

City of Hesperia

STAFF REPORT



DATE: April 6, 2021

TO: Mayor and Council Members

FROM: Nils Bentsen, City Manager

BY: Rachel Molina, Deputy City Manager
Michael Thornton, City Engineer

SUBJECT: Pavement Management Program (PMP), C.O. No. 3150-1803

RECOMMENDED ACTION

It is recommended the City Council receive and file the Pavement Management Program report.

BACKGROUND

Over the past 10 years, the City has invested approximately \$2.3 million each year from a variety of funding sources as presented below:

Fund	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	10-Year Average	2020-21 Budget
100 General Fund	-	-	-	-	-	-	500,000	-	-	-	50,000	-
201 Measure I - Arterial	466,573	94,772	141,665	-	-	-	-	-	-	-	70,301	-
204 Measure I Renewal	516,370	295,678	316,890	1,911,147	1,761,934	2,782,960	1,419,803	1,360,078	14,965	1,088,720	1,146,855	1,081,282
205 Gas Tax Fund - Excise	-	-	-	-	-	466	280,118	141,633	-	-	42,222	-
207 Local Transportation Fund	-	-	-	594,308	372,382	651,543	169,849	578,706	293,574	2,348	266,271	-
209 RMRA - 2018 Gas Tax	-	-	-	-	-	-	-	498,000	805,494	768,364	207,186	2,870,764
251 CDBG	-	-	-	-	-	383,046	2,027,488	1,354,952	379,547	961,145	510,618	1,598,807
Totals:	982,943	390,450	458,555	2,505,455	2,134,316	3,818,015	4,397,258	3,933,369	1,493,580	2,820,577	2,293,452	5,550,853

As shown on the above table, during a 3-year period, greater investments were made (2015-2018) than are currently programmed. Some of the historic funding sources are no longer used for roadway maintenance or rehabilitation. In particular, the City does not use General Fund and the City no longer receives Measure I – Arterial, Excise Gas Tax, or Local Transportation Fund funds.

To effectively manage the resources currently available, staff, assisted by pavement management experts, prepared a Pavement Management Program (PMP). A Pavement Management Analysis is a planning tool used to aid pavement maintenance decisions. Every city in California is required to develop and adopt a pavement management program in accordance with § 2108.1 of the California Streets and Highways Code. In addition, cities are required to utilize PMP's in order to be eligible for Measure I funding and any Federal or State grants. Pavement management is a system or methodology to develop cost effective maintenance and rehabilitation strategies for roadways. To aid strategy selection, a pavement condition rating system is used – Pavement Condition Index (PCI). To determine a roadway segment PCI, a combination of existing surveyed pavement defects, road classifications, and traffic volumes are used. Pavements are assigned a PCI rating from 0 (no asphalt) to 100 (new asphalt).

On March 5, 2019, staff released a Request for Proposal (RFP). On April 16, 2019 staff received five responses to the RFP. The proposals were reviewed and ranked by a selection panel made

up of seven City staff members. On June 4, 2019, Staff recommended and Council awarded a contract to Transmap Corporation.

Transmap performed the following:

- Inventory pavement conditions, identifying good, fair and poor pavements.
- Assign importance ratings for road segments, based on traffic volumes, road functional class and cost/benefit for the overall community.
- Schedule maintenance of good roads to keep them in good condition.
- Schedule repairs or replacement of poor and fair pavements as available funding allows.
- Prepared a summary report.

Research has shown that it is far less expensive over time to keep a road in good condition than it is to repair it once it has completely deteriorated. That is why a PMP places a higher priority on preventive maintenance of roads that are still in good condition, rather than reconstructing roads in poor condition. In terms of lifetime cost and long-term pavement conditions, this results in better overall system performance. The PMP gives a snapshot of current pavement conditions and the current cost to bring all segments up to standard.

Over the past 70 years, the design of paved driving surfaces has evolved through a number of formulas derived from experimental test procedures. Today, engineers have an extensive knowledge and understanding on exactly how pavement surfaces react to the daily stresses/loads. When designing asphalt pavement streets two major factors are considered (1) the strength of the underlying soil and (2) the degree of traffic loading the street will be subjected to, also called the “Traffic Index” or “TI”. Using this data, a street structural section can be determined.

