

PAVEMENT SURFACE EVALUATION AND RATING (PASER) STUDY

SOPRIS VILLAGE WATER AND IRRIGATION SYSTEM

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1.0 Executive Summary

This report is part of a cumulative design project for the Sopris Village HOA developing new potable water and irrigation systems. This assessment was completed to determine whether improvements are necessary to the aging asphalt and concrete roadway components in the community that could be completed as part of with the proposed water and irrigation system project. To complete this assessment the Pavement Surface Evaluation and Rating (PASER) system was utilized. The following report describes the background of the proposed water and irrigation system project, a background of the PASER system and methodology, and the results of the study.

Overall, the HOA's roadways were found to be in poor condition. Some of the issues found include extensive potholing, failed repairs, alligator cracking, transverse cracking, and longitudinal cracking. Many of the concrete valley pans at roadway intersections were found to be in poor or failed condition as well. These issues are all thoroughly detailed in the following report. The recommended course of action is removal of the existing asphalt throughout the neighborhood, assessment of the existing subgrade, and installation of a new 3" asphalt mat. Additionally, concrete valley pans that are demolished during construction of the water and irrigation systems will need to be replaced.

2.0 Project Background

2.1 Project Background

The Sopris Village HOA hired SGM to design new for potable water and irrigation distribution systems. The current potable water system places most of the water mainlines in the utility easements in the rear of each property and between streets, with the service lines tapped and extended through the rear of each property. The new potable water and irrigation systems are designed to position the mainlines in the roadways with service lines tapped to a curb stops at the front of each property. Installation of the new water and irrigation piping will disturb the existing asphalt and concrete. The purpose of this study is to document the conditions of the asphalt and concrete in the HOA's roadways and determine the proper repairs.

2.2 PASER Study Background

The Pavement Surface Evaluation and Rating (PASER) system uses a standardized rating scale to denote the condition of asphalt and concrete on roadways. A score was assigned for each road within the Sopris Village HOA and each transitional valley pan. The standardized scale, as used in the data collection for this study, is as follows:

