

**A Whitepaper
on
Private Road Maintenance**

Oak Ridge Road Association

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The Goal of this Whitepaper:

One of the requests of the neighbors at the year 2000 Annual Road Meeting was that we document the philosophy and specifications we have adopted as our defacto standard for constructing and maintaining Oak Ridge Road. As we rotate through various road managers (a nice way of saying that we wear these volunteers out), we have experienced a number of approaches to maintaining the road. The costs associated with these approaches have been equally variable, sometimes surprising the neighbors and causing hard feelings.

It is the goal of this summary to document our intended approach to road maintenance. This is not intended to be a set of engineering specifications, but rather it is intended to help us all enjoy a common understanding of how we arrived with the road we currently enjoy and why / how we maintain the road. Inserted, purely by the author, are occasional references to our shared responsibilities, in hopes that we might set common expectations.

This is intended to be a living document and may perhaps be posted on our web page. Written comments are welcome and will be addressed. They may be directed to Andy Finrock, or to any of the members of the Board.

Special thanks to Jerry Herr, Linda Stinchfield and Kim Hamilton, who took the time to edit the draft of this paper. Clearly they deserve the gratitude of all of the neighbors as they tried valiantly to rescue this prose, in spite of my best efforts to butcher this effort. The grammatical mistakes remain mine; the spelling mistakes remain Microsoft Word; and the factual errors are embedded to test the acumen of my neighbors (I am very willing to make changes as you discover these errors).

Andy Finrock

The History of Oak Ridge Road:

Any discussion about Oak Ridge Road should start with the local histories in order to provide all of the neighbors a common understanding of how our road came to be ... or more importantly, how it came to be completed in the current manner.

The history of Oak Ridge Road should begin with the settlement of this part of the mountain by the Pfeffers on what is now the land bordering Oak Ridge to the East, near where Black Road deadends into Skyline Blvd. The Pfeffers raised a family on their land by raising livestock, selling butter in town twice a week, and through the sale of fruit they raised in their orchards and vineyards.

Old Skyline Road ran up the current Oak Ridge Road from near the vicinity of our current gate, turned uphill up the Weigle's driveway and turned north toward Las Cumbres below the cabin in which Jim and Alis Whitman now reside. When the Finfrock's arrived on the road in 1978, the cabin was inhabited and had been, so we were told, continuously since the 1880's. There was an old farm road which departed Old Skyline Road (also known as Summit Road) at the junction of the Weigle driveway (180 Oak Ridge Road) and ran down the spine of Oak Ridge. It ran past the Stinchfield - Hamilton property (200 Oak Ridge Road), past the Danner-Walton property (220 Oak Ridge Road), through the flower bed's of the Finfrock front yard (280 Oak Ridge Road), through the Reuter-Elworthy yard, down the hill through the Herr properties, exiting their property below the cabin and coming out near the rock wall at the head of Bruce McIntyre's driveway. It followed the Schmitz driveway (560 Oak Ridge Road) and ran through the meadow onto the Jorgenson meadow (620 Oak Ridge Road)... and so on down the mountain until it eventually met up with an old logging road that passed up the other side of the Shear Creek Valley and back to Skyline. Along this "road" were grapes, of which a few rare plants are still around for those interested in locating old grape varieties.

The old farm road serviced Oak Ridge for the purpose of accessing the fields, vineyards and pastures that once were located here. It also served as a means of taking to market the redwood shingles made by hand by Chris Müller, a loner whose cabin below the Skilman property still stood in 1980.

There was a problem with the location of the road that was addressed when this property was subdivided and "developed" in the 1970's, i.e., the road ran through the best and flattest property...land that was perfect for the future home sites, yards, and gardens of homeowners yet to build. Therefore, the location of the road was moved by the developer to one side of the crest of the ridge to the current location. A few of us have discovered that the surveyor's description of the original road still remains on their title ... and have been forced to re-survey the road location to update the County records as part of the process of getting a building permit.