The City’s soils range from high strength to very low strength. Prior to design of any roadway, Geotechnical Engineers determine the strength of subgrade soils – referred to as R-Value testing. For subgrade soils that demonstrate low strength, the City has required contractors to treat it with cement to enhance strength.

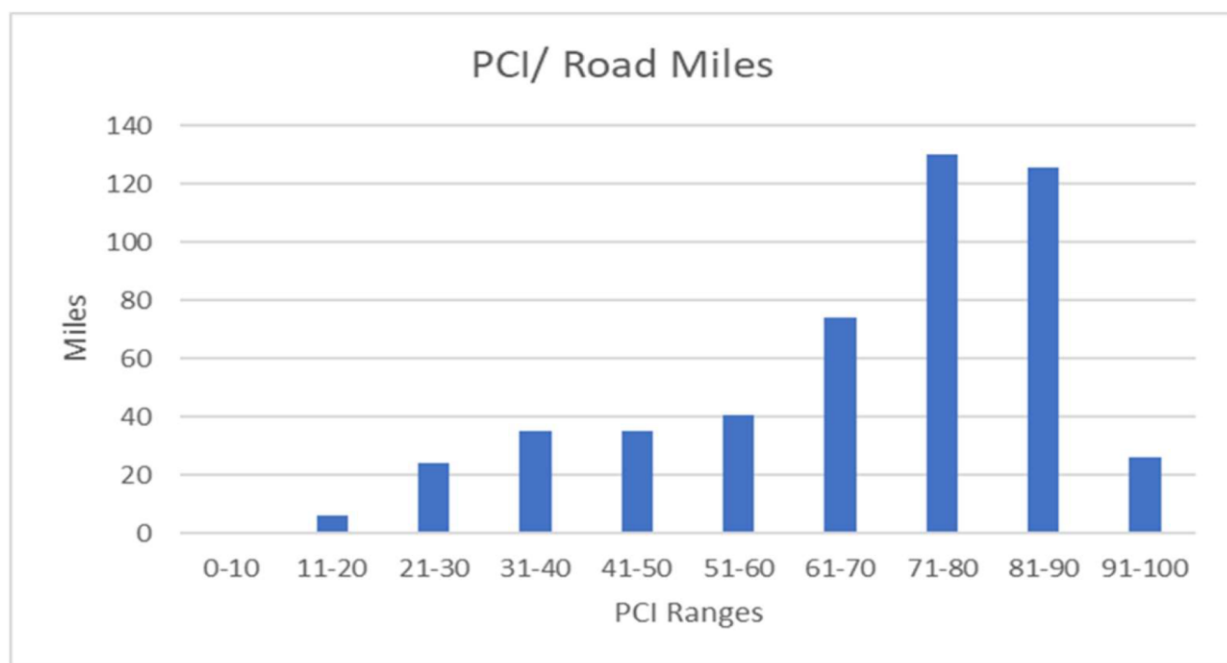
Regarding traffic loading, loading represents the weight that a vehicle applies to pavement surfaces and how often that weight is applied. For perspective, a “pick-up truck” gross vehicle weight is less than 6 tons while a tractor trailer gross weight is as much as 10 tons – without a fully loaded trailer.

The American Association of State Highway and Transportation Officials (AASHTO) and other researcher have determined that a load that weights twice as much as another will damage the roadway pavement roughly 16 times greater. Therefore, to stretch the limited amount of funding that the City is able to invest in roadways and to protect the previous investments, the City has adopted truck routes with the goal of keeping heavier vehicles off roadways that simply were not designed to support these loads. For truck routes, a TI between 10 and 12 must be used to ensure pavement life expectancy is achieved. TI’s for all City roadway classifications are presented in the following table:

Roadway Classification	Traffic Index (T.I.)
Local	5-6
Rural Collector	8
Suburban Collector	8
Arterial	10
Secondary Arterial	10
Major Arterial	12

ISSUES/ANALYSIS

Transmap Corporation report is enclosed. In summary, the City has nearly 500 centerline miles of asphalt and concrete paved roadways. All 500 miles of roadways were surveyed. As indicated above, using a combination of existing surveyed pavement defects, roadway classifications, and traffic volumes, a PCI for each street segment (intersection to intersection) has been determined. PCI amount for any particular roadway segment can be found in the referenced report. The PCI's for City streets is summarized below:



The average PCI for all City streets is 65. The analysis considered CDBG funding eligible streets separately from all other City streets. Most Southern California cities have set an average PCI index goal at 70.