PASER RATING	ASPHALT	CONCRETE
10 Excellent	<ul style="list-style-type: none"> o New construction o No defects o Less than a year old o <i>Remedy/ Action: No action required</i> 	<ul style="list-style-type: none"> o New Construction o No defects o Less than 1 year old o Recent reconstruction o <i>Remedy/ Action: No action Required</i>
9 Excellent	<ul style="list-style-type: none"> o Like new condition o Recent overlay o More than 1 year old o No defects o <i>Remedy/ Action: No action required</i> 	<ul style="list-style-type: none"> o Joint rehabilitation, only if no other defects are present o Slight traffic wear in wheel path o Slight map cracking o Few pop outs o Recent concrete overlay o <i>Remedy/ Action: Like new condition. No maintenance required</i>
8 Very Good	<ul style="list-style-type: none"> o Occasional transverse crack >40' apart o All cracks tight (hairline) o Recent seal coat or slurry seal o Few longitudinal cracks on joints o <i>Remedy/ Action: Little to no maintenance required</i> 	<ul style="list-style-type: none"> o Joints all in good condition o Partial loss of joint sealant o No transverse cracks o Minor surface defects- pop outs, map cracking or slight scaling o Isolated meander cracks (well-sealed or tight) o Light surface wear o Isolated cracks at manholes (well-sealed or tight) o <i>Remedy/ Action: Little to no maintenance required</i>
7 Good	<ul style="list-style-type: none"> o Longitudinal crack on paving joint open <1/4" o Transverse cracks 10'-40' apart o Transverse cracks open <1/4" o First signs of wear o Little or no crack erosion o Little or no raveling o Few if any patches in good condition o <i>Remedy/ Action: Maintain with crack seal</i> 	<ul style="list-style-type: none"> o Isolated transverse cracks o Full depth repairs all in excellent condition o Minor surface scaling o Some open joints o Some manhole cracks o Isolated settlement or heave areas o Pop outs could be extensive but sound o <i>Remedy/ Action: Seal open joints. Spot repair surface defects.</i>
6 Good	<ul style="list-style-type: none"> o Longitudinal & transverse cracks open 1/4" - 1/2" o Transverse cracks less than 10' apart o First sign of block cracking o Sound structural condition o Blocks are large and stable o Slight to moderate polishing or flushing o No patches or few in good condition o Slight raveling o <i>Remedy/ Action: Maintain with sealcoat</i> 	<ul style="list-style-type: none"> o Meander and transverse cracks 1/4" open o Transverse joints open 1/4" o Longitudinal joints open 1/4" o Moderate surface scaling <25% of surface o Several corner cracks tight or well-sealed o First signs of shallow reinforcement cracks o <i>Remedy/ Action: Seal open joints and cracks. Overlay surface raveling areas.</i>
5 Fair	<ul style="list-style-type: none"> o Longitudinal & transverse cracks > 1/2" o Secondary cracks (crack raveling) o < 50% of block cracking o First signs of longitudinal cracks at edges o Sound structural condition o Moderate raveling o Extensive to severe flushing & polishing o <i>Remedy/ Action: Maintain with sealcoat or thin overlay</i> 	<ul style="list-style-type: none"> o First signs of crack or joint faulting up to 1/4" o First signs of joint or crack spalling o Moderate to severe scaling or polishing between 25% to 50% of surface o Spalling from shallow reinforcement o Multiple corner cracks o <i>Remedy/ Action: Grind and repair surface defects. Some partial depth joint repairs or patching may be needed.</i>
4 Fair	<ul style="list-style-type: none"> o Longitudinal cracking in the wheel paths. o Rutting 1/2" - 1" deep. o >50% block cracking. o First signs of structural weakening. o Severe surface raveling. o Multiple longitudinal & transverse cracks with slight in fair condition o Patching in fair condition. o <i>Remedy/ Action: Structural overlay > 2".</i> 	<ul style="list-style-type: none"> o Crack or joint faulting up to 1/2" o Severe spalling on joints and cracks o Multiple transverse or meander cracks o Severe scaling, polishing, map cracking or spalling >50% of surface o Corner cracks missing pieces or patches o Pavement blowups o <i>Remedy/ Action: Some full depth repairs. Asphalt overlay or extensive surface texturing.</i>
3 Poor	<ul style="list-style-type: none"> o <25% alligator cracking (first signs) o Moderate rutting 1"-2" deep o Severe block cracking o Longitudinal & transverse cracks showing extensive crack erosion o Occasional potholes o Patches in fair/poor condition o <i>Remedy/ Action: Structural overlay > 2", patching and repair prior to a major overlay, milling would extend overlay life</i> 	<ul style="list-style-type: none"> o Severe crack or joint faulting up to 1" o D-Cracking evident o Many joints, transverse, and meander cracks open and severely spalled o Extensive patching in fair to poor condition o <i>Remedy/ Action: Extensive full depth repairs. Some full slab replacements.</i>
2 Very Poor	<ul style="list-style-type: none"> o >25% alligator cracking o Severe rutting or distortion >2" o Closely spaced cracks with erosion o Frequent potholes o Extensive patches in poor condition o <i>Remedy/ Action: Reconstruction with base repair, crush and shape possible</i> 	<ul style="list-style-type: none"> o Extensive and severely spalled slab cracks o Extensive failed patches o Joints failed o Severe and extensive settlement & heaves o <i>Remedy/ Action: Recycle or rebuild pavement.</i>
1 Failed	<ul style="list-style-type: none"> o Loss of surface integrity o Extensive surface distress o <i>Remedy/ Action: Reconstruction with base repair, crush and shape possible</i> 	<ul style="list-style-type: none"> o Severe crack or joint faulting up to 1" o D-Cracking evident o Many joints, transverse, and meander cracks open and severely spalled o Extensive patching in fair to poor condition o <i>Remedy/ Action: Replace</i>

3.0 Results

SGM walked every foot of roadway within the Sopris Village HOA documenting the conditions of the asphalt and concrete using the PASER rating system. The results are summarized in **Figure 3-1**.

