



Copper Valley Community Services District
Pavement Preventative Maintenance Program

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Willdan Engineering

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Attachments

1. Key Map – Copper Valley Community Services District

References

1. Pavement Condition Assessment for Saddle Creek Community Services District, June 2016, Peter Rei, PE
2. Technical Memorandum – Pavement Evaluation for Saddle Creek Resort, August 2006, Jon K Lynch, PE



Introduction

At the request of the Saddle Creek Community Services District Board of Directors Willdan Engineering is pleased to provide the District with this Pavement Maintenance Program. The goal of this program is to assist the District in keeping its roadways in excellent condition by scheduling timely and cost-effective roadway surface treatments on a continuous basis.

Executive Summary

The pavement rehabilitation projects in 2018 and 2020 have brought the District's roadways up to a much better, and more maintainable, standard. Every roadway within the subdivision has either been ground out and replaced with new asphalt or has been treated with a Microsurfing treatment intended to prolong the life of pavements that are in fair to good shape.

A regular program of pavement preservation treatments will keep the District's roadways in good condition and avoid the costly repairs of occasional grinding and replacing of asphalt. Willdan recommends that a surface treatment such as Microsurfing or Type II slurry be placed on a year interval per the guidance of the State of California Pavement Preservation Center at California State University, Chico. The estimated 5 year cycle cost to maintain the District's roadways and striping is estimated at \$ 577,500 (\$115,500 per year in 2025 dollars).

Striping is recommended to be replaced every 2-3 years in order to remain visible. This cost is estimated at approximately \$25,000 per installation. If one additional striping installation is scheduled between every 5 year resurfacing project, this adds \$25,000 (\$5,000 per year) to the 5 year cycle cost, for a total 5 year cycle cost of approximately \$120,500.

Regularly scheduled field observations of both the asphalt conditions and stormdrain conditions is strongly recommended prior to the design and bidding of any future pavement preservation projects.

Ongoing maintenance to control weed growth in cracks is an effective tool to limit the possibility of water getting beneath the pavements and deteriorating the pavement conditions.



History of Roadway Rehabilitation Investigations 2006-2016

This report is a follow-up to the pavement resurfacing projects of Summer 2018 (Saddle Creek Drive and portions of Oak Creek Drive) and Summer 2020 (all other roadways within the Copper Valley Development). It also is a further refinement of the Pavement Condition Assessment Report prepared for the District by Peter Rei in June 2016 and the Technical Memorandum entitled Pavement Evaluation for Saddle Creek Resort prepared by Jon W. Lynch in 2006.

The 2016 report was compiled from field Pavement Condition surveys of all Copper Valley (then Saddle Creek) Community Services District subdivision roads performed in Spring 2016. The 2018 and 2020 Resurfacing projects were designed based on the results of the Spring 2016 field observations of roadway condition and was intended to provide recommendations for future pavement improvements beginning in 2019 and beyond.

The results of the 2016 Report were then used by District staff to create a Roadway Assessment, to be voted upon by the residents, in order to raise the funds to pay for the anticipated costs. That Assessment was approved by the residents in November 2016.

Pavement Conditions Observed in May 2016

The condition of a pavement is rated on a scale of 0 to 100. This rating is called the Pavement Condition Index (PCI). The 2016 Pavement Condition survey results indicated that the average PCI of the District's roadways at that time was 62 with 31.4 % of the roadways determined to be in Poor or Very Poor condition at the time of the field surveys in Spring 2016. This indicated that the District's roadways were well below the desired average PCI of 80 to ensure that yearly maintenance costs are kept to a manageable level.

Roadway Improvement Projects 2018-2020

In Summer 2018 Willdan designed and the District advertised a project which included the grinding and repaving of the Resort Entrance Road, the Resort Roundabout, the entire length of Saddle Creek Drive and a majority of Oak Creek Drive. The areas included in the Summer 2018 Project are highlighted in yellow on the attached As-Built Key Map.

In Summer 2020 the District advertised a project which included the grinding and repaving of the entire length of Rockridge Lane, the entire length of Copper Glen Terrace, a portion of Hawkridge Road and several courts. The project also included placement of a treatment known as Microsurfacing on many other roadways throughout the Copper Valley development. The areas of grinding/resurfacing are highlighted in orange and the areas of Microsurfacing are highlighted in purple on the attached As-Built Key Map.



