TBPOC APRIL 17, 2015

SUPPLEMENTAL PACKET
ITEM 4A

CAPITAL OUTLAY SUPPORT UPDATE
Memorandum

TO: Toll Bridge Program Oversight Committee (TBPOC)  DATE: April 16, 2015

FR: Dan McElhinney, Chief Deputy District Director, Caltrans District 4
    Steven Whipple, Principal Construction Engineer, Caltrans District 4

RE: Agenda No. - 4a
    Item- TBSRP Capital Outlay Support (COS) Update

Recommendation:
Information

Cost:
TBD

Schedule:
FY 14/15

Discussion:
The expenditure data is now available through March 2015 for FY 2014/2015 East Span construction contracts staffing/consultant support as well as the unanticipated SAS tower anchor rod investigation. The budget history is summarized below for reference. The COS expenditures data through March 2015 for construction contracts support is $31.8M. In addition, the COS expenditures data through March 2015 is $1.7M for the ongoing unanticipated SAS tower anchor rod initial investigation, which includes TBPOC approved field and lab rod testing, expert peer reviews, staffing, and consultant support. Therefore, the total COS expenditures data through March 2015 is $33.5M. The PMT will meet next week to review the FY 14/15 work plan of staffing and consultant contracts to further define options to maintain the current approved budget of $42.4M, and review the additional tower anchor rod investigation testing plan proposal cost estimates to be presented to the TBPOC on April 17, 2015 for decision. An updated forecast will be presented in May 2015.

Below is a summary of activities documented from past TBPOC meetings relating to the 2014/15 FY capital outlay support budget:
April 1, 2015 (TBPOC Urgent Meeting)
During the April 1, 2015 TBPOC urgent meeting, the Department presented the possible need for additional tower anchor rod investigation testing, related peer reviews, and impacts to the 2014/15 FY approved budget. The TBPOC approved an additional 2014/15FY COS budget of $1M for the TBSRP Program from $41.4M to $42.4M. The Department is to present a full testing plan with scope, updated cost estimates, and timelines to be presented at the next TBPOC meeting for consideration.

March 5, 2015 (TBPOC Regular Monthly Meeting)
As requested, the Department presented an overall work plan for 2014/15 FY to match the $41.4M approved in January 2015, with updated expenditure data of $26.8M through to January 2015 including new expenditures data and budget impacts of unanticipated workload for the SAS anchor rod investigation. The discussion clarified the new work would need to initially utilize a portion of the current COS contingency to proceed with METS contract anchor rod UT and SEM testing- the Department was still in the process of evaluating the additional cost risks and planned to present updated information at the April TBPOC meeting. The Department was tracking the $41.4M approved budget.

January 27, 2015 (TBPOC Regular Monthly Meeting)
BATA, representing the PMT, presented the updated proposed COS mitigation plan, recommending a $3M augmentation to the existing approved COS 2014/15 FY budget from $38.4M to $41.4M. The TBPOC approved the updated proposed budget. The TBPOC requested for the PMT to return to the March TBPOC meeting to present a work plan to match the $41.4M with $1M in unallocated contingency.

December 1, 2014 (TBPOC Urgent Meeting)
The Department presented the COS mitigation plan to reduce overall COS 2014/15 FY forecast from $49.8M to $44.8M ($6.4M above the approved COS budget). The chair noted that BATA will present a counter offer to the Department’s COS mitigation plan for 2014/15 FY and for the rest of the program in an effort to result in a better forecasted figure.

November 4, 2014 (TBPOC Regular Monthly Meeting)
The Department presented the third quarter 2014 COS update that provided information on the 2014/15 FY forecasted amount of $49.8M against the 2014/15 FY approved budget of $38.4M ($11.4M above the approved COS budget). A number of unanticipated additional work was discussed that resulted in the budget variance.
The TPBOC requested the Department to present a COS mitigation plan at a TBPOC conference call prior to the December 3rd TBPOC monthly meeting. (Conference call was held on December 1, 2014.)

April 11, 2014 (TBPOC Regular Monthly Meeting)
During the April 11th 2014 TBPOC Monthly meeting, the TBPOC approved a 2014/15FY COS budget of $38.4M for the TBSRP Program. The TBPOC also approved the Department’s request for an additional increase of $84.4M to the TBSRP COS total budget, resulting from $1221.6M to $1306M.
ITEM 5C1
SAS UPDATE
Tower Footing

- 424 Anchor rods
  - Approximately 26 feet long
  - 388 - 76 mm Diameter
  - 36 - 100 mm Diameter

- 152 Steel Dowels
  - 150 mm Diameter
Tower Footing Illustration

- Within tower footing
- Extend 18 feet below tower base plate
Tensioned Anchor Rods

- Within tower base
- Extend 8 feet above tower base plate
Ultrasonic Testing (UT) of the Tower Anchor Rods for Length Verification

- Pulse-echo UT was used to determine the length of each installed tower anchor rod
- Procedure carried out on each anchor rod from March 16 to 18, 2015
UT Procedure and Calibration

- Length measurement accuracy was found to be within ± 2 mm
- UT instrument was calibrated everyday prior to operation to ensure accuracy in the field
UT Procedure in the Tower

• All 422 tower rods were UT measured (minimum of two times with different technicians and instruments for repeatability)
Summary of UT Results

- Histogram of measured rod length differences from expected (deltas)

- 89% of rods have a delta within ±10 of expected

- Rod 155-1-1 has a delta of (-155) mm from expected
Location of Rods Greater than ± 10 mm of Expected Length

- Location with -155 mm difference from expected length (1 total)
- Location with difference of -60 mm to -11 mm/ +11 mm to +20 mm from expected length (45 total)
Rod 155-1-1