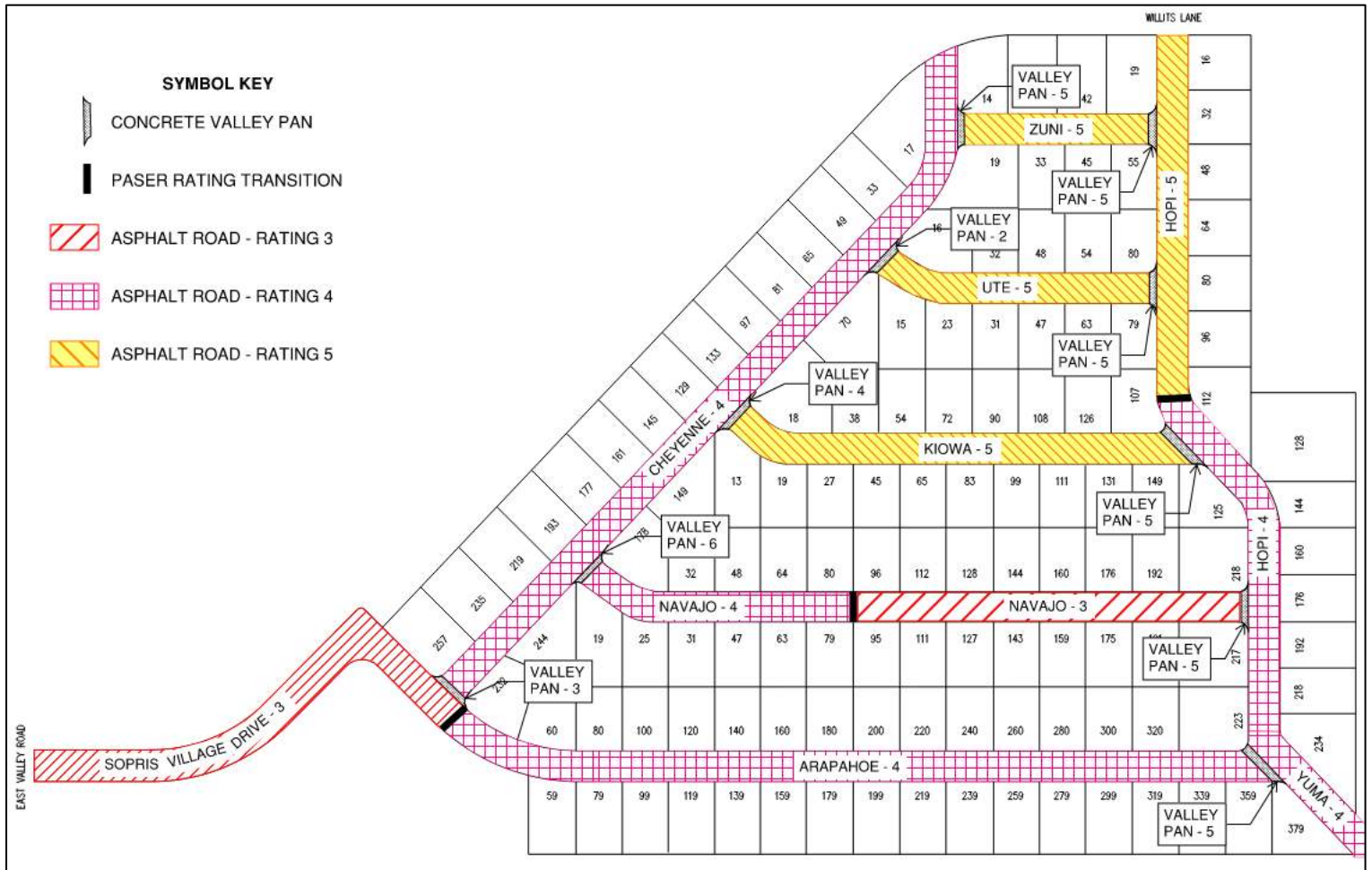


Figure 3-1. PASER Ratings for Asphalt and Concrete Within Sopris Village HOA

The following sections detail the asphalt and concrete conditions for each road with descriptions of the issues found and related pictures.

3.1 Sopris Village Drive

Table 3-1. Sopris Village Drive Asphalt PASER Rating

STREET SECTION DESCRIPTION	ASPHALT PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Sopris Village Drive	3	Structural overlay > 2", patching and repair prior to a major overlay, milling would extend overlay life	<ul style="list-style-type: none"> • Severe cracking and blocking, 5' to 10' • Ruts are 1/2" deep • Potholes are present and old repairs are failing • Alligator cracking extensive

