

Buckhorn Ranch

Roads Capital Improvement Plan Strategy

DRAFT FOR REVIEW

June 2017

Prepared For
Buckhorn Ranch
at the Request of
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Toad Property Management

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SECTION I: INTRODUCTION

The purpose of this report is to present a roads needs and condition assessment and a Capital Improvement Plan (CIP) spreadsheet for Buckhorn Ranch. The collected information has been used to create a budgetary cost spreadsheet for road improvements. The spreadsheet, if acceptable to the HOA, will be provided for your use to develop a CIP strategy. The overall goal is to bring all of Buckhorn's roads to good or excellent standard thereby allowing the HOA to get away from nagging chipseal patching and cyclic "pothole" maintenance.

Within the attached spreadsheet we have totaled up the road segment lengths and calculated a current replacement value (CRV) for the entire road system. The CRV is based on a building a gravel road and adding a double chip and seal surface, equal to what you have. The Buckhorn road system consists of approximately 3.9 miles of paved roads (most all of which is chip and seal). The CRV would be the cost if all roads within the development were to be built today, as chip sealed gravel roads.

The CRV for Buckhorn roads is approximately \$2.9M if they were built from raw ground today and finished with a double chip and seal. The significance of determining a CRV is to advise decision makers and residents of the value of the asset you are tasked with maintaining. This represents a significant investment worthy of a dedicated pavement maintenance, improvement and preservation plan.

Summary

In general, the current road system is in pretty rough condition as the evaluation will show and residents will attest. The recently re-built and paved entrance is holding up well and the entrance is very attractive. When you look at the attached spreadsheet, for every road except the entrance (Airhart Lane) and short portions of both North and South Avion, they all could be replaced by Full Depth Reclamation (FDR), as described elsewhere.

The evaluation of the street system has been done using a visual, comparative analysis based on the PASER system developed by the University of Wisconsin at Madison.

Within the attached spreadsheet, we have rated the roads as described below. Associated with these ratings are costs for rehabilitation work techniques required to bring the road sections up to a good to excellent condition.

SECTION II: EXISTING CONDITIONS INVENTORY

Inventory Methodology

The PASER system utilizes a ranking from 1 to 10, 1 being the worst condition and 10 being the best condition. Each road was either field measured or measured during previous survey work by SGM. Each road section was driven and in some cases walked to perform the evaluations. Photos were taken of almost all road sections.

The visual examination of the street surface includes observation with respect to cracking,

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surface distortion, surface deterioration, surface rutting, surface failure from heavy equipment and trucks, and potholing.

The Paser system is most ideal for hot mix asphalt paved surfaces however; we used this at Buckhorn simply for comparative purposes. In reality, the road ratings are not that important given the fact we are dealing with chip and seal gravel roads. Chip and sealed gravel roads do not typically have long service lives as noted below.

	<u>Life Expectancy¹</u>
1. Full Depth Reclamation (FDR) with 3" Hot Mix Asphalt (HMA)	15 - 25 years
2. Surface Mill with 2" HMA overlay	8 – 15 years
3. Chip/seal with fog seal cover	5 – 8 years
4. Asphalt slurry seal	4- 7 years

Existing Infrastructure Conditions

Generally, the rate of deterioration of street surfaces within Buckhorn Ranch has been exacerbated by construction traffic and turning movements from larger trucks and trailers. With a chip and seal gravel road, typically the road holds up well when not subjected to a lot of truck turning movements and/or few turning movements. Low volume gravel roads that are basically straight, like a lot of County roads, can obtain very good life out of a chip and seal. In general, the roads in Buckhorn have met typical chip and seal life expectancies, as noted above, particularly given the harsh climate and the amount of heavy/construction traffic the roads have experienced.

Currently, as the HOA and users are well aware, the road surface is at the end of its life and, if not rehabilitated, will continue to become more of a high maintenance item as time goes on. For discussion purposes we have rated the Buckhorn roads an average of 4.25 out of a possible 10, with 10 being the best.