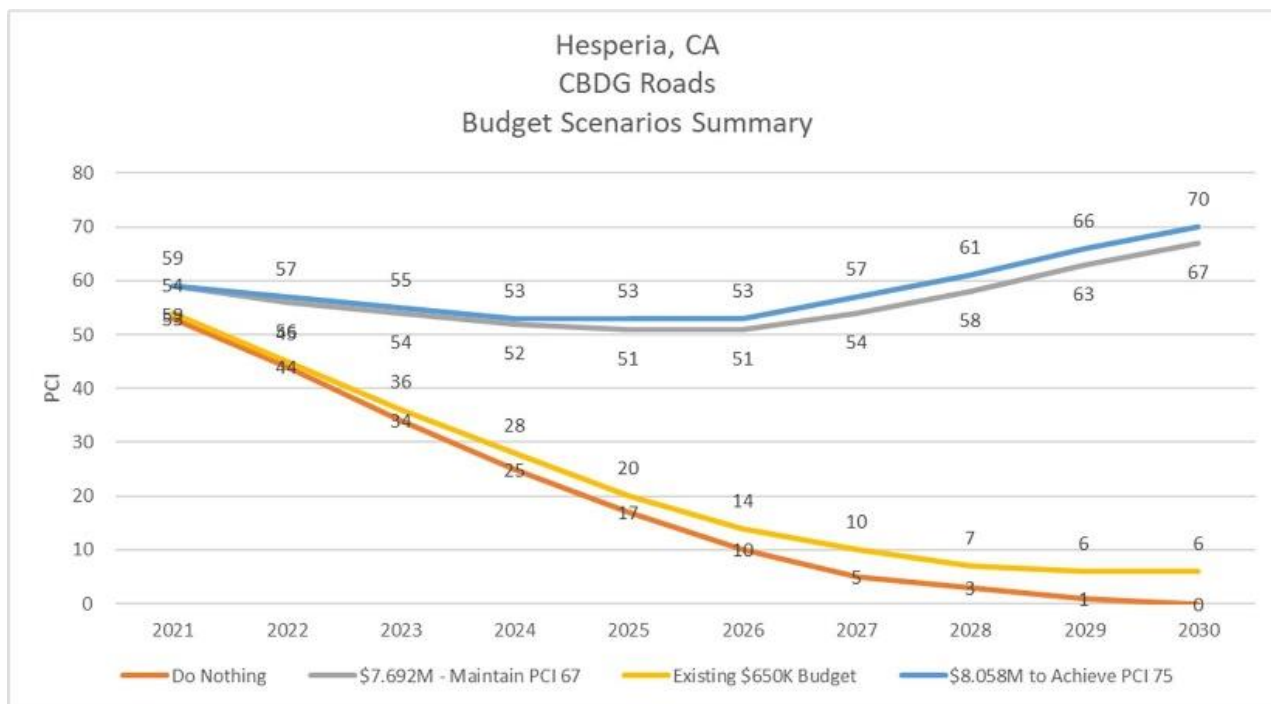
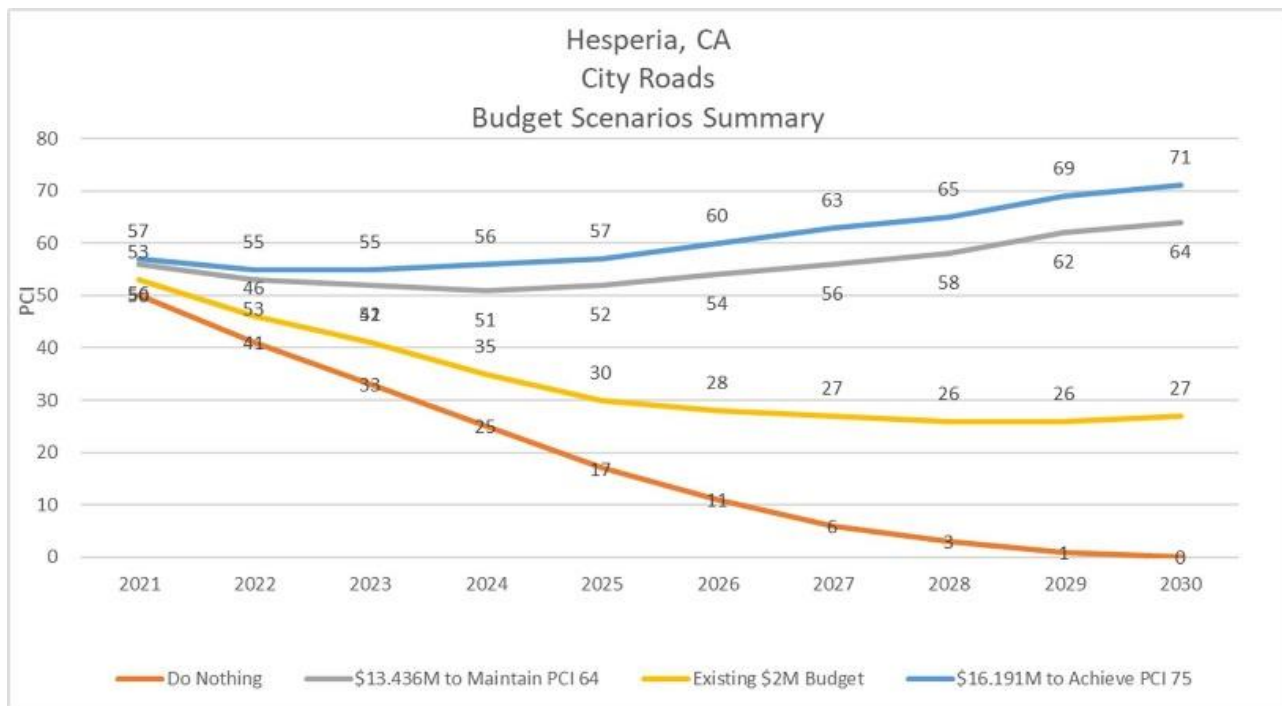
There are many types of maintenance and reconstruction (M&R) strategies that may be utilized. The report presents certain alternatives – other management strategies that may be used include selected removal and replacement with a grind and overlay, and full reconstruction with cement treated subgrade. The following table is a summary of strategies presented in the report and application of strategy is dependent upon PCI rating. The data presented also includes strategy estimated cost and life.