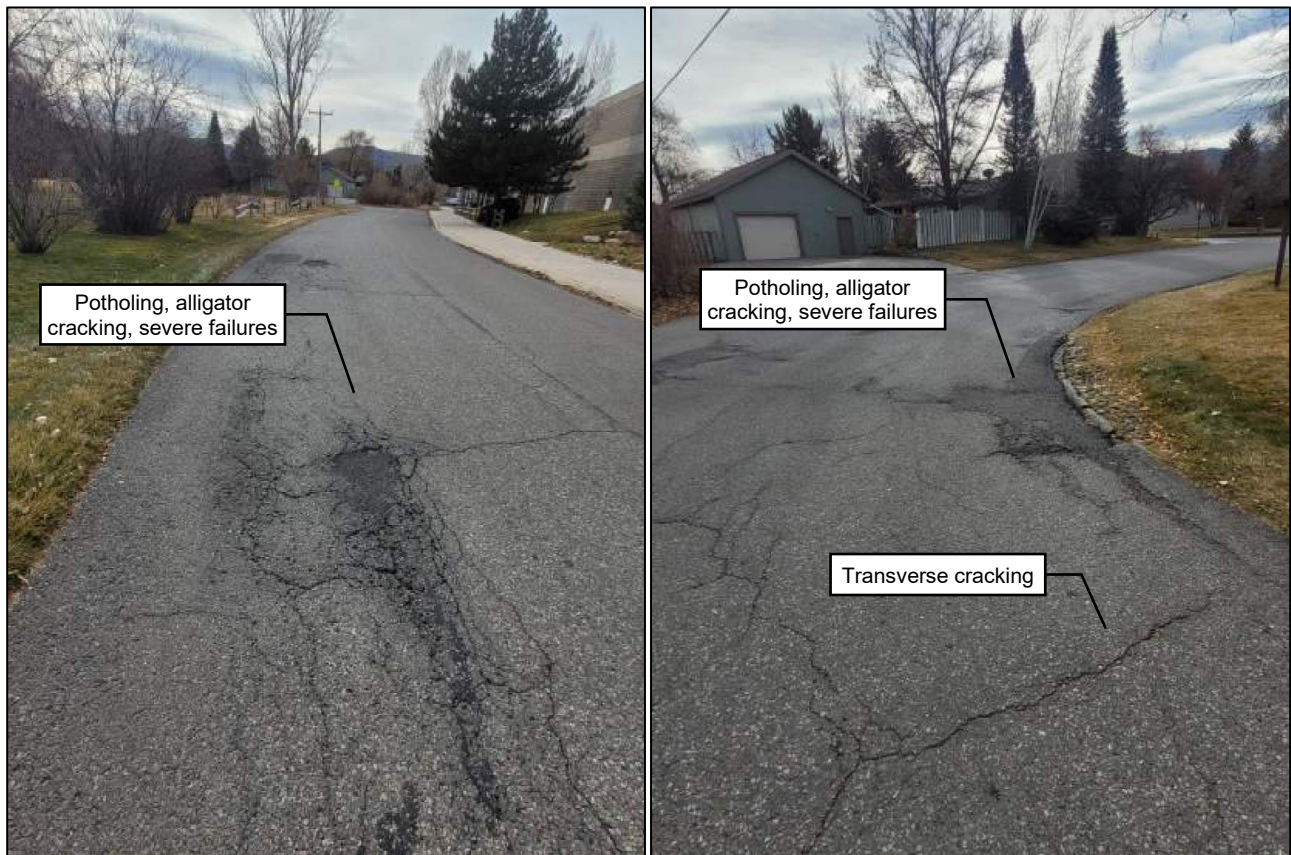


Figure 3-2. Sopris Village Drive Roadway Conditions

3.2 Arapahoe

Table 3-2. Arapahoe Asphalt PASER Rating

STREET SECTION DESCRIPTION	ASPHALT PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Arapahoe	4	Structural overlay > 2"	<ul style="list-style-type: none"> • Longitudinal cracking present but not continuous • 10' to 20' blocking • Alligator cracking in areas (5) • Severe unraveling in area • Cracks ½" to 1" some previously sealed

Table 3-3. Arapahoe Concrete Valley Pan PASER Rating

VALLEY PAN LOCATION	CONCRETE PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Intersection of Arapahoe and Yuma	5	Grind and repair surface defects. Some partial depth joint repairs or patching may be needed.	<ul style="list-style-type: none"> • Spalling • Moderate Cracking • Alligator cracking in areas (5) • Severe unraveling in area • Cracks ½" to 1" some previously sealed