• The red line represents where the back reflector occurs
Removed Rods

150-1-2
- Stripped prior to removal in 2013
- Fully grouted

136-2-3
- Removed 2014
- Fully ungrouted
Micro-Crack Investigation

**Rod 150-1-2**
- Stripped prior to removal in 2013
- Fully Grouted

- **Above Top Nut**
  - No water
  - Temporary loading

- **Below Top Nut**
  - No water
  - Temporary loading

- **Above Bottom Nut**
  - Temporary loading

- **Below Bottom Nut**
  - No loading

**Rod 136-2-3**
- Extracted 2014
- Fully Ungrouted
- Standing Water

- **Above Top Nut**
  - No water
  - Temporary loading

- **Below Top Nut**
  - No water
  - Sustained loading

- **Above Bottom Nut**
  - Sustained loading

- **Below Bottom Nut**
  - No loading

- **Areas Examined to Date**
  - Red: Micro-cracks found
  - Green: No micro-cracks found

- **Galvanizing Steel Substrate**
  - 12.34 μm

- **Microscopic examination using optical microscope and SEM**
- **High magnification**
- **Detailed investigation ongoing**
**Testing Program Summary Sheet**

<table>
<thead>
<tr>
<th>ROD ID</th>
<th>TEST NAME</th>
<th>TEST PHOTOS</th>
<th>TEST PHOTOS</th>
<th>TEST PHOTOS</th>
<th>TEST PURPOSE</th>
<th>Completion %</th>
<th>Results to Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>132.46 (Rod 2, Removed in December 2014)</td>
<td>MECHANICAL TESTING: Reduced Section Tensile, Hardness Testing of Cross Section; Charpy Impact Testing</td>
<td><img src="image1.jpg" alt="Image" /></td>
<td><img src="image2.jpg" alt="Image" /></td>
<td><img src="image3.jpg" alt="Image" /></td>
<td>Check for mechanical properties of the tower anchor rods such as tensile strength, hardness across the rod cross sections, and charpy impact toughness. The data provides for comparison to past information collected.</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>132.46 (Rod 2, Removed in December 2014)</td>
<td>OTHER TEST:</td>
<td><img src="image4.jpg" alt="Image" /></td>
<td><img src="image5.jpg" alt="Image" /></td>
<td><img src="image6.jpg" alt="Image" /></td>
<td>Check for evidence of indications and defects.</td>
<td>75% (25% Authorization Pending)</td>
<td></td>
</tr>
<tr>
<td>RSL (RAYMOND TEST)</td>
<td>Diameter Measurements and examination of thread engagement</td>
<td><img src="image7.jpg" alt="Image" /></td>
<td><img src="image8.jpg" alt="Image" /></td>
<td><img src="image9.jpg" alt="Image" /></td>
<td>Determine the diameter of the rod and location of thread engagement along the length</td>
<td>Authorization Pending</td>
<td></td>
</tr>
<tr>
<td>RSL (RAYMOND TEST)</td>
<td>Small Specimen Stress Corrosion Test (Threaded pieces and Shank)</td>
<td><img src="image10.jpg" alt="Image" /></td>
<td><img src="image11.jpg" alt="Image" /></td>
<td><img src="image12.jpg" alt="Image" /></td>
<td>To determine the stress corrosion cracking threshold load for the full diameter rods by using ASTM F1624 accelerated step load test method on small threaded specimens.</td>
<td>Authorization Pending - Samples shipped to LRA</td>
<td></td>
</tr>
<tr>
<td>1351.2 (Rod 1, used for Test III and Test IV)</td>
<td>MECHANICAL TESTING: Reduced Section Tensile, Hardness Testing of Cross Section; Charpy Impact Testing</td>
<td><img src="image13.jpg" alt="Image" /></td>
<td><img src="image14.jpg" alt="Image" /></td>
<td><img src="image15.jpg" alt="Image" /></td>
<td>Check for mechanical properties of the tower anchor rods such as tensile strength, hardness across the rod cross sections, and charpy impact toughness. The data provides for comparison to past information collected.</td>
<td>100% (Tests III &amp; IV)</td>
<td></td>
</tr>
<tr>
<td>1351.2 (Rod 1, used for Test III and Test IV)</td>
<td>Examination under Optical Microscope and SEM for indications and defects</td>
<td><img src="image16.jpg" alt="Image" /></td>
<td><img src="image17.jpg" alt="Image" /></td>
<td><img src="image18.jpg" alt="Image" /></td>
<td>Check for evidence of indications and defects.</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>1351.2 (Rod 1, used for Test III and Test IV)</td>
<td>Diameter Measurements</td>
<td><img src="image19.jpg" alt="Image" /></td>
<td><img src="image20.jpg" alt="Image" /></td>
<td><img src="image21.jpg" alt="Image" /></td>
<td>Determine the diameter of the rod</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

**ANALYSIS OF GALVANIZING AND CHEMICAL ANALYSIS: Chemical analysis of galvanizing; Thickness determination, Microscopic Examination of galvanizing.**

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Supplemental Packet
Agenda Item 5c - SAS
April 17, 2015
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</tr>
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<tbody>
<tr>
<td>R01</td>
<td>RGL (RAYMOND TEST) Small Specimen Stress Corrosion Test</td>
<td>(Threaded pieces only)</td>
<td></td>
<td></td>
<td></td>
<td>To determine the stress corrosion cracking threshold load for the full diameter rods by using ASTM F1624 accelerated incremental load test method on small threaded specimens.</td>
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<td></td>
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<tr>
<td>A01</td>
<td>Microscopic Examination of 2 threaded and 2 unstressed bolts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Compare thread root indications with examination of A354BD bolts.</td>
<td></td>
<td>0%</td>
</tr>
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</table>