

M E M O R A N D U M

To: Tim Allison
Project Manager
Design A-2
(M.S. D1)

Date: January 12, 1993

File: 11-SD-5
R31.8/R35.0
11-030111

From : DEPARTMENT OF TRANSPORTATION - DISTRICT 11
GEOTECHNICAL SECTION

Subject: MEMO IN LIEU OF MATERIALS REPORT

Project Description

The existing freeway on Interstate 5 between the I-5/I-805 junction and the I-5/Del Mar Heights interchange will be widened with additional freeway lanes and an interchange consisting of a series of bridges and long modernized curve connectors between I-5 and the join with State Route 56 to the east which is presently under construction. The existing diamond interchange at Carmel Valley Road will be replaced by the new construction.

Previous Reports and Investigations

Due to the complexity of this project there have been numerous reports issued with the major aspects of the geotechnical engineering recommendations having been provided by the Geotechnical Section of NTM&R.

The reports referenced below are applicable for the project:

Preliminary

- Project Report, 11-SD-5, PM R29.6/R35.0 and 11-SD-805, PM 27.3/28.3, 11-030100, 12-1-86, District 11 Design

Geotechnical/Geologic/Structures

- Slope Recommendations, 11-SD-5, PM 33.8-36.1, 6-22-88, District 11 Materials Lab
- Foundation Soil Analysis, 11-SD-5/56, 11-030111, 12-1-88, District 11 Materials Lab
- Preliminary Materials Report, 11-SD-5, PM R31.8/R35.0, 11-030111, 4-24-90, District 11 Materials Lab
- Geologic Review of Sculptured Cut Slopes, 11-SD-5/56, PM 31, 11-010051, 3-7-91, District 11 Materials Lab

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- Work Responsibility, 11-SD-5/56 Interchange, 11-030111, 7-11-91, OGE, NTM&R
- Approach Embankments, 11-SD-5, R31.8/R35.0, 11-030111, 3-24-92, District 11 Materials Lab
- Preliminary Design for Mitigating Liquefaction Potential, 11-SD-5/56 Interchange, 11-030111, dated 6-22-92, OGE, NTM&R
- Liquefaction Potential 5/56 Interchange, 11-SD-5/56 IC, 11-030111, OGE, NTM&R
- Foundation Recommendations (6 Reports), 11-SD-56, PM 0.00, 11-SD-56, PM 0.02, 11-SD-5, PM R32.72, 11-SD-5, PM 32.88, 11-SD-5, PM R32.72, 11-SD-5, PM R32.88, 9-18-92, OEG-South
- Stone Column Design for Mitigating Liquefaction Potential, 11-SD-5/56 IC, 11-030111, 10-2-92, OGE, NTM&R
- Foundation Study for Earth Retaining Structure, 11-SD-5, R31.8/R35.0, 11-030111, OGE, NTM&R
- Stone Pile Island Construction Sequence, 11-SD-5, PM R31.8/R35.0, 11-030111, 11-12-92, District 11 Design
- Subsurface Drainage System, 11-SD-5, R29.7/R35.0, 11-030111, 11-17-92, District 11 Materials Lab
- Earth Retaining Structure Design, 11-SD-5, R31.8/R35.0, 11-030111, 12-16-92, OGE, NTM&R

Structural Section

- Structural Section Recommendations, 11-SD-5, R31.8/R35.0, 11-030111, 4-14-92, District 11 Materials Lab
- Detour Structural Section Recommendations, 11-SD-5, R31.8/R35.0, 11-030111, 8-11-92, District 11 Materials Lab
- Structural Section Recommendation for Superelevation Correction, 11-SD-5, R31.8/R35.0, 11-030111, 8-21-92, District 11 Materials Lab

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- Alternate Structural Section, 11-SD-5/56, R29.7/R35.0, 11-030111, 11-16-92, District 11 Materials Lab

Corrosion

- Corrosion Element, 11-SD-5, 31.8/35.0, 11-030111, 6-5-92, District 11 Materials Lab

Foundations and Embankments

The major feature of this project is the proposed interchange with its long curve connectors between the I-5 and SR 56 freeways. The interchange will be located primarily in a tidal flat area within the influence of fault lines. The results of previous studies indicate a high potential for liquefaction. In order to mitigate the liquefaction potential, stone columns have been recommended at approach embankments to provide foundation stability. As outlined in a memo dated July 11, 1991, the responsibility for the geotechnical report for this project is that of the Office of Geotechnical Engineering, NTM&R, which includes the approach embankments. The Office of Engineering Geology is responsible for the foundation report.

