

Recommendations on a Road Maintenance and Rehabilitation Strategy for Nature Pointe

Prepared by the Finance Committee:

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Recommendations

A professionally prepared reserve study, commissioned by the NP HOA Board of Directors, identified items that will require maintenance or repairs in the future and estimates the magnitude and timing of future (especially large) expenses that do not occur on an annual basis. Asphalt roads, in their totality, are the dominant expense in the reserve study. This one component *has* to be right to estimate future reserve expenses and to justify annual reserve contributions that ensure we will have sufficient resources available to pay for road expenses when the time comes.

The reserve study made definitive recommendations concerning maintenance and rehabilitation of Nature Pointe roads. The reserve study reflects industry best practice when making these recommendations. We call the reserve study recommendations Option 1. The NP Board deferred acting upon a key recommendation of the reserve study dealing with preventative maintenance of our roads. We call this Option 2. These two options are summarized briefly below:

- Option 1: Annual crack filling, surface seal coating every 5 years, and mill with overlay at the end of a 30-year useful life.
- Option 2: Annual crack filling, NO surface seal coating, overlay when the time comes. The developer has best voiced this option during informal conversations.

The FC assessed quantitatively both options and concluded, “Maintenance pays.” There is compelling evidence that Option 1 is in the best financial interests of the community. The FC makes the following recommendations:

1. Adopt and abide by a road maintenance strategy that supplements annual crack filling with surface seal coating every 5 years. The intent is to ensure at least a 30-year useful life for our roads and to maintain the possibility of overlay *without* milling as a viable option at the end of its useful life. This strategy, when referenced to the no seal coating strategy in Option 2, could save the HOA approximately \$97,000 to \$158,000 over a 30-year lifecycle of Phase 1 roads, Phase 2 roads, and the clubhouse parking lot. This strategy will also maintain or improve property values and increase the likelihood of lot sales by providing visible evidence that the HOA is willing and able to maintain its assets.
2. Solicit formal quotes now from three paving companies to repair a few existing asphalt failures and seal coat all Phase 1 roads, all Phase 2 roads, and the clubhouse parking lot in the spring of 2017. Crack filling should be completed prior to the seal coating and continue into the future, per our normal practice, throughout the 30 year life cycle of the roads. Asphalt repair and seal coat would be repeated every 5 years thereafter (2022, 2027, etc.) until the asphalt overlay is

required.

3. Proactively pursue options to dedicate Avenida Allegre to the county. This strategy could save the HOA an additional \$45,000 to \$50,000 over a 30-year lifecycle.
4. Distribute this document to the whole community, soliciting comment and feedback before the board implements these recommendations. Given the magnitude and consequence of these recommendations, full transparency and public discussion serves the community best.

Basis for FC Recommendations

The Finance Committee (FC) developed a business model for NP that takes a 30-year view of all sources of income (including weddings), all operational expenses (including weddings), all annual maintenance activities, and all reserve expenses. The purpose of the business model is to inform the board about the potential risk of special assessments in the future resulting from financial decisions that the Board makes today.

We have estimated 30-year lifetime costs for the two options under consideration. This analysis requires, as inputs, the costs, the maintenance intervals, and the useful lives of activities associated with each option.

Costs are relatively easy to acquire since quotes are obtainable from local paving contractors. Table 1 summarizes the various forms of road maintenance and their associated costs on a \$/ft² basis that have been obtained recently by NP from local paving companies. Some of the costs in Table 1 come from historical quotes while this study obtained other more timely quotes. Costs in today's dollars form the basis for estimated lifetime costs. However, we note that the price of oil has a strong influence on the cost of asphalt, which is currently at an anomalously low price relative to historical prices as recent as 2 years ago. Seal coating prices are about 5% lower today relative to 2 years ago, so there is some motivation to seal coat our roads soon if you think the price of oil will rebound any time soon. The costs of 1.5" overlay are about 20% lower today relative to two years ago. For comparative purposes, this analysis presents 30-year lifetime cost projections for the overlay at both today's price and the higher historically representative price.

