INFORMATION HANDOUT COVER sheet: Use for IH cover. Delete, replace, or add text to match the titles of the Information Handout contents. Use if supplemental project information includes an IH. Include cover if changes are made to IH due to addendum.

INFORMATION HANDOUT

INSERT: contract number ending in phase number 4. Road includes District–County–Route–Post Mile. Project ID phase number 1.

For Contract No. 12-0P2504

At 12-Ora-405-3.7/3.9

Identified by

Project ID 1215000058

MATERIALS INFORMATION

Material Report for University on ramp to SB 405 Freeway, Irvine, Orange County

Material Report Supplemental

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Serious Drought!
Help Save Water!

To: **Matthew Cugini**
Branch Chief, Design C

Date: July 27, 2015
File: 12-Ora 405
PM 3.7/ 3.9
EA: 0P2501
Materials Letter Report

From: **BAHMAN PANAH**
Materials and Research Branch

Subject: **University on ramp to SB 405 Freeway, Irvine, Orange County**

Per your request on May 4, 2015, Materials and Research (M&R) Branch has prepared Materials Letter Report (MLR) for the above-referenced project.

This report provides pavement design and materials recommendations in accordance with Topic 114 of Highway Design Manual (2013).

1.0 Introduction

It is proposed to widen the University on ramp to SB I-405 to increase the ramp storage capacity.

2.0 Existing Facility

The existing SB University Drive on-ramp has a single lane, then expanding into two lanes which causes traffic back up into the local street.

Proposed Project Improvement

The proposed improvements consist of widening the on-ramp with an additional lane and shoulder to increase the storage capacity that is needed on the ramp to prevent the back up of traffic onto the local street

4.0 Traffic Index

A Traffic Index $TI_{20}=12$ has been used for the Ramp per HDM.

5.0 Subsurface and Groundwater Conditions

The purpose of this investigation was to obtain samples from the subgrade soils for laboratory testing. Details of laboratory testing are discussed in Section 9. Drilling was conducted in the shoulder in areas where proposed widening is planned. Groundwater was not detected in any of our coring and we have no information regarding the groundwater elevations in this area.

6.0 Earthwork

6.1 General Earthwork Requirements

All earthworks shall conform to requirements of Section 19 of Caltrans May 2010 edition of Standard Specifications, and project Special Provisions. Compaction of soils shall be conducted in accordance with Section 19-5 of the Caltrans Standard Specifications. Any temporary sloping, sheeting and shoring shall be made at the Contractor's responsibility. Appropriate measures shall be taken to prevent damage to adjacent structures and utilities. It should be noted that it is the responsibility of the Contractor to oversee the safety of the workers in the field during construction. The Contractor shall conform to all applicable occupational safety and health standards, rules, regulations, and orders established by the State of California.

6.2 Construction Observation and Testing

It is recommended that inspection and testing be performed and documented during the following stages of construction:

- Grading operations, including overexcavation and cut.
- Removal of existing shoulder, structural sections and dikes.
- Preparation of pavement subgrade.
- Placement of aggregate base and subbase.
- Placement of Pavement sections.
- When any unusual conditions are encountered.

It is imperative that special attention be given to mix design and compaction requirements. A copy of the approved mix design (field samplings/ laboratory test results) for Asphalt Concrete (AC) and summary of all field compaction records (AC, ACB, AB, AS and subgrade) with all field temperature measurements shall be provided to our office at the conclusion of the construction activities and project closeout.

7.0 Existing Pavement Sections

Our field investigation was performed on May 11, 2015, and consisted of conducting two cores (SB-1 and SB-2) on the shoulder of the University Drive on ramp. The purpose of the core was to obtain representative samples from the subsurface soils. Two bulk samples collected were sent to Southern Regional Laboratory in District 8. Coring of pavement section and base layer was conducted at both locations. Our core data is limited to a depth of 5 feet below the existing grade. The purpose of these cores were to measure the thickness of each pavement layer and to evaluate the condition of the cores, presence of water and any drainage layer (ATPB, or CTPB) below the pavement, as well as obtaining representative sample of subsurface soils for laboratory testing. Table 1 presents summary of core data as found during coring and Table 2 presents summary of test results. Two cores had different kind of base, one core shows the base as 0.5 feet old HMA (Road Mixed Cement Treated Base, RMCTB) and 0.5 feet Cement Treated Base (CTB) on AB, but the second core shows only Aggregate Base. It appears that the existing pavement is:

0.1 feet HMA-O, 0.2 feet RHMA-G, 0.5 feet RMCTB, 0.5 feet CTB on AB

8.0 Laboratory Testing

The following laboratory tests were performed on each sample collected from the boring:

- Sieve Analysis (CTM 202)
- Mechanical Analysis (CTM 203)

- Atterberg Limits (CTM 204)
- Sand Equivalent (CTM 217)
- R-Value (CTM 301)
- Expansion Index (UBC 29.2)
- Resistivity and pH (CTM 643)

Table 2 presents summary of laboratory test results from samples taken.