A report dated June 22, 1991 from the Office of Geotechnical Engineering indicated that 2:1 slope ratios are recommended for all fill locations for the proposed interchange. Further, the report stated embankment heights of less than 15 feet would not require ground modification.

According to the Foundation Reports dated September 18, 1992, the approach fills will be constructed to a maximum height of about 40 feet. A surcharge of 10 feet is recommended for a 120 day time period or until the settlement is less than 1/4 inch over 10 consecutive days. It is our understanding that surcharge fills will be placed in the "plug" areas between approach fills as shown on the Contract Plans.

Cuts and Excavations

From Design estimates as of January 11, 1992, the project will involve 490,000 cubic yards of excavation and 420,000 cubic yards of fill. The fill quantity includes the backfill for the proposed earth retaining structure West of I-5. Surcharge quantity is not included.

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Except for the area right of the "SD" line from Station 680 to 700+-, the cut slope ratios will be 2:1. The area between Stations 680 to 700+- will vary from 10:1 to 1:1 within the planned contour grading area.

Grading Factor

Based on the review of the 1961 and 1964 Material Reports, it is our opinion that the overall grading factor for the project should be 0.99. This is based on using a grading factor of 1.00 for the excavation area between Stations 680 to 700 +- "SD" for the Torrey Sandstone type material and a grading factor of 0.98 for the other excavation areas.

Based on a 1 percent shrinkage factor the excess material will decrease from 70,000 cubic yards to about 65,000 which will be disposed of within the project limits.

Corrosion Investigation

Inspection of existing culverts and corrosion testing indicates that the environment exhibits a low corrosion potential with respect to galvanized CSP and reinforced concrete culverts. The extreme test values preclude the use of aluminum or aluminumized-steel culverts.

Project soils tested were slightly acidic with an average pH of 5.8 and a range of 4.5 to 7.4. Resistivities were generally very high, averaging 7500 Ohms-Cm. and varied from 1000 to 19900 Ohms-Cm. With resistivities greater than 1000 Ohms-Cm, the soils are presumed to have chlorides less than 500 Mg./Lt. and sulfates less than 2000 Mg./Lt. and are therefore non-corrosive to reinforced concrete pipe. (The test results are presented in the attached Table A.)

Existing culverts, downdrains, and sidedrains were inspected and are in very good condition considering their 26+- year age. Very little corrosion product or invert abrasion wear was observed. Existing galvanized CSP observed was 14 (0.079") or 16 (0.064") gauge.

Recommendations

1. As per CTM 643, the condition of existing CSP supersedes design by corrosion test results. Therefore, galvanize CSP should match the "as-builts" gauge, but in no case should they be thinner than 16 gauge (0.064"). Except for sidedrains, we also recommend that the CSP be bituminous coated on the soil side to counteract the acidic soil conditions.

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2. Reinforced Concrete Pipe should use the standard mix design and have a minimum one inch concrete cover over rebar on the soil side.
3. Plastic Pipe Culverts meeting the cover height requirements could also be used. Either Corrugated Polyethylene (Type S), Ribbed Profile Wall Polyethylene, or Ribbed Profile Wall Polyvinyl Chloride pipe can be used.

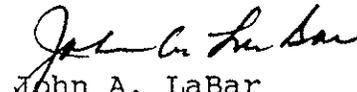
The corrosion investigation is based on field inspection of existing culverts and corrosion testing performed on the existing culvert foundation soils and the soils from the proposed borrow area, Stations 687+- - 1082+- "SD" (Line Equation: $711+49=1075+10$). Any other sources of imported borrow must be sampled and tested for corrosion to confirm design. The following Table A contains corrosion test results and locations.

Structural Section Design

As indicated in the Previous Reports and Investigation Section, there are 4 separate structural section recommendations. The major structural section recommendations are as referenced in Tables 1 through 4. It should be noted that the R-values used in design varied based on values from the 1964 Supplemental Materials Report. An R-value of 60 was used for the material that will be excavated from the cut section between Stations 680-700+- "SD." This material is indicated as Select Material in the Structural Section Design Tables.

The other memos regarding structural section design are included and are referenced by dates of August 11, 1992, August 21, 1992 and November 16, 1992.

If there are any questions regarding the items we have addressed in this memo, please contact me at 688-6869, Fax 688-6097.


