

# Memorandum



Date: July 12, 2019  
To: Aaron Brusatori/REY Engineers  
From: Robert Lawrence  
CC: Cory Schiestel/City of Placerville  
Re: Preliminary Pavement Rehabilitation Memo for the Mosquito Road Rehabilitation Project  
Twining Project No. 190399.5

Mr. Brusatori:

Twining Inc. (TWINING) is pleased to present this Preliminary Pavement Rehabilitation Memo for the Mosquito Road Rehabilitation Project. The proposed project limit are from Clay Street to the City limits just east of Wildlife Way. Based upon communications with REY Engineers, Inc., the portion of Mosquito Road from Clay Street to Dimity Lane is a Minor Arterial with a design Traffic Index (TI) of 8.0. The remaining portion of Mosquito Road is a two lane rural road with no shoulder.

## Field Exploration Program and Findings

On May 23, 2019, TWINING performed a total of five pavement cores within the existing travel way lanes of Mosquito Road to observe and measure the existing structural pavement section and identify the type of subgrade soils at those locations. The following table, Table 1 Pavement Core Summary, provides the observed and measured existing pavement types and thicknesses, observed base materials, and subgrade soils.

**Table 1. Pavement Core Summary**

Pavement Core ID	AC Thickness (in.)	AB Thickness (in.)	Notes
C-1	6	9 - 10	Clean processed fill beneath base material
C-2	5 ¾	11 - 12	Clean processed fill beneath base material
C-3	5 ¾	11 - 12	Tensar BX 1100 geogrid below base material over saturated soft fat clay
C-4	3	0	Native soil below AC
C-5	3	0	4" of PCC below AC over native
<u>Notes:</u> AC = asphalt concrete; AB = aggregate base			

Where the original roadway was widened between Clay Street and Hocking Street, it appears that the roadway was widened with a travel way structural section of approximately 6 inches of asphalt concrete over between 10 to 12 inches of base material. The shoulder sections were identified in one of the pavement cores as 3 inches of asphalt concrete over approximately 12 inches of base materials.



As Portland Cement Concrete was identified in one of the pavement core locations between Dimity Street and Wildlife Way portion of the road, TWINING performed additional field exploration work on June 6, 2019 utilizing the City of Placerville's potholing contractor to perform seven (7) shallow potholes to observe and measure the existing structural pavement section and identify the type of subgrade soils at these locations. In all seven of the pothole locations, approximately 2 ¾ to 3 inches of asphalt concrete pavement on native soils were identified.

TWINING also reviewed the potholing data performed by the City of Placerville performed for the waterline replacement project. The potholing data shows that there is approximately 6 inches Portland Cement Concrete (PCC) under 4 inches asphalt concrete pavement which appears to be centered around the middle of the existing roadway and appears to be discontinuous and centered around the centerline of the existing roadway between Dimity Lane and Clay Street.

### **Preliminary Rehabilitation Recommendations**

The following provides potential pavement rehabilitation strategies for the two discrete sections of Mosquito Road.

#### **Mosquito Road from Dimity Lane to the City Limit just south of Wildlife Way:**

The majority of the pavement coring and potholing along this section of roadway identified the existing pavement section as between approximately 2 ¾ to 3 inches of asphalt concrete pavement on native soils. This existing asphalt concrete appeared very aged and brittle when struck with a hammer. Additionally, the existing asphalt in the southern half of this section is severely distressed to the point that it is made up of individual pieces of asphalt concrete in contact with each other and no longer a cohesive uniform pavement.

There was one pavement core (Pavement Core C-4) which identified 4 inches of Portland Cement Concrete but no other Portland Cement Concrete was found. For this section of roadway, Full Depth Reclamation using Cement (FDR-C) is a viable rehabilitation alternative as it will allow the existing materials to be used and correct the cross slope to help eliminate the low areas in the existing roadway. The depth of FDR-C in this section is anticipated to be on the order of 12 inches of treatment with a hot mix asphalt cap anticipated to be between two to three inches in thickness. If rubberized hot mix asphalt is used, the maximum thickness of the rubberized asphalt pavement section should be 0.2 feet (2 ½ inches) as limited by Caltrans guidelines for rubberized asphalt usage.

Any pavement rehabilitation in this portion of the project should include drainage improvements as the majority of the pavement failures on the southern end of this section of the roadway appear to be a result of water infiltration into the subgrade soils and pumping of the existing roadway sections over time.