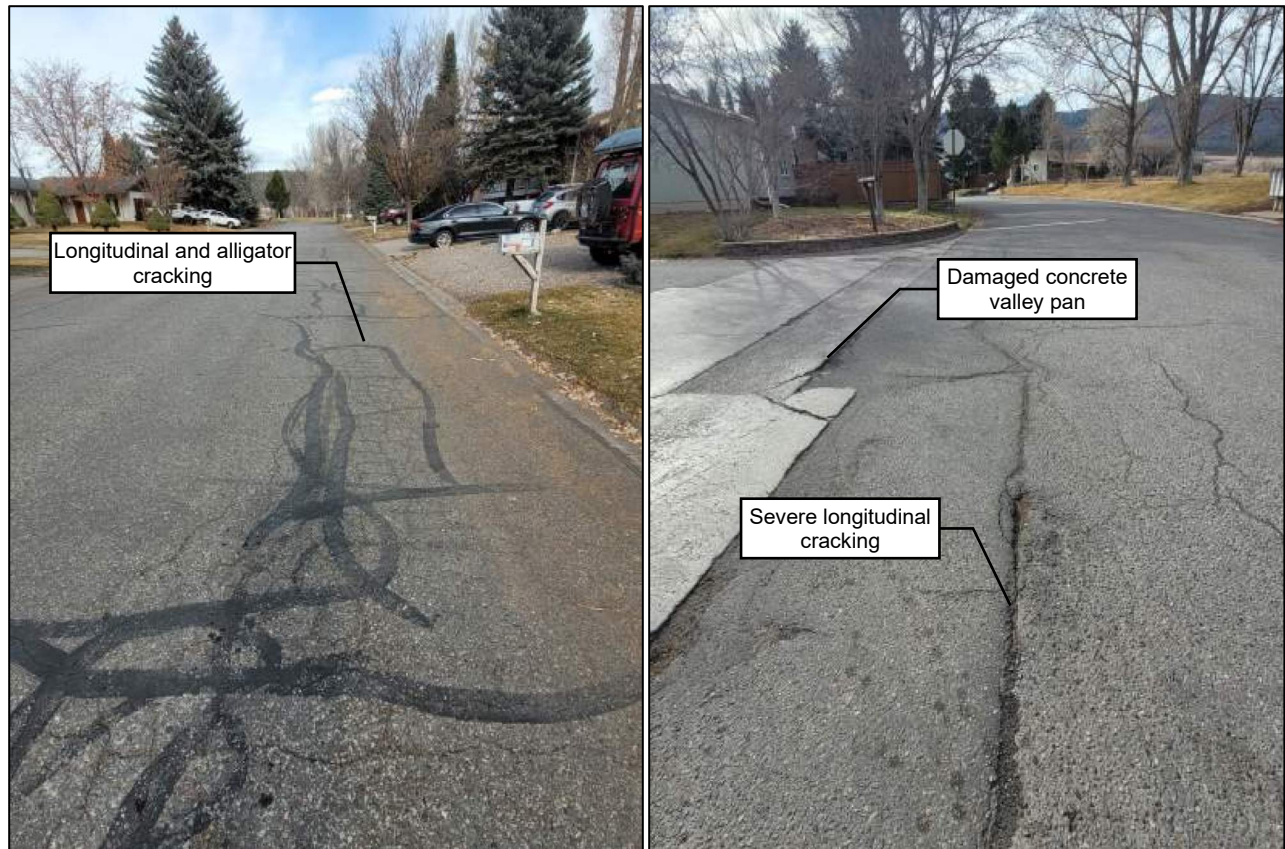


Figure 3-3. Arapahoe Roadway Conditions

3.3 Cheyenne

Table 3-4. Cheyenne Asphalt PASER Rating

STREET SECTION DESCRIPTION	ASPHALT PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Cheyenne	4	Structural overlay > 2"	<ul style="list-style-type: none"> • Longitudinal cracking common • 5' to 10' blocking • Extensive areas with alligator cracking • Unraveling areas severe • Moderate polishing • Cracks ½" to 1" some have been previously sealed

Table 3-5. Cheyenne Concrete Valley Pan PASER Rating

VALLEY PAN LOCATION	CONCRETE PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Intersection of Cheyenne and Arapahoe	3	Extensive full depth repairs or full replacement.	<ul style="list-style-type: none"> • Valley pan cracked • Multiple pieces of concrete missing