Stories of living on Oak Ridge Road in the early 1970s always seem to include, as one of the re-occurring themes, some version of "life in spite of the road". The early road association fee collection process included an algorithm for establishing the assessment that was the envy of the IRS. Never has our tax law been as complicated as the Oak Ridge Road Assessment algorithm. It included a parcel's distance from the gate, the number of acres and the number of drivers. Changes to the bylaws took a unanimous vote ... and many of the original owners were unfriendly to any attempt to revise the rules (as well as to each other). Over the years, the assessment process and bylaws have been cleaned up. More importantly, the annual budget has increased from the \$300 total budget in the 1970s to our current budget ... and we have been able to progress from the early days of having just enough of a budget to provide a little gravel to be thrown into the worst of the ruts ... to our current asphalt, all-weather road. As late as 1980, Oak Ridge Road was a gravel road in marginal condition. The neighbors turned out when it rained, because one blocked culvert could lead to a washout in the road that would trap you in until the road was repaired, a repair for which there was never a budget.

Beginning in the early 1980s, the neighbors voted to start the process of putting an all-weather surface on the road. At first, the worst sections of the road were addressed with baserock. After six to 12 inches of baserock were compacted, then Bob Whalen would top the section off with two layers of a thick road oil with granite screenings. The one and a half miles of the road were attacked section by section, the length of each road section determined by the quantity of work required and the budget for that year. Not all sections of the road received the baserock because of lack of funds and a belief that the dirt in those areas was "ok" by itself. These sections continue to plague us today, as the dirt is largely clay and is unable to provide the resistance required in traffic areas.

In the 1990s, the quality of the original oil and screenings had deteriorated and the neighbors voted to surface the entire road with a two-inch, asphalt overlay. Again the re-surfacing was attacked section by section. Over the last few years, some trouble sections have been readdressed with additional repair using a structural mat sandwiched between the layers of asphalt in order to give the road more strength and the ability to resist the heavy truck loads which sometime travel the road. In 2000, the asphalt was again deteriorating with a multitude of cracks, potholes and alligating. The neighbors voted to seal the asphalt with a new round of oil and screenings, again by Bob Whalen.

Thus a road that began as a farmer's service road to his pastures and vineyards has progressed to a modern, all-weather road serving our homes.

Basic Road Design:

Oak Ridge Road is constructed in a manner similar to other roads in the Santa Cruz Mountains. The original developer of the property bulldozed the new road along the side of the ridge. Road building theory requires that the roadbed be located on compacted soil. Typically, this is undisturbed soil that is exposed during the road excavation process, however it can also be soil that has been compacted using a variety of equipment. A bulldozer is unable to re-compact the soil to the required specification without additional equipment. There are some locations along Oak Ridge Road where one suspects that the compaction was inadequate. We continue to see minor slippage occur in these spots (just before one reaches the Weigle / Whitman driveway and just after the Candelaria driveway).

The inward slope of the roadway toward the hillside, rather than outward toward the drop-off, is by design. While we may want to believe that someone was making sure our automobiles would slide into the hillside rather than off the road and over the edge when it snowed, the inward slope design manages the rainwater flow to make sure that water running off the road and down the hillside doesn't erode the roadbase and undercut the road. Thus the inward slope directs the water into the roadside ditches, where the water is controlled until it can exit under the road through the culverts strategically placed to keep water from puddling.

Water is the enemy of roads. The force of water is amazing, even water just running down a ditch can eat away at the mountain over time. It can certainly eat away at the road, also. Water makes its presence felt several ways. First, water on the road surface will move the small grit, sand and gravel that make up the baserock roadbed. If there is no all-weather surface on the baserock, a single heavy storm can leave the roadway so rutted and washed out as to make the road impassable. If there is a hard, weather resistant surface, it is interesting to note that water will still move the grit, sand and gravel that compose the hard surface. Asphalt is just a mixture of sand and gravel held together with a binder. Water running over asphalt with any force will slowly etch away at the surface.... first removing particles of dirt and then sand particles. With the sand particles gone, the gravel will lie exposed on the surface, only to be broken off by the next passing vehicle. The cycle repeats itself and slowly the roadway ages. If the road surface were to crack, as caused by physical pressure from heavy loads, from earth movement (as during the 1987 Loma Prieta Earthquake), or from the freeze/thaw cycle or from heavy traffic, then the prepared base below the hard surface becomes exposed to water infiltrating into the base. Water infiltrating in this manner will lead to failure of the base and sub-base, which in turn can lead to potholes and "alligating" of the hard surface. This is especially true when the base is thin or when the sub-base is of poor quality soil which expands and contracts as the soil moisture level changes.