#### **Mosquito Road from Dimity Lane to Hocking Lane:**

Visual observations of the existing pavement in this section of roadway and from potholing data identified the existing pavement section as between approximately 4 inches of asphalt concrete pavement on native soils. The existing asphalt in this area is severely distressed to the point that it is made up of individual pieces of asphalt concrete in contact with each other and no longer a cohesive uniform pavement. For this section of roadway, Full Depth Reclamation using Cement (FDR-C) is a viable rehabilitation alternative as it will allow the existing materials to

be used and correct the cross slope to help eliminate the low areas in the existing roadway. The depth of FDR-C in this section is anticipated to be on the order of 12 inches of treatment with a hot mix asphalt cap anticipated to be between 2 to three inches in thickness. If rubberized hot mix asphalt is used, the maximum thickness of the rubberized asphalt pavement section should be 0.2 feet (2 ½ inches) as limited by Caltrans guidelines for rubberized asphalt usage.

Any pavement rehabilitation in this portion of the project should include drainage improvements as some of the pavement failures on this section of the roadway appear to be a result of water infiltration into the subgrade soils and pumping of the existing roadway sections over time.



#### Mosquito Road from Hocking Lane to Clay Street:

There were two distinct pavement sections identified along this section of roadway based upon visual observations and pavement core/pothole data. These sections are asphalt concrete over base materials and asphalt concrete over Portland Cement Concrete. From the coring and potholing data, it appears the majority of the outside travel lanes and shoulders are asphalt concrete over a base material. Portions of the median and potentially a portion of the southbound lane were identified to have asphalt concrete over Portland Cement concrete pavement. Due to the severe surface distress of the of existing roadway surface, it is difficult to visually delineate the Portland Cement concrete by mapping reflective cracking of the concrete slabs.

For the rehabilitation of this portion of Mosquito Road, we suggest the following methods which can be applied to this section of roadway:

- For any areas without Portland Cement concrete, FDR-C is a viable option to rehabilitate the existing roadway. This includes the travel lanes and shoulder pavements from Clay Street up to Hocking Lane, and any median pavements without Portland Cement concrete beneath. For this option, we anticipate the depth of treatment to be on the order of 12 to 14 inches to account for the removal of a portion of the mixed materials to allow the placement of a hot mix asphalt concrete cap section and not raise the roadway profile. Additionally, this depth of treatment should keep the mixed materials within the existing identified asphalt concrete and aggregate base sections without going into the native base materials. Pre-pulverization can be performed prior to actual mixing with cement to perform the grading and removal of excess material and can be compacted in place to allow temporary traffic placement.
- A non-structural overlay or grind and replace (mill-n-fill) can be performed over this section of roadway. We evaluated three options for this type of rehabilitation and they are presented below:
  - A 2 ½ inch mill and replace with a gap-graded RHMA-G. This does not raise the existing profile of the roadway.
  - A 1 ¼ inch mill and replace with a 2 ½ inch gap-graded RHMA-G taper grinding the shoulder pavement to match existing lip of gutter. This will raise the profile slightly.
  - A 2 ½ inch overlay with a gap-graded RHMA-G tapering grinding the shoulder pavement to match existing lip of gutter. This will raise the existing profile.

1572 Santa Ana Ave  
Sacramento CA  
95838

Tel 916.649.9000  
Fax 916.921.8532



For all three of these options, the mill depth should be limited to 2 inches within the existing shoulder areas as the measured existing AC thickness in this area is 3 inches.

- These options are non-structural as no deflection testing was performed which is required to determine the existing structural section design properties. Saying this, the greater the thickness of the final structural section (existing AC plus new HMA), the longer the life and better performance the rehabilitated pavement will exhibit.
- Within both travel lanes, there are areas of existing pavement which should require a full depth digouts and replacement with full depth hot mix asphalt concrete along with areas which require crack sealing prior to the new pavement placement. A majority of these areas requiring full depth digouts and crack sealing generally follow existing utility trenches and where different pavement sections were placed adjacent to each other.
- The use of a Geosynthetic Paving Interlayer (GPI) can be placed beneath the new asphalt to aid in retarding reflective cracking of the new pavement. However, if RHMA-G is used, we feel the GPI will not add sufficient benefit to justify the cost of construction.

We thank you and the City of Placerville for this opportunity to prepare this study and if you have any questions or wish to discuss anything in greater detail, please contact us at 916.649.9000 or at 916.872.3661.