

**DATE:** July 14, 2021

**TO:** Ana M. Olivares  
Director

**FROM:** Robert Johnson P. E.  
Division Manager



**SUBJECT: San Joaquin Road Pavement Treatment Testing Program Status Update**

This memorandum provides a status update, economic analysis and observations/conclusions of the San Joaquin Road Pavement Test Program. The objective of the testing program is to evaluate different pavement sections and surface treatments to determine the most cost effective for residential/local streets.

The program started in December 2018 and consists of 13 pavement sections and 2 surface treatments installed along 4.3 miles of San Joaquin Road between Old Ajo Highway and Milky Way Drive. Refer to Table 1 for a list of pavement sections and surface treatments. San Joaquin Road prior to the start of the program was estimated to have a pavement condition index (PCI) of 30.

Infrastructure Management Systems (IMS) conducted pavement condition surveys in December 2019, August 2020 and March 2021 and provided a PCI for each test section which were used to model pavement performance. Refer to Attachment 1 for adjusted performance curves and Table 1 for PCI values for each of the three surveys.

A life cycle cost analysis (LCCA) was conducted using the Equivalent Uniform Annual Cost (EUAC) methodology. The EUAC was used to analyze life cycle costs per lane mile over a 50-year period. Unlike standard life cycle cost analysis, EUAC expresses life cycle costs as an annualized estimate of costs instead of a lump sum estimate of present value. The costs only reflect production rates for placing one lane mile of pavement section/treatment and should not be viewed as total construction cost per lane mile.

The StreetSaver PCI incremental adjustments (attachment 2) were applied over the 50-year analysis period and pavement preservation treatment breakpoints were applied as follows: Sections 1 thru 11, crack sealing at 4-year intervals (PCI 100 to 75) and double chip seal at 8-year intervals (PCI 75 to 60); Section 12, roller compacted concrete, crack sealing at 8-year intervals (PCI 100 to 75) and diamond grinding at 15-year intervals (PCI 75 to 60). Each pavement section was reapplied over the previous section at a PCI of 60. A 2.0% discount rate was used for the life cycle analysis based on the Federal Highway Administration National Highway Construction Cost Index which ranges between 1.0 and 2.0 percent. EUAC analysis results are provided in Table 1.

Table 1. Survey Results and Equivalent Uniform Annual Costs

Test Section	Description	PCI			EUAC (per lane mile)
		December 2019	August 2020	May 2021	
PAVEMENT SECTIONS					
1N	1-inch Green Asphalt overlay over existing pvmt northbound lane	100	92	81	\$17,000
1S	1-inch Green Asphalt overlay with fiber over existing pvmt southbound lane	100	89	78	\$23,000
2	1-1/4" asphalt overlay (PAG 3, PG70-22TR) over existing pvmt	100	99	85	\$21,000
3	2" asphalt overlay PAG 2 over existing pvmt	100	100	97	\$25,000
4	2" asphalt overlay PAG 2 with fiber over existing pvmt	100	99	85	\$31,000
5	Fog seal, double chip seal class 1 & 2, pulverized & recompact 6" of existing pvmt & subgrade	92	90	83	\$40,000
6	Microsurface, chip seal Class 1, pulverized & recompact 6" of existing pvmt & subgrade	94	91	87	\$47,000
7	Fog seal, chip seal Class 1, pulverized & recompact 6" of existing pvmt & subgrade	87	87	79	\$32,000
8	Fog seal, dbl chip class 1 & rubberized chips, pulverized & recompact 6" w/2 lbs cement /sf	93	87	87	\$36,000
9	Fog seal, chip class 1, pulverized & recompact 6" with 1 lb of cement/sf	91	91	85	\$37,000
10	2" mill and fill (PAG 2) over existing pvmt	100	99	98	\$28,000
11	Fog seal, double chip class 1, pulverized & recompact 6" with 2 lbs of cement/sf	90	82	75	\$43,000
12	6" rolled compacted concrete, remove 4-inches below existing top of pavement.	92	91	89	\$47,000
SURFACE TREATMENTS					
13	Fog seal, double chip class 2/class 1 over existing pavement	79	79	74	\$22,000
14	Fog seal, double chip rubberized precoated chips over existing pavement	82	80	74	\$13,000

Ana Olivares, Director

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At this early stage in the program, the following observations and conclusions are made:

- Pavement sections with a PCI of 80 or less after 2.5 years of service will be eliminated from further consideration (Sections 1S, 7 and 11) since they are incompatible with the County goal of an average PCI of 80 for its roadway network.
- In general, additional pavement condition data is necessary to better establish the shape of the adjusted performance curves. In particular, Sections 1N, 2 and 4 exhibit a steep rate of deterioration between the second and third data points which if continued could significantly alter the shape of the adjusted curve and life cycle cost.
- The performance of both surface treatments (Section 13 and 14) are essentially the same with Section 14 being a better value at about half the life cycle cost of Section 13; therefore, Section 13 will be eliminated from further consideration.
- Section 3, 2” Asphalt Overlay Over Existing Pavement provides the best value. The inclusion of milling in conjunction with the overlay is contingent of the condition of existing pavement and paving operation’s ability to provide a smooth riding surface without adversely altering roadway and drainage conditions.

To achieve a higher level of confidence in the performance of the test sections, additional pavement condition surveys are required. We recommended that a status update of the program be revisited after the fourth pavement condition survey scheduled in FY23/24.

Summary

The San Joaquin Road Pavement Treatment Testing Program to date demonstrates that Section 3 (2” asphalt overlay over existing) and Section 10 (2” mill and fill asphalt) are the best value for road repair of failed local roads.

Attachment 1 - Performance Curves

Attachment 2 – StreetSaver PCI Adjustments

c: Kathryn Skinner, Deputy Director  
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Robert Lane, Division Manager  
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