As noted previously, for the purposes of clarity, the costs are projected in fixed, constant (i.e.; today's) dollars. The NP business model will account for inflation with selection of the best course of action. The business model will also take into account the time phasing of the maintenance and overlay activities based on the relative age of the various sections of road in NP.

We provide a brief tutorial of maintenance and rehabilitation options typically provided by paving companies:

1. Crack Filling: It is normal for asphalt to lose its flexibility and become brittle with time. Brittle asphalt will crack because of traffic loads, expansion-and-contractions due to seasonal or daily temperature variations, or structural failures of the asphalt base. Annual filling of cracks will

prevent water intrusion into cracks preventing damage to the base and preventing damage from freeze and thaw cycles during the winter. Crack filling is very cost effective and NP has been diligent about filling cracks on an annual basis.

2. **Fog Seal and Seal Coating (1x or 2x):** These processes involve spraying one or two coats of asphalt emulsion on a properly cleaned road surface. Fog or seal coats every 3 to 5 years will rejuvenate brittle asphalt and prevent further UV damage. Fog and seal coats will fill micro and emergent cracks that are normally too small for the crack filling process to be effective. The coatings are thin and do not add any significant wear layer to the road. Fog and seal coatings are most effective when road wear is dominated by UV damage and weathering as opposed to heavy road traffic, (this would seem to be the case for NP). Crack filling and seal coating are processes that complement each other, and one does not replace the need for the other. Cracks should be filled and structural failures repaired before seal coating. Because of its preventative nature, some sources recommend fog or seal coating a road as soon as two years after initial construction. Nature Pointe has never fog or seal coated its roads, although the latter is a key recommendation of our reserve study.
3. **Slurry and Chip Seal:** Slurry involves adding thin layers of asphalt (~3/8ths of an inch) impregnated with sand or fine aggregate on the road surface. Chip seal adds the aggregate on top of the asphalt layer. Slurry is more appropriate when the asphalt binder has degraded and the large aggregate in the road is exposed to the point where it potentially starts rolling out. Slurry has the benefits of fog or seal coats, and has the added benefit of adding wear layer back onto the road. The replacement interval for slurry is approximately every 8 years. A slurry seal requires that structural failures be repaired first. One paving contractor in Table 1 stated that fog or seal coating was still required. If true, then slurry is not an economical option for NP.
4. **Overlay, mill/overlay, and pulverize/overlay:** These all address road rehabilitation when the road reaches the end of its useful life. Overlay involves adding 1.5" of fresh asphalt over a properly prepared road surface. Overlay is appropriate when the road surface is structurally sound (i.e., well maintained), when there is no significant rutting in the tire lanes, and when there are no height restrictions (e.g., no need to match curb heights). It may be necessary to mill 1.5" of asphalt from the road surface before applying the overlay if these conditions are not met. The milling process (with offsite disposal of the waste) is expensive. As Table 1 suggests, it may be cost effective to pulverize the old asphalt in place, forming an enhanced road base, and overlay with 2" of new asphalt. Although milling/overlay may be forgiving of minor structural failures, the pulverize/overlay option is most appropriate when there are widespread structural failures in the road too numerous to economically repair at a reference price (Ace Paving) of \$3/ft² to \$5/ft².

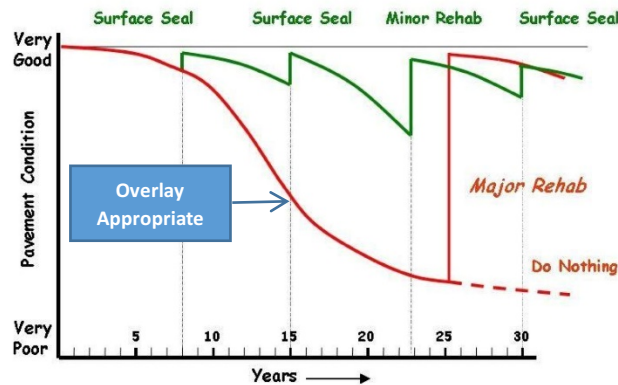
Table 1: Comparative Costs of Maintenance Activities