Figure 3-4. Cheyenne Roadway Conditions

3.4 Navajo

Table 3-6. Navajo Asphalt PASER Rating

STREET SECTION DESCRIPTION	ASPHALT PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
19 Navajo to 79 Navajo	4	Structural overlay > 2"	<ul style="list-style-type: none"> • Longitudinal cracking common • 5' to 10' blocking • Extensive areas with alligator cracking • Unraveling areas severe • Moderate polishing • Cracks ½" to 1" some have been previously sealed
95 Navajo to 217 Hopi	3	Structural overlay > 2", patching and repair prior to a major overlay, milling would extend overlay life	

Table 3-7. Navajo Concrete Valley Pan PASER Rating

VALLEY PAN LOCATION	CONCRETE PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Intersection of Navajo and Cheyenne	6	Seal open joints and cracks. Overlay surface raveling areas.	<ul style="list-style-type: none"> • Moderate cracking
Intersection of Navajo and Hopi	5	Grind and repair surface defects. Some partial depth joint repairs or patching may be needed.	<ul style="list-style-type: none"> • Moderate cracking



Figure 3-5. Navajo Roadway Conditions

3.5 Kiowa

Table 3-8. Kiowa Asphalt PASER Rating

STREET SECTION DESCRIPTION	ASPHALT PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Kiowa	5	Maintain with sealcoat or thin overlay	<ul style="list-style-type: none"> • Blocking 10' to 20' • Moderate unraveling • Little to no alligator cracking • Little to no longitudinal cracking • Asphalt heaved in one area which appears to be the result of adjacent tree roots • Cracks are ½" to 1" some previously sealed

Table 3-9. Kiowa Concrete Valley Pan PASER Rating

VALLEY PAN LOCATION	CONCRETE PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Intersection of Kiowa and Cheyenne	4	Some full depth repairs, surface texturing.	<ul style="list-style-type: none"> • Moderate cracking
Intersection of Kiowa and Hopi	5	Grind and repair surface defects. Some partial depth joint repairs or patching may be needed.	<ul style="list-style-type: none"> • Small to moderate cracking