Thus, the key to the long-term viability of any road is the proper management of water flow, and the proper maintenance of the hard surface to minimize open cracks that allow water to deteriorate the road base.

Road Maintenance:

The job of the Oak Ridge Road Manager is voluntary and thankless. That said, it should be noted that the responsibility for maintaining the road and the gate is a responsibility each of us living on Oak Ridge shares, and we need to give the Road Manager the support required to keep our road serviced.

The following represents our approach to maintenance:

A. Repairing cracks

As mentioned above, keeping the cracks in the road surface repaired is absolutely key to maintaining the road bed and avoiding costly repairs. Therefore, the following approaches should be followed:

1. Clean the crack by blowing compressed air (preferably hot) at the crack to remove loose material and dirt. The crack must be dry.
2. Fill the crack with a hot -applied material that meets the minimum requirements of ASTM D-1190. There are hot and cold materials available locally (Reed and Graham) which meet this standard.

If the cracking is too involved or the cracks too large, it may be appropriate to "slurry seal" or "oil and screen" the section.

Clearly, the road manager must review the road annually to determine if there are new cracks that require sealing.

As with any asphaltic repair, it is important to make sure that cracks are sealed on days when it is hot, as cold temperatures will likely prevent the successful binding of the repair compound and the existing road.

B. Surface sealing

Sealing the asphalt surface is required as a regular part of road maintenance, even when no cracking is evident. This is because the upper portion of the asphalt's surface will slowly degrade as the material off-gases the volatile compounds in the asphalt binder. If allowed to continue without a rejuvenating sealer, the fines, sand, and ultimately the gravel, will wash away under water and vehicle traffic.

There are several types of slurries. We have used a thin, penetrating sealer sprayed onto the surface ... and this was, essentially, a waste of our money. The most recent sealing completed (summer, 2000) was an "oil and screen" seal, and has been successful at sealing the road surface and the cracks.

Slurry sealing small sections of the road can be completed by local work parties using equipment that can be rented locally. However "oil and screening" typically involves coordinating the delivery of screenings (crushed granite rock), hot oil and an amount of equipment which would generally be better handled by a contractor, such as Bob Whalen.

C. Repairing potholes

Potholes must be repaired in a manner which insures that the fill material will remain in place. Unless the pothole is sealed, tamped, and the hotpatch adheres to the surrounding road, the material will just pop out and the effort wasted. Therefore, the following approach should be followed:

1. Clean the pothole of all loose debris, preferably by using hot, dry compressed air. Dry the surrounding soil and road surface. A dry, hot day in summer is preferred.
2. Seal the pothole with a sealant material that meets the minimum requirements of ASTM D-1190. It is preferable that the material is hot and that the sealant is brushed out onto the surrounding road surface.
3. Install the hotpatch asphalt material in maximum lifts of six inches. Tamp between lifts. The final lift should flow onto the surrounding road surface and the entire pothole tamped with a vibrating tamper until the pothole is flush with the road.

D. Cleaning the edges of the road

Asphalt is an organic compound and is susceptible to degradation if the edges of the roadway are allowed to be covered by soil and vegetation. In essence, the soil microbes digest the asphalt binder in the mix. Therefore, it is important to keep the edges of the road clear of soil and vegetation annually.

E. Cleaning the ditches

As mentioned earlier, the long-term viability of the road depends on keeping water from penetrating the asphalt surface and by successfully managing the flow of water away from the sub-base of the road. It is important that before the first few storms of the rain season, as the fall leaves are filling the ditches, to walk the road and clean out the ditches where water is forced onto the road surface or where culverts are blocked. A blocked culvert, in a heavy rainstorm, can potentially result in the loss of the road or driveway. Each landowner shares in the responsibility of keeping the water flowing across their section of the road.

Ditches where the water flow has eroded a mini Grand Canyon should be repaired with rip rap, pieces of broken concrete driveways, or two inch drain walk, whatever size is appropriate to fill the ditch and still allow the water to flow.

F. Protecting the edges

Oak Ridge Road is a narrow road and makes the meeting of oncoming traffic especially interesting. With rare exception, meeting an oncoming vehicle requires that at least one vehicle pull partially off the road to allow the other to pass. This pulling off / pulling back on breaks off the edges of the road. Therefore, it is important that Type Two baserock be placed and compacted flush with the road surface at the standard pullouts.