The ratings applied to each road section was followed up in the attached spreadsheet with a maintenance technique to improve the condition to good or excellent (9 or 10) or to maintain an existing good to excellent road in that condition. Techniques include:

1. Full Depth Reclamation with 3" of hot mix asphalt
2. Remove chip and seal surface and replace with add road base and 3" hot mix asphalt
3. Emulsified Asphalt Slurry seal

The Paser rating system used placed a condition rating on each District street. In general, the ratings equate to the following type of work:

<u>Overall Rating</u>	<u>Description</u>
10,9,8	New or relatively new road surface

¹ Data obtained from the Colorado Asphalt Products Association

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7,6,5	Road in good condition, ready for cyclic maintenance
5,4,3	Cracking, pot holes and edge raveling. In need of preventative maintenance and rehab to select areas.
3,2,1	Failed roads. Full rehab is only option.

Capital Improvements (a general strategy to consider):

The bulk of the Buckhorn roads are rated between 3 and 5, with an average of 4.25. Although the surface is failed in many locations, the roads are still serviceable. They eliminate dust and provide reasonable skid resistance. The challenge is that most preventative maintenance road techniques, designed to extend the life of a road, such as chip seal and slurry seal, may not provide as much value to the HOA as desired.

Per the Paser system, if these were asphalt paved roads, the recommendation would be a mill and overlay. Milling of a chip seal surface provides no real value, in our opinion, unless the milling mixes the surface aggregates and asphalt oil with the underlying road base, which by default, this become a full depth reclamation of a chip and seal surface. Basically this is mixing the chip seal surface with the underlying road base. In asphalt roads this is known as Full Depth Reclamation (FDR). The resulting product is moisture conditioned and re-compacted to form a road base for a new road surface. A 3” depth of hot mix asphalt is our recommendation.

The attached spreadsheet has the following costs built in to it for budgetary purposes:

Basis of Costs

The following basis of costs has been used to generate cost estimates in the spreadsheet.

1. Full Depth Road rehabilitation with 3” of hot mix asphalt. This technique essentially pulverizes the existing asphalt surface (chip and seal in our case) and mixes this material with 6” to 8” of the underlying base material. The resulting product is shaped compacted and then paved with 3” of hot mix asphalt. Drainage improvements are key considerations and will be made on a case by case basis.

Cost:	FDR (w/out drainage improvements)	\$30.00/SY
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2. Remove chip and seal, add 4” of base and pave with 3” of hot mix asphalt. This option would allow the contractor to remove and dispose of the chip and seal surface. Typically, a portion of road base is removed with the surface therefore, we would expect to import additional base for the hot mix asphalt. Hauling and disposal adds to cost.

Cost:		\$32.00/SY
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3. Emulsified Asphalt Slurry Seal. This technique consists of mixing a dense graded aggregate (usually heavy sand) with an asphalt emulsion, water and mineral fillers. This technique improves surface friction, slows surface raveling and oxidation, seals small cracks and can correct minor surface deformations. Placed over a chip seal, this treatment would improve the aesthetics and general performance but would not increase structural integrity. SGM would not recommend this treatment over a chip sealed gravel

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road. However, we do recommend this treatment over existing pavement such as Airhart Lane.

Cost	Slurry Seal	\$3.50/SY
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Conclusion

The HOA will set the priority and strategy for both the pavement preventative (cyclic) maintenance work and road rehab work.

Our overall recommendation for the Buckhorn Ranch HOA is to pave the roads and eliminate as much chip and sealed gravel roads as possible.

We have developed an excel spreadsheet to help the HOA develop their strategy to best improve the road infrastructure within Buckhorn Ranch. Within the attached spreadsheet, we have identified road sections and optional techniques and our opinion of unit costs required to improve the condition.

SGM would be happy to assist the HOA or answer any questions related to this report and the attached spreadsheet tool.