TABLE 1- CORE DATA

Core No.	RHMA-O, feet	RHMA-G, feet	HMA, feet	Old HMA, feet	Base type, CTB, feet	Base type, AB
SB-1	0.1	0.2	0.5	0.5	0.4	_
SB-2	0.1	0.2	0.5	_	_	AB

TABLE 2 - SUMMARY OF TEST RESULTS

Core No.	R-value	Expansion Index (EI)	Plasticity Index (PI)	Sand Equivalent (SE)	Resistivity, Ohm-Cm	Ph
SB-1	16	10	8	11	1755>1000	8.97>5.5
SB-2	56	0	NP	18	3252>1000	8.69>5.5

8.1 Corrosion Testing

Soil sample obtained from Boring SB-1 and SB-2 were sent to Southern Regional Lab (SRL) for PH and resistivity testing. Results of laboratory corrosion testing are presented in Table 2.

8.2 Site Corrosion Recommendations

Caltrans Corrosion Guidelines (September 2003), defines a corrosive environment as one where one of the following condition exist at a site, the soil has electrical resistivity of less than 1000 Ω-cm, pH of less than 5.5, sulfate content of greater than 2,000 ppm, chloride content of greater than 500 ppm. Only samples with electrical resistivity of less than 1000 ohm-cm will be sent to Headquarters for chloride and sulfate content testing in accordance with CTM 422, and CTM 417 respectively. Results of laboratory corrosion test indicate that the site is non-corrosive.

9.0 Recommendations

The following alternatives is recommended based on TI value of 12. The same structural section is recommended for the shoulder area to compensate for wheel off tracking of heavy trucks on the shoulder area.

Alternative 1:

0.1 feet HMA- O, 0.65 feet HMA (Type A)/ 0.65 feet AB (Class 2)/ 0.9 feet Class 3 AS

Alternative 2:

0.1 feet RHMA-O, 0.2 feet RHMA-G, 0.45 feet HMA (Type A),0.65 feet AB Class 2/0.9 feet Class 3 AS

HMA-O, Hot Mixed Asphalt Open Graded, RHMA-O, Rubberized Hot Mixed Asphalt Open Graded
RHMA-G, Rubberized Hot Mixed Asphalt

10.0 Limitations

The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. Soil and subsurface conditions encountered in the exploratory borings is presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. District Materials and Research Branch should be notified of any pertinent changes to the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained in this report are applicable to the specific design element(s) and location(s) which is (are) the subject of this report. They have no applicability to any other design elements or to any other locations and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of the District Materials and Research Branch.

11.0 Recommended Materials Specifications

The following requirements shall be included in the project specifications:

- Prior to the placement of pavement widening section on native soils, the native soils within upper 4 feet to the finished grade shall be tested and verified to have a minimum R-value as required in Table 3. The native soils shall be non-corrosive to metal and concrete and have an expansive index (EI) of less than 31 or plasticity index of less than 12. If the existing native soils within upper 4 feet to the finished grade is determined to be not meeting the above requirements, the existing native soils shall be over-excavated and replaced with imported borrow to meet the imported fill recommendations herein. Borrow materials shall conform to Section 19-7.02 of Caltrans Standard Specifications (2010).

- For pavement widening section on imported fill areas, the engineering fill within the upper 4.0 feet to the finished grade shall have an R-value of at least 40. The imported fill be non-corrosive to metal and concrete and have an expansive index (EI) of less than 31 or plasticity index (PI) of less than 12. Non-corrosive requirements shall be based on Caltrans Corrosion Guidelines (2003).

- Prior to the placement of pavement sections, the subgrade soils shall be compacted in accordance with Section 19-5.03 of Caltrans Standard Specification (2010)

- Saw cut and remove the existing shoulder consisting of AC, CTB and AB. The AC pavement shall be saw cut to full depth.

- HMA shall be Type "A", Aggregate Base (AB) shall be class 2 and Aggregate Sub-base (AS) shall be Class 3. Proper tests shall be performed to ensure moisture sensitive aggregates are not used for HMA mix design.

- It is imperative that special attention is given to the mix design, compaction and temperature requirements for flexible pavement as stated in Caltrans Standard Specifications and Project Standard Special Provisions (SSPs).

- The prime coat and tack coat applications and requirements shall follow Sections 39-4.02 of the Caltrans Standard Specifications.

