478	SHEET OF
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