	Assoc. Res.	Star Paving				Armour	IPR Ltd.	Gaylord	Ace
	~10/14	~9/14	~2/15	~8/16	Hist/Current	~3/15	~9/14	~9/14	~10/16
Crack Fill \$/ft ²	\$0.0049								
Fog Seal \$/ft ²				\$0.0837					
Seal Coat (1x) \$/ft ²		\$0.0957						\$0.1554	
Seal Coat (2x) \$/ft ²	\$0.1303	\$0.1315	\$0.1315	\$0.1256	1.05	\$0.1495		\$0.2367	\$0.1254
Slurry (1x)							\$0.3764		
Slurry (Liquid Road, 2x) \$/ft ²		\$0.5384		\$0.5142					
Overlay (1.5") \$/ft ²		\$1.1070		\$0.9208	1.20				\$1.0732
Mill/Overlay (1.5") \$/ft ²	\$1.6666								\$1.3525
Pulverize/Overlay(2") \$/ft ²				\$1.3160					

Where costs are easy to estimate, the useful lives of roads are notoriously difficult to estimate in advance, and there is no definitive source for this information. The usual wisdom is that “you’ll know it when you see it”, but that is not useful for planning. For our purposes, we define useful life as the asphalt lifetime before overlay is required. Waiting longer runs the risk of requiring much more expensive rehabilitation options; i.e., mill/overlay or pulverize/overlay. Our reserve study estimated the useful life our roads as 30 years if we periodically apply seal coat every 5 years. As we will see below, seal coating at least doubles the useful life of the road, so we estimate the useful life of our roads as 15 years if we opt not to periodically seal coat the roads. Since lifetime costs estimates are sensitive to useful life estimates, some additional discussion is required to justify our assumptions.

The useful life of a road is difficult to predict because it depends on so many factors: construction quality (base thickness and characteristics, thickness of asphalt, the “right” mixture of asphalt ingredients), traffic, weather, etc. Figure 1 is representative of many such figures found on the web if you Google “Pavement Condition Index (PCI)”. Figure 1 shows pavement deterioration as a function of time using the PCI as a measure of pavement deterioration.

Figure 1: Pavement Deterioration vs Age With and Without Surface Maintenance



Similar figures on the web show a wide variation of useful lives (typically shorter), but qualitative features are common to all:

1. Road deterioration starts slowly at first and then increases rapidly. A road that looks reasonably good at 10 years may exhibit significant deterioration at 15 years.
2. Overlay, as a rehabilitation option, is appropriate when the PCI is about 40% to 50%. This occurs between 15 and 17 years in Figure 1.
3. Preventative maintenance options (primarily seal coating in this figure) greatly extend the useful life of a road. Typically, the life extension is a factor of two or more. Figure 1 shows that preventative maintenance has the potential to extend the useful life of a road beyond 30 years.
4. "Major Rehab" in Figure 1 means complete reconstruction of the road, which is a cost prohibitive option. More importantly, the condition of the road in the years preceding major rehabilitation would be unacceptable to a community such as Nature Pointe.

We use a case study as a second means to estimate the useful lives of our roads. We reference Western Saddle Drive in the Sandia Mountain Ranch (SMR) Community, which is development a few miles east of Nature Pointe and is of similar size. The source of our information is Linda Davis who was an early resident on the road and who is a past SMR neighborhood association president. The current road was constructed in 1999, according to Davis, making it about 17 years old. Unlike our roads, the SMR roads are county maintained. Martin Pilch and Eric Schindwolf took a field trip to ascertain the road condition. Here is what we observed:

1. The road has been crack filled, but likely not annually.
2. There are extensive regions of alligator cracks along many portions of the road. Alligator cracks are structural failures.
3. There are transverse cracks in some regions up to an inch wide. These are also structural failures.
4. Edge failures exist in some areas.
5. The large aggregate is heavily exposed (asphalt binder has deteriorated between the aggregate) along the whole road.
6. There are patches of raveling i.e., regions where the asphalt binder has deteriorated to the point that the large aggregate has rolled out giving birth to potholes, some of which have been patched.
7. There are a few other potholes along the length of the road.
8. Rutting of the tire lanes is obvious in some areas.