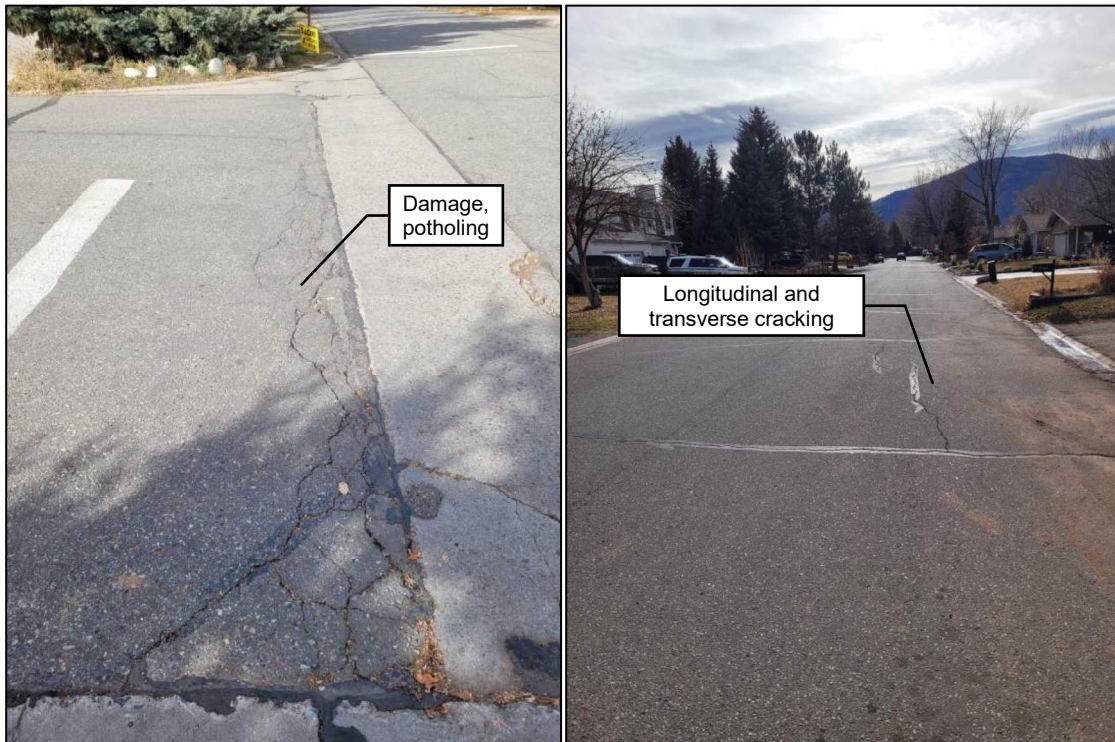


Figure 3-6. Kiowa Roadway Conditions

3.6 Ute

Table 3-10. Ute Asphalt PASER Rating

STREET SECTION DESCRIPTION	ASPHALT PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Ute	5	Maintain with sealcoat or thin overlay	<ul style="list-style-type: none"> • Blocking 20' to 40' • Little to no unraveling • Cross cracking 20' to 40' with very few longitudinal cracking • Asphalt heaved in one area which appears to be the result of adjacent tree roots • Cracks are 1/2" to 1" some previously sealed

Table 3-11. Ute Concrete Valley Pan PASER Rating

VALLEY PAN LOCATION	CONCRETE PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Intersection of Ute and Cheyenne	2	Replace	<ul style="list-style-type: none"> • Badly broken • Multiple cracks
Intersection of Ute and Hopi	5	Grind and repair surface defects. Some partial depth joint repairs or patching may be needed.	<ul style="list-style-type: none"> • Small to moderate cracking



Figure 3-7. Ute Roadway Conditions

3.7 Zuni

Table 3-12. Zuni Asphalt PASER Rating

STREET SECTION DESCRIPTION	ASPHALT PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Zuni	5	Maintain with sealcoat or thin overlay	<ul style="list-style-type: none"> • Transverse cracks 10' to 50' • Little to no longitudinal cracking • Unraveling moderate in isolated areas • Cracks are ½" to 1" some previously sealed

Table 3-13. Zuni Concrete Valley Pan PASER Rating

VALLEY PAN LOCATION	CONCRETE PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Intersection of Zuni and Cheyenne	5	Grind and repair surface defects. Some partial depth joint repairs or patching may be needed.	<ul style="list-style-type: none"> • Some spalling • Small to moderate cracking
Intersection of Zuni and Hopi	5	Grind and repair surface defects. Some partial depth joint repairs or patching may be needed.	<ul style="list-style-type: none"> • Some spalling • Small to moderate cracking



Figure 3-8. Zuni Roadway Conditions

3.8 Yuma

Table 3-14. Yuma Asphalt PASER Rating

STREET SECTION DESCRIPTION	ASPHALT PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
Yuma	4	Structural overlay > 2"	<ul style="list-style-type: none"> • Blocking 5' to 10' • Longitudinal cracking common • Unraveling in areas • Some alligator cracking • Cracks are 1/2" to 1" some have been previously sealed



Figure 3-9. Yuma Roadway Conditions

3.9 Hopi

Table 3-15. Hopi Asphalt PASER Rating

STREET SECTION DESCRIPTION	ASPHALT PASER RATING	MINIMUM RECOMMENDED REMEDY/ ACTION	NOTES
16 Hopi to 112 Hopi	5	Maintain with sealcoat or thin overlay	<ul style="list-style-type: none"> • Blocking 10' to 15' • Moderate polishing sporadic longitudinal cracking • Rutting is low < 1/2" • Unraveling in areas • 3 areas of alligator cracking • Cracks 1/2" to 1" some have been previously sealed
112 Hopi to 234 Hopi	4	Structural overlay > 2"	



Figure 3-10. Hopi Roadway Conditions

3.10 Summary

The condition of the asphalt throughout the HOA varies between 3 and 5 on the PASER rating scale. From an overall visual assessment most of the asphalt is intact, but there are signs of failing sections throughout the HOA. The total smoothness is rated a 4 out of 10 due to cracking as a result of the aging asphalt. Rutting in the neighborhood is very low and the roadway crown is currently at 4% to 5%. The suggested action is to remove the existing asphalt, assess the existing subgrade, and install a new 3" mat as the vast majority of HOA appears to have a stable and intact subgrade.

Some of the concrete valley pans will need repair due to compromised integrity with isolated areas requiring repairs to counteract heaving subgrade likely caused by tree roots. Many valley pans will be demolished during construction of the water and irrigation systems and should be replaced in-kind.