John A. LaBar
District Geotechnical Engineer

JLB:es
cc: DRSchmoltd (S1)
SCraig (DA)
TBouquin (2) (D1)
LEdmonds (D1)
HJones (NTM&R-Headquarters)
PFile





Table A

CORROSION TESTING
11-SD-5/56 PM R31.8/R35.0
11-030111

Station	Line	Offset-Foot	Elevation Interval	Use Code	pH Units	Resist. Ohms-Cm	Chloride Mg./Kg.	Sulfate Mg./Kg.
685+00	SB	20 Lt.	93-94	O	6.0	1000		
689+50	SB	20 Lt.	79-80	O	5.4	2500		
700+80	NB	25 Rt.	67-68	I	5.9	5100		
708+05	NB	5 Lt.	53-54	O	7.0	5650		
1153+15	SD	81 Rt.	174-175	O	7.4	5200		
690+50	SD	115 Rt.	99-100	SM	4.5	1075	150	100
689+30	SD	267 Rt.	169-170	SM	6.6	19200		
690+00	SD	185 Rt.	139-140	SM	4.8	3490		
693+90	SD	283 Rt.	169-170	SM	5.0	11700		
695+00	SD	145 Rt.	109-110	SM	5.0	19900		
			MINIMUM		4.5	1000		
			MAXIMUM		7.4	19900		
			AVERAGE		5.8	7482		
			STD. DEV.		1.0	7050		

USE CODES:

- O = Streambed Sample at Existing Culvert Outlet.
- I = Streambed Sample at Existing Culvert Inlet.
- SM = Select Material Sample from Cutslope, Sta. 687-700

TABLE 1

11-SD-5 PM R31.8/R35.0
 11205-030111
 APRIL, 1992

AUXILIARY LANE, LINE "SD"

STRUCTURAL SECTION DESIGN - FT.

LOCATION OR LINE	R-VALUE DESIGN	TRAF. INDEX	PCC	AC SURF.	ACB	LCB OR ACB	AB	SM*	TOTAL THICK.	REMARKS
AUX. LANE, Station 688+50 to 1087+60 "SD":	10	14.5	0.85			0.50		1.65	3.00	Line Eq.: 711+49 BK =1075+10 AH "SD".
AUX. LANE, Station 1111+00 to 1126+00 "SD"	30	14.5	0.85			0.50		0.70	2.05	SM* = Select Material from cutslope exc.
Outside Shoulder: Alternate 1	30	9.0		0.45			0.45	0.70	1.60	RV=60 Min.
Alternate 2	30	9.0		0.15	0.30		0.45	0.70	1.60	
AUX. LANE, Station 1126+00 to 1178+00 "SD"	10	14.5	0.85			0.50		1.65	3.00	R-Value design from 1964 Supplemental Materials Report.
Outside Shoulder: Alternate 1	10	9.0		0.45			0.45	1.25	2.15	
Alternate 2	10	9.0		0.15	0.30		0.45	1.25	2.15	
AUX. LANE, Station 1178+00 to 1200+00 "SD"	60	14.5	0.85			0.50			1.35	
Outside Shoulder: Alternate 1	60	9.0		0.45			0.35		0.80	
Alternate 2	60	9.0		0.15	0.30		0.35		0.80	

TABLE 3

11-SD-5 PM R31.8/R35.0
 11205-030111
 APRIL, 1992

LINES "NE", "WS", "CVS", "CV1" & "FS1"

STRUCTURAL SECTION DESIGN - FT.

LOCATION OR LINE	R- VALUE DESIGN	TRAF. INDEX	PCC	AC SURF.	ACB	LOB OR ACB	AB	SM*	TOTAL THICK.	REMARKS
MAIN LANES										
Lines "NE" & "WS":	10	12.5	0.85			0.50		1.65	3.00	SM* = Select Material from cut slope exc.
Outside Shoulders:										
Alternate 1	10	8.0		0.60				1.05	1.65	RV=60 Min.
Alternate 2	10	8.0		0.40			1.35		1.75	
Alternate 3	10	8.0		0.40			0.40	1.05	1.85	
Inside Shoulders:										
Alternate 1	10	10.0		0.75				1.35	2.10	
Alternate 2	10	10.0		0.15	0.60			1.35	2.10	
Alternate 3	10	10.0		0.50			0.55	1.35	2.40	
RAMP LINE "CV1":	**	**		0.35			0.55	1.60	2.50	** = Approx. matches existing section.
RAMP LINE "FS1":	**	**		0.30			0.50		0.80	

M e m o r a n d u m

To : John O'Brien
Design A
(M.S. DA)

Date: November 16, 1992

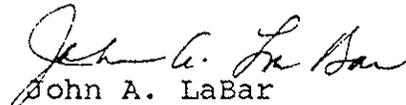
File: 11-SD-5, 56
R29.7/R35.0
11-030111

From : DEPARTMENT OF TRANSPORTATION - District 11
GEOTECHNICAL SECTION

Subject: ALTERNATE STRUCTURAL SECTION

In accordance with your request dated November 11, 1992, the Caltrans equivalent structural section as compared to the City of San Diego's Schedule J (ADT 1200, 2.5" AC-10" CTB, TI=6.0) would be 0.25' AC over 1.05' of AB Class 2. The structural sections are based on R-values between 10 and 19.9 for the City and 10 for Caltrans.