The original plan for the Summer 2020 Project also included the placement of a fog seal on Quail Creek Drive and Quail Covey Court. However, due to construction activity occurring on those roadways at the time of construction the fog seal was eliminated from the project. These areas are highlighted in red on the attached As-Built Key Map.

Pavement Conditions Observed in July 2021

During early 2021 the District received several calls concerning cracks reappearing in some locations where the microsurfacing treatment had been applied. At the request of General Manager Peter Kampa a meeting was held on July 16, 2021 to review the roadway conditions one year after the conclusion of the 2020 Pavement project. The meeting included the prime contractor (Tom Mayo), the Microsurfacing sub-contractor (Ryan Bangle), Copper Valley CSD (Greg Hebard) and Willdan Engineering (Peter Rei).

The group looked at several locations where cracks have reappeared following the Phase II project in summer 2020. In each case we observed that the rubberized crack seal material was present in the cracks that had reappeared. This is important because the rubberized crack seal is intended to prevent water from getting down under the pavement and causing further deterioration of the asphalt surface. That was the most important goal of the 2020 project.

The cracks that are apparent now are essentially the same cracks that existed prior to the microsurfacing being placed. In the overwhelming majority of locations throughout the subdivision there are no cracks reappearing. This means that the combination of rubberized crack seal material with the microsurfacing placed on top of the roadway covered the vast majority of cracks. The conclusion of the group is that the larger the width of the original crack the more likely that an original crack will reappear. The smaller the width of the original crack the less likely the crack will reappear. This is consistent with what we all observed at our meeting.

The group discussed at some length what the options are for future treatments of the roadway that would eliminate the cracks that have reappeared. We all agreed that asphalt's material properties guarantee that it will crack over time as the summer heat and winter cold cause the roadway to continuously expand and contract. There is really no way to prevent the cracking from happening. Over time all asphalt roadways will crack.

The group also agreed that once an asphalt surface cracks the only real solution to the reappearance of the original cracks is to grind out that section of roadway and repave it with new asphalt. Any surface treatments such as microsurfacing will mask the cracking, but will not eliminate the underlying original crack. As the microsurfacing erodes with time more of the underlying cracks will reappear. This does not mean the project was unsuccessful. It only means that once a road cracks there really is no way to make the crack disappear.

As part of our analysis leading to the design of the 2020 project Willdan recommended grinding and repaving several locations where the asphalt surface had deteriorated to the point where placing a microsurfacing treatment on top of the already failed asphalt would not make sense. In areas where the roadway cracking was less severe we recommended that the remainder of the roadways be treated with the microsurfacing process. Based on the observations of the group that strategy worked very well for the vast majority of roadways within the subdivision. However, in the some areas where there were wider cracks the microsurfacing did not prevent the cracks from reappearing.



Going forward the options for addressing the reappearing cracks are to grind those areas out and resurface them with new asphalt, or continue to treat the roadways with microsurfacing or slurry treatments and live with the cracks. Grinding and repaving is a much more expensive alternative. The good news is the rubberized crack seal material is protecting the roadways from further deterioration caused by water getting under the pavement. That is the primary goal of resurfacing, whether it is new asphalt or microsurfacing. That goal was met with the projects in 2018 and 2020.

It is anticipated that some will say that because there are cracks reappearing one year after construction that the 2020 microsurfacing project “failed”. That is likely to be the opinion of people that expected that the project would produce a “perfect surface” in all locations. What Willdan recommended was not intended to result in a perfect surface in every location. It was intended to provide a good driving surface and eliminate the process that has been causing the deterioration of the roadways, at a cost that was affordable to the District. Continuing to follow this approach will result in much lower pavement replacement costs over time.

Recommended Schedule for future Roadway Surface Treatments

According to the California State Pavement Preservation Center at Chico State University once roadways are brought up to an acceptable standard the recommended interval for resurfacing roadways to keep them in excellent condition (PCI of 80 or greater) is to schedule a microsurfacing or type II slurry treatment every 5 to 7 years. Since the pavement projects at Copper Valley were constructed in 2018 and 2020, using the 5 to 7 year recommendation would indicate that the next treatments should be scheduled for 2025. For planning purposes it is recommended that future roadway resurfacing treatments be scheduled for every 5 years (2030, 2035 etc.).

Estimated Cost (2020 \$) of future Roadway Surface Treatments

The total area of roadway surfaces in the Copper Valley subdivision in 2020 was calculated to be approximately 1,240,00 square feet. The successful bid price from Tom Mayo Construction for microsurfacing was \$2.30 per square yard (\$ 0.256 per square foot) which results in an estimated cost of \$316,889 in 2020 dollars.