G. Repairing slumps

We have encountered a couple of areas on the road which continue to slowly slump or slip down the hill. The standard repair for this type of problem is to lay another layer of asphalt overlay down, on top of a tack coat. We have used a structural road mat under the overlay to help spread out the traffic weight and impact in these areas. The two areas where this was used are holding up well, however this should be considered our "little experiment", until more time passes.

H. Installing and maintaining culverts

As previously discussed, the management of the water flow is critical to the long-term viability of the road. The installation of culverts, be they under a private driveway or under the road, is key to proper water management. The uphill end of the culvert must be installed with the bottom of the culvert even with the bottom of the roadside ditch AND there must be adequate soil coverage above the culvert. For driveways, this coverage depth should be a minimum of one foot and for roads this should be a minimum of 2 feet. The slope of the culvert should be 1/4 inch of slope per horizontal foot of culvert. This slope is considered adequate to keep the water in the culvert flowing and make the culvert self-cleaning (culverts installed with less slope will silt up over time). A collector box is required at the uphill end culverts under the road to aid in capturing the flow. One would

also be required if the culvert under a private drive is set very low relative to the roadside ditch. Deepening the ditch, in such a case, would present a potential hazard to vehicles, a risk alleviated through the use of a capture box.

The downhill end of the culverts under the road require additional attention. Members of the Road Association have authorized the modification of the road's culverts to include additional piping to dissipate the energy of the flowing water to insure that the water flow below the roadway doesn't erode the roadway, itself.

I. Annual maintenance checklist

| <u>What</u> | <u>When (Who)</u> |
|--|---|
| * Review the status of the road, develop a scope of repair work, alternatives, and a proposed budget | Req'd @ annual meeting (Road Manager) |
| * Repair cracks, potholes, slumps contractor) | Annually as req'd (Road Manager w/ neighbors or |
| * Seal road surface or contractor) | Every three yrs as req'd (Road Manager |
| * Cleaning ditches and culverts | Every Fall as req'd (Every owner - VP) |
| * Brushing and weed control | Annually as req'd (Every owner - VP) |
| * Gate maintenance | As req'd (Gate managers) |

Other Ongoing Maintenance Activities

While the Road Manager is busy trying to insure a well maintained roadway, it is important to note that there are several activities on the road which require the active involvement of the neighbors. Often these activities rely on work parties arranged by the Oak Ridge Road Vice President; however it is the responsibility of each of us to keep the neighborhood looking good.

A. Brushing

The annual brushing parties are legendary on the road. It is a tradition to meet after the Annual Meeting in April to start the brushing for the year. Past years' brushing activity have lasted from one to several days and are successful largely because of the equal amounts of sweat, laughter, and cursing enjoyed by the crew.

Brushing involves cutting back the undergrowth and overhanging tree branches along the sides of the road and, in turn, disposing of the debris, usually by chipping. This work is important in order to:

- * Open up the sightlines on the road and improve visibility for the safety of drivers, walkers and baby-carriage-pushers, etc.
- * Remove weak or dead limbs and trees that threaten to fall into the road or onto power lines at inopportune moments.
- * Keep the turnouts clear, safe, and visible in order to facilitate passing oncoming traffic on our narrow road.
- * Remove small to medium-sized firs, with their shallow root systems, which threaten to crowd out the eponymous oaks.
- * Keep the road clean and attractive, for pleasure and the protection of our property values.

B. Weed control

Weed control involves trimming the grass along the sides of the road, especially in the wider turnout areas. This is extremely important for fire prevention. Once the rainy season ends and the grasses mature, they become extremely dry and flammable. The danger of fire is thereby increasedóboth from cars with inadequate heat shields and from the cigarette butts that are carelessly tossed out by idiots. It is easier, unfortunately, to cut the grass than to prevent the idiots.

C. The gate

Maintenance on the gate is the purview of the Gate and Assistant Gate manager. It is unnecessary for any of us untrained, lay people to ever mess with the gate. In the event of a power failure, it is required that the hinge pin at the elbow of the gate arm is pulled and the gate pinned back.

Check with the Gate Manager to be trained on this procedure.