M&R Category	M&R Treatment	Price per Square Yard	Expected Result
Rejuvenation (PCI 86-100)	Crack Seal	\$1.18	3 Years
Global (PCI 81-85)	Crack Seal/ Slurry	\$3.21	5 Years
Global (PCI 71-80)	DBL Fiber Micro-surfacing	\$4.00	8 Years
Conventional (PCI 41-70)	2-inch Mill and Overlay	\$17.74	15 Years
Reclamation (PCI 0-40)	Structural Mill/ Overlay/ Chip Seal	\$37.39	20 years

In addition, the analysis considered a number of 10-year funding scenarios as presented in the following table:

Scenario Title	City Roads Cost	CDBG City Roads Cost	Total Cost
Fix- All	\$126.3 M	\$27.6 M	\$153.9 M
Do Nothing (10yr)	0.00	0.00	0.00
PCI's of 27 City Roads/ PCI's 6 CDBG (5yr)	\$2 M	\$650 K	\$2.65 M
PCI's of 64 City Roads/ PCI's of 67 CDBG	\$13.436 M	\$7.692 M	\$21.128 M
PCI's of 70 City Roads and CDBG	\$16.191M	\$8.058 M	\$24.249 M

The following charts track PCI performance for the alternative investment for both City and City CDBG roads.



To bring all roadway to a PCI rating of 70 or greater, \$126.3 million are required for City roadways and \$27.6 million are required for CDBG roadways. As demonstrated above, current funding levels will result in significant pavement condition degradation. Current funding sources of gas tax, Measure I, and CDBG are not sufficient to meet program demands over the next decade.

FISCAL IMPACT

None.

ALTERNATIVE(S)

Provide alternative direction to staff

ATTACHMENT(S)

2020 Pavement Management Report (Available for review in the City Clerk's office)