The total length of centerline striping is approximately 10,500 linear feet. The successful bid price from Tom Mayo Construction for striping was \$1.00 per lineal foot. Which results in an estimated cost of \$10,500 in 2020 dollars.

Please note that these are only materials cost and do not include the cost of contractor mobilization, traffic control, bonds, and insurance. It also does not include the cost of project bidding or construction inspection for the project engineer.

The Engineering News Record Cost of Construction Index has averaged approximately 3% on a yearly basis over the past decade. Willdan recommends using this 3% yearly construction cost increase to estimate the costs of a pavement preservation project in 2025. Using a 3% yearly increase for 5 years results in an estimated total increase of 16% above 2020 prices by 2025.



The following planning level estimate is for a 2025 project applying microsurfacing over the entire roadway surface as it existed in 2020:

Contractor Mobilization, Bonds, Insurance	\$ 50,000
Traffic Control	\$ 25,000
Crack Sealing	\$ 75,000
Microsurfacing	\$350,000
Striping	\$ <u>25,000</u>
Sub-Total	\$525,000
Bidding/Construction Engineering (10%)	\$ <u>52,500</u>
Total	\$ 577,500

Please note that it will likely be necessary to restripe the roadways on an interval more frequent than 5 years. The current water-based paints that are allowed by the State of California typically lose their visibility after 2-3 years. Allowing for a second striping between resurfacings on a 5 year basis brings the total 5 year cycle for 2020-2025 to approximately \$602,500 or \$120,500 per year in 2020 dollars. This estimate should be used only for planning purposes as it is just that, an estimate. The District is encouraged to get a much more specific engineer's estimate of cost as part of the engineering for the recommended 2025 resurfacing project.

Future Roadway Condition Surveys

As part of the preparation for every future pavement preservation project it is strongly recommended that a thorough observation of each roadway be performed using the Metropolitan Transportation Commission's Street Saver program, or a similar pavement condition rating process. Should those observations indicate that some areas have begun to exhibit signs of pavement distress site specific treatments can be designed to repair those areas before construction of the pavement preservation project. As the recommended interval for resurfacing is every 5 years the roadway condition surveys are recommended to be conducted every five years also, with the condition survey occurring the year prior to the next pavement preservation project.

Future Stormdrain Condition Surveys

In summer 2020 the District also asked Willdan and District staff to investigate the condition of all of the storm drain inlets throughout the subdivision. This resulted in over 50 stormdrains being recommended for repairs. Many of the repairs were cosmetic and involved the addition of concrete to patch areas that had spalled. However, in some locations there were significant settlements observed. In those locations entire sections were removed and replaced to correct drainage and ensure that runoff water actually made it to the drain inlet successfully.

Per the recommendation above Willdan recommends that pavement condition observations to occur one year prior to the next pavement preservation project. It would also be cost-efficient to have the condition of each storm drain inlet reviewed at the same time as the pavement observations. Should any deterioration be observed those repairs could be scheduled prior to the placement of any pavement treatments.