If there are any questions, please call me at 688-6869.



John A. LaBar
District Geotechnical Engineer

JLB:es
cc: DRSchmoldt (S-1)
T Allison (D1)
PFile

WSV 



Memorandum

To : TIM ALLISON (MS D-1A)
Attention : Tom Bouquin

Date: August 21, 1992

File: 11-SD-5
R31.8/R35.0
EA 030111

From : DEPARTMENT OF TRANSPORTATION - District 11
MATERIALS LAB - Geotechnical Section

Subject: STRUCTURAL SECTION RECOMMENDATION FOR SUPERELEVATION CORRECTION

This memorandum is in response to your telephone request for a recommendation regarding the area on I-5 where the profile grade of the existing PCC pavement must be raised in order to match the new profile grade of the new Carmel Valley Creek Bridge, BR 57-0590.

The replacement of the two existing structures with a single structure will require raising the PCC profile grade from 0' to approximately 0.6' above the existing PCC lanes at both abutments of the new bridge.

It is our recommendation to remove the existing PCCP and CTB-A layers within the area where the proposed profile grade differs from the existing profile grade. The PCC pavement layer should be replaced with new PCC of the same thickness. ACB is recommended in lieu of CTB-A. Use 0.35' ACB in the #1 & #2 lanes and 0.40' ACB in the #3 & #4 lanes. The thickness of Select Material will increase accordingly with the increase in the profile grade.

If you have questions or comments about this subject, I can be reached by telephone at 688-2546 or by FAX at 688-6097.



David Evans
Roadbed Design Engineer

cc:DRSchmoldt (MS S-1)
EJNyhammer (MS D-1A)
DEvans
MKnight
File - 030111.SS2

JLB 

WSV 



Memorandum

To : TIM ALLISON (MS D-1A)
Attention : Tom Bouquin

Date: August 11, 1992

File: 11-SD-5
R31.8/R35.0
EA 030111

From : DEPARTMENT OF TRANSPORTATION - District 11
MATERIALS LAB - Geotechnical Section

Subject: DETOUR STRUCTURAL SECTION RECOMMENDATIONS

In response to your request dated August 6, 1992, the following detour structural section recommendations are submitted to you for the above project. The Traffic Indices (TI) and the basement soil R-values are based on the Structural Section Recommendation Memorandum from John La Bar to Tim Allison, dated April 14, 1992. Specific information is provided with the recommendation for each detour location.

RECOMMENDATIONS

1) SB-5 Detour, Main Lane Shift & NB-5 Detour, Main Lane Shift:

Main Lanes

<u>Alt #</u>	<u>TI</u>	<u>R-Val</u>	<u>AC</u>	<u>AB (Cl 2)</u>	<u>AS (Cl 4)</u>
1	10.0	30	1.05'	-----	-----
2	10.0	30	0.50'	1.20'	-----
3	10.0	30	0.50'	0.55'	0.75'

Outside Shoulder

1	6.5	30	0.65"	-----	-----
2	6.5	30	0.30'	0.75'	-----
3	6.5	30	0.30'	0.35'	0.45'

Inside Shoulder

	0.20'	0.50'	-----
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2) City Street Detours ("OLD ECR" & "SVR"):

0.20' 0.50' -----

3) Ramp Detours ("CV2" & "CV3"):

Full Width Structural Section

<u>Alt #</u>	<u>TI</u>	<u>R-Val</u>	<u>AC</u>	<u>AB (CI 2)</u>	<u>AS (CI 4)</u>
1	8.0	30	0.80'	-----	-----
2	8.0	30	0.40'	0.90'	-----
3	8.0	30	0.40'	0.40'	0.55'

The above recommendations have been designed with a subgrade R-Value of 30. Any borrow material placed in embankment areas of these detours should have a minimum R-Value of 30. If material with an R-Value of less than 30 is used, then new structural section alternatives will have to be designed based on the in-place R-Value of the imported material.

Placement and compaction of embankment materials should be in accordance with the provisions in Section 19, "Earthwork", of the Standard Specifications.

If you have questions or comments about this subject, I can be reached by telephone at 688-2546 or by FAX at 688-6097.

David S. Evans

David Evans
Roadbed Design Engineer

cc:DRSchmoldt (MS S-1)
EJNyhammer (MS D-1A)
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File - 030111.SS2
JLB *JLB*
WSV *WSV*