- Specifications are required for asphalt pavement treatment by applying prime coat on AS prior to the placement of AC.

- Tack coat shall be applied to all vertical faces of existing pavement, curbs, gutters and construction joints in the surfacing against which additional material is to be placed, to a pavement to be surfaced and to other surfaces designated in the Special Provisions.

- All Standard Special Provisions (SSPs) to be included in the project shall be submitted to the Materials and Research Branch for review and approval.

1) Roadway Items, and Earthwork:

   a) The AC pavement shall be saw cut to full depth (to provide a neat and straight pavement break). The existing shoulder shall be saw cut within one foot (1ft) distance from the edge of gutter. The join between the existing pavement and the new pavement shall be sealed. The tack coat applications and requirements shall follow Sections 39-1.03 C(6) of the Standard Specifications (Revised 07/18/2014 - http://www.dot.ca.gov/hq/esc/oe/construction_standards.html). Tack Coat shall be also applied to all vertical faces of existing curbs, gutters and construction joints in the surfacing against which additional material is to be placed, to a pavement to be surfaced and to other surfaces designated in the Special Provisions. Spreading and compacting of HMA shall follow section 39-1.11 of Standard Specifications and any applicable revised sections.

   b) Prior to the placement of pavement sections, the subgrade soils shall be compacted in accordance with Section 19-5.03 of Standard Specification (Revised).

   c) Furthermore as the HMA section is relatively impermeable, any moisture penetrating below surface is very minimal. Also considering the ramp's super elevation design and downhill grade any surface water /run-off shall be collected by storm drain outlets. There shall be no standing water.

If you have any questions, please contact Bahman Panah at (949) 724-2180 or Behdad Baseghi at (949) 724 2485.

Prepared by:

Bahman Panah, MS, PE
Materials & Research Branch
Division of Project Delivery
RCE # C61201

Concurred by:

Behdad Baseghi, Ph.D, PE, GE, PMP.
Chief, Materials & Research Branch
Division of Project Delivery
RCE # C47051

Cc: Tam Nguyen, Design
David Lam, Design
File

Lam, David H@DOT

From: Lam, David H@DOT
Sent: Friday, November 13, 2015 9:32 AM
To: Panah, Bahman J@DOT
Subject: RE: 95% PS&E comments for EA 0P2501- University Drive Onramp Widening

Hi Bahman,
Per phone conversation today (11-13-15)
The following section will be used: **0.2 feet RHMA-G, 0.9 feet HMA type A, 0.9 feet AB**

Thanks,

David Lam, P.E.
Project Engineer
Design Branch "C"
CALTRANS-District 12
949-724-2192

From: Panah, Bahman J@DOT
Sent: Friday, November 13, 2015 8:54 AM
To: Lam, David H@DOT
Cc: Baseghi, Behdad@DOT; Cugini, Matthew Q@DOT; Bazargan, Bob@DOT
Subject: RE: 95% PS&E comments for EA 0P2501- University Drive Onramp Widening

Hi David,
Again the OGFC was recommended to match the existing. There probably was a reason they put it there, perhaps a prior safety projects.
As for the section creating sump, that is questionable? It is possible that water gets there, but the existing sections do not have drainage layer or edge drain.
One recommendation would be to use the following section with thicker HMA layer which will be more expensive. I also eliminated the AS.
0.1 HMH-O, 0.2 feet RHMA-G, 0.9 feet HMA type A, 0.9 feet AB
Or we can provide an edge drain which is not very economical for only one lane. We also have had problem with them if not maintained properly and it gets clogged up.
We always provide AS, it is the contractor decision to change it to AB if it more economical. Sometime we have a thick layer of AS to overcome expansive soil.

From: Lam, David H@DOT
Sent: Tuesday, November 03, 2015 1:29 PM
To: Panah, Bahman J@DOT
Subject: 95% PS&E comments for EA 0P2501- University Drive Onramp Widening

Hi Bahman,

Would you please response to Construction comments below.

Thanks,

003	Plans	Sheet X-1	Proposed type 1 section has a proposed open grade surface that serves no purpose and should be deleted.
004	Plans	Sheet X-1	Proposed type 1 section has a proposed depth that will create a sump for water to collect and saturate the subgrade, causing the section to deteriorate. Please modify the section to fix this issue.
005	Plans	Sheet X-1	type 1 section has too many grading planes. Consolidate materials to reduce the cost to construct.
006	Plans	Sheet X-2	Section sta 38+92 to 44+37, proposed type 1 section with open grade material will conflict with the construction of the MVP that does not have

David Lam, P.E.
Project Engineer
Design Branch "C"
CALTRANS-District 12
949-724-2192