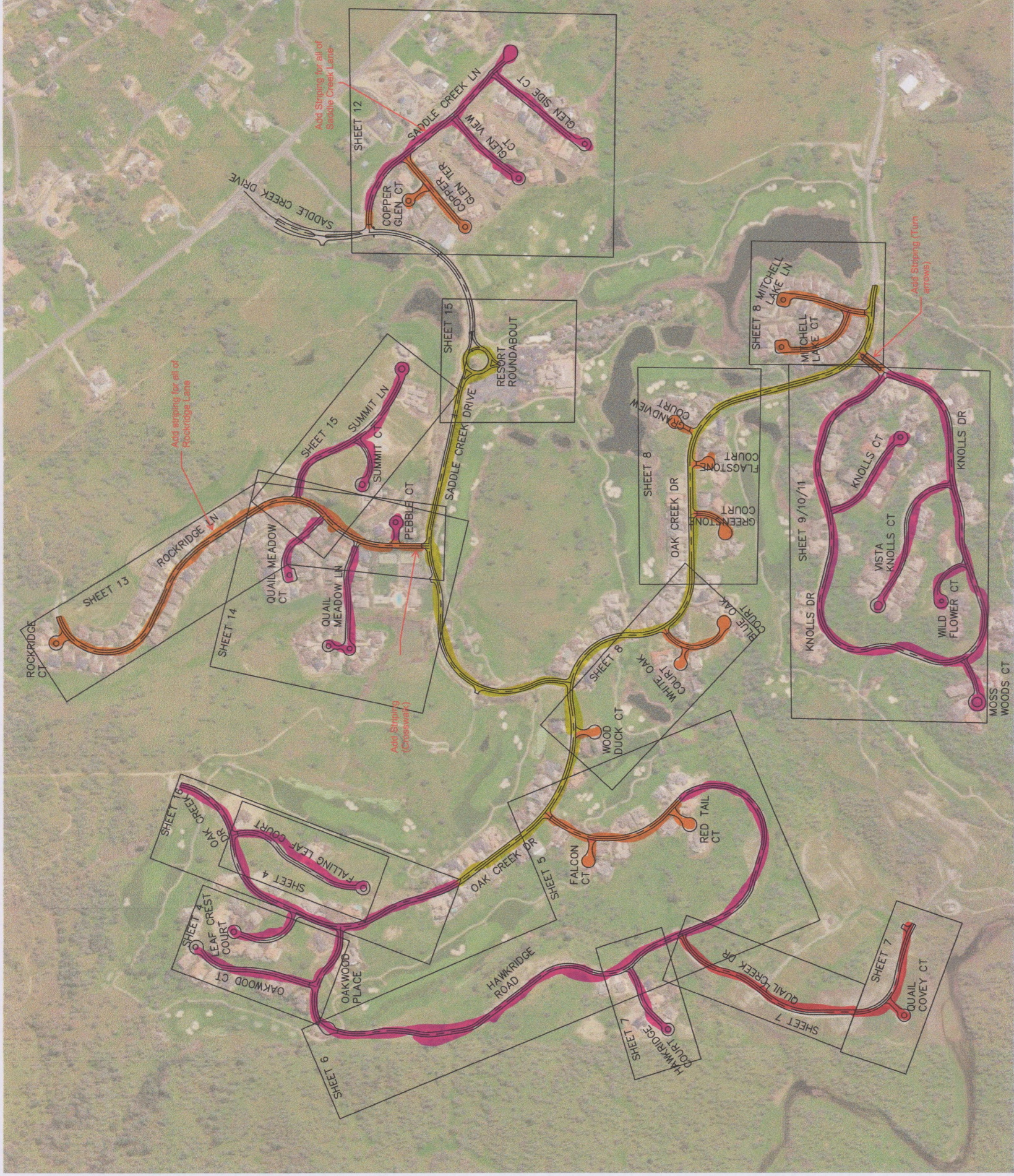
It is further recommended that every ten years a closed circuit TV investigation be done of the stormdrains. This effort involves the use of a camera that travels along the bottom of the stormdrain culverts and records the condition of the pipes. Should any blockages or damage be noticed on the recordings they can then be scheduled for repair/flushing during the summer and fall prior to any winter rain events.

Best Management Practices to Extend Pavement Life

The primary enemy of all asphalt roadways is water. Keeping water out of the base layer beneath the asphalt is the key to having roadways remain in good condition. The best way to keep water from getting beneath the asphalt roadway is to diligently seal the cracks that do occur in a timely manner. Using a rubberized crack sealing material prior to a surface treatment provides the best protection for the roadway and avoids the more costly grinding and overlaying of roadways once water has infiltrated and accelerated the deterioration of the roadway.

As stated earlier in this report all asphalt roadways will crack given enough time. When this occurs it provides the opportunity for soil and water to collect in the crack and weeds to grow. Weed roots often penetrate the pavement allowing water a pathway to get below the asphalt and begin the deterioration process. Regular spraying of the weeds to prevent that deterioration is recommended.





As Built

Description

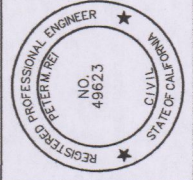
- 2" Overlay
- Fog Seal Deleted
- Micro-Surface
- Striping Only



KEY MAP



NO.	REVISIONS	DESCRIPTION	APP.	DATE



APPROVED BY:
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COPPER VALLEY COMMUNITY SERVICES DISTRICT
 PAVEMENT REHABILITATION PROJECT-PHASE II
 DATE: 01/15/2020
 SCALE: AS-NOTED
 PROJECT NO. 109421
 DRAWN BY: GC
 CHECKED BY: PR
 SHEET: 2 OF 16

KEY MAP
 COPPEROPOLIS, CALIFORNIA