11/11/16

Bottom line, the condition of Western Saddle Drive is well beyond the state where overly or mill/overlay would be appropriate. We speculate that overlay would have been an appropriate rehabilitation strategy 5 years ago i.e., when the road was about 12 years old.

Fortunately, we know something about the construction of roads at SMR and NP because Alex Leonard was the common developer. Leonard asserts road were construction with 2' of asphalt at SMR in comparison to 3" of asphalt at NP. Consequently, we might reasonably expect a longer useful life at NP. We sought the opinion of Dave Johnson (Senior Regional Engineer of the Asphalt Institute) on this issue. Johnson stated that the extra inch of asphalt at NP could reasonably translate into 30% to 50% of extra life. This suggests that overlay should be an option for NP when our roads are 16 to 18 years old under the assumption of no surface maintenance (i.e., Option 2). Again referencing Figure 1, periodic seal coating at least doubles the useful life of our roads, resulting in an estimated useful life of about 35 years. We expect most experts would consider these estimates optimistic despite their seeming consistency with Figure 1. For planning purposes, we recommend using the more conservative lifetimes of 30 years and 15 years for Options 1 and 2 respectively. It is better to have the money in reserves if you need it and reap the rewards if the roads last longer than planned.

The 30-year lifecycle costs of the two options noted above derive from the cost information in Table 1. Table 2 summarizes the calculations. The cost estimates come primarily from a quote provided by Star Paving in August of this year. The exception is the cost of crack filling, which comes from our reserve study, which is reasonably consistent with our actual experience. For the purpose of this comparison, we assume that all Phase 1 roads, all Phase 2 roads, and the clubhouse parking lot are maintained and are rehabilitated without regard to time phasing concerns.

The cost comparisons are conditional on the useful life of our road with and without surface maintenance. For Option 1 we use the recommendation of our reserve study; i.e., 30 useful life if we seal coat every 5 years. As noted above, we estimate the useful life of NP roads to be 15 years without seal coatings.

The results in Table 2 show that "maintenance pays" (i.e., Option 1) with an estimated lifetime savings of \$97,362 over Option 2 based on the current price of asphalt products. However, the price of oil, which currently is at anomalously low levels, strongly influences the price of asphalt products. The estimated lifecycle savings of Option 1 grows to \$158,599 if the price of overlay reverts to a historically (high) level by the time an overlay is required. This only strengthens the conclusion that "maintenance pays". The principle that maintenance pays is completely consistent with industry best practice (reinforced by Dave Johnson, Asphalt Institute). We can find no example where a road department has argued that it is cost effective to accept a shorter useful life in exchange for not having to perform preventative maintenance. It would be risky for the HOA to assume that it is an exception to this principle without compelling evidence.

Table 2: Comparative Costs of NP Maintenance Strategies

	Phase 1 + Phase 2 + CH Parking Lot (ft ²)			332520	
Maintenance	Crack Fill	Seal Coat	Overlay	Overlay	
Cost \$/ft ²	\$0.0049	\$0.1256	\$0.9208	\$0.9208	
Frequency	Annual	Every 5 Yrs	15 & 30 Yrs	30 Yrs	
30 Year Lifecycle Costs					
Option 1: With Surface Maintenance	\$563,887	\$48,880	\$208,823		\$306,184
Option 2: Without Surface Maintenance	\$661,249	\$48,880		\$612,369	
Option 1 Lifecycle Savings	\$97,362				

Nature Pointe markets itself as a “premier gated community”. Consistent with its self-image, it is important that NP distinguish itself as a community willing and able to maintain its assets. A collateral benefit of periodic seal coating is that it refreshes the aesthetics of our roads maximizing property values and the potential for future lot sales. Both are essential for the necessary growth and long-term viability of the community.

Access to the NP gate and community is via Avenida Allegre. The county does not own or maintain Avenida Allegre; instead, a private easement gives NP access to our community. Who is accountable for the additional \$45,000 to \$50,000 lifecycle costs to maintain and eventually rehabilitate Avenida Allegre? Twice initialed, the process to dedicate Avenida Allegre to the county remains uncompleted; but now is the time to drive proactively the process to completion.