

## PINE BROOK HILLS ROAD QUALITY

Below is the evaluation of the roads in Pine Brook Hills based on Mike Thomas', Boulder County Department of Transportation, visual observation on March 28, 2011. This information is more subjective than the measurements by the road evaluation equipment, but coupled with the PQI map it indicates a need for road rehabilitation.

**From Mike:** After driving a few roads since March, I would consider some of the alligator cracking now more extensive than shown below. Rehabilitation of, at least, the worst roads is highly recommended.

Sorted by Alligating			
<i>Pinebrook Hills</i>	Pavement Condition		
Road Names	Alligating	Cracking	Rutting
Linden Dr.	70%	50%	20%
Wildhorse Cir	70%	70%	0%
Alpine Way	60%	60%	0%
Timber Ln	50%	50%	10%
Pinetree Ln	50%	60%	0%
Hawk Ln	50%	60%	0%
N. Cedarbrook	40%	50%	10%
S. Cedarbrook	30%	50%	0%
Beaver Way	20%	30%	0%
Balsam Ln	10%	10%	0%
Averages	45%	49%	4%

Sorted by Cracking			
<i>Pinebrook Hills</i>	Pavement Condition		
Road Names	Alligating	Cracking	Rutting
Wildhorse Cir	70%	70%	0%
Alpine Way	60%	60%	0%
Pinetree Ln	50%	60%	0%
Hawk Ln	50%	60%	0%
Linden Dr.	70%	50%	20%
Timber Ln	50%	50%	10%
N. Cedarbrook	40%	50%	10%
S. Cedarbrook	30%	50%	0%
Beaver Way	20%	30%	0%
Balsam Ln	10%	10%	0%
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### Definitions from county and paving websites:

**Alligating:** One of the most common failures of asphalt surfaces is alligating. Alligating is the development of a pattern of interconnected cracks that take on the appearance of an alligator's skin. It is typically caused by a loss of flexibility in the asphalt. Alligating should be considered to be a warning sign of asphalt pavement failure. Cracks that form very closely together and in high prevalence are more serious than the cracks repairable with sealant and fill. These cracks are usually caused by inadequate strength or compaction of base and/or subgrade. Also, poor drainage can lead to early development of alligating pavement. Sealing an area that is alligating is a temporary solution that may delay having to replace the asphalt. A more permanent repair would be to completely replace the alligatored section. Severe alligating can lead to crumbling which is the final stage in asphalt failure. At this point, water has penetrated and damaged the base, leading the asphalt to be unsupported. The asphalt then breaks into small, loose fragments. The only solution to crumbling asphalt is removal and replacement.

**Stage One:** Alligator cracks begin with branched, discontinuous thin cracks that interconnect slightly to form a typical alligator pattern. In many cases, the initial alligating forms around a single, center crack with many intermittent smaller cracks running at angle from it. The cracks are usually no more than ¼" wide.

**Stage Two:** The cracks become prevalent & wide and are highly interconnected. Although the pieces are still small – usually less than 12" at the longest dimension – they are very loose and may be easily displaced by traffic. As the pieces become progressively larger and deeper pieces are displaced, potholes develop in the pavement surface that can reach as deep as the subgrade.

**Cracking: Random cracks** are those that appear in areas other than seams or joints in the asphalt. They follow no particular pattern and can be caused by a wide range of factors, including thermal expansion and

contraction or movement of the base material. All random cracks should be thoroughly cleaned, dried, and filled. **Reflection cracks** occur when asphalt is installed over other layers of asphalt; the cracks and joints in the underlying layer often reappear in the surface layer. This cracking is generally caused by movement in the underlying layer brought on by thermal expansion and contraction. Little can be done to eliminate reflection cracks. They should, however, be filled with a crack sealer to limit penetration of water. **Shrinkage cracks** are similar in appearance to alligating, except that the pattern is much larger. In alligating, the distance between cracks is measured in inches. The distance between shrinkage cracks is typically a foot or more. Shrinkage cracks are the result of the asphalt becoming brittle due to drying of the asphalt material. Shrinkage cracks, like alligating, are a sign that the asphalt is nearing the end of its service life. **Neglected cracks** can develop into much more serious and costly issues. Cracks that form in the pavement surface can allow harmful substances – including water, salts and engine oils – into the base and subgrade, effectively leading to the failure of the pavement surface.

**Ruts:** Ruts can form in asphalt for a number of reasons, such as heavy traffic in a particular area exceeding the load carrying capabilities of the asphalt or the base material. As base material is displaced, longitudinal channels are created in the wheel paths, causing rutting. High temperatures may soften the asphalt allowing loads to gradually displace some of the asphalt. Ruts can be repaired by removing the damaged section of asphalt, compacting the base material and installing new asphalt. Ruts can lead to the creation of potholes which are roadway/pavement failures resulting in a depression or hole.

**Chip Sealing:** Exposure to heat and sunlight evaporates oils in the asphalt, bleaching it to a light gray color. As the asphalt dries out, it loses its flexibility and becomes more susceptible to cracking and alligating. Sealing asphalt will help to slow this process, extending the life of the asphalt pavement. Chip sealing consists of mixture of aggregates and asphalt cements applied as an aggregate sealcoat. The asphalt cement is sprayed on the pavement and the aggregate is sprinkled on the surface. For most locations, asphalt should be sealed once every five years.

**Overlays:** Overlays can help preserve a road surface by placing new pavement directly over the surface of existing pavement. For most locations, overlays will last 1 - 2 years. For larger areas, overlays may need to be addressed in four stages:

Stage One: Identify broken or failed areas.

Stage Two: Mill identified areas to help with adhesion of new asphalt.

Stage Three: Install new asphalt at an average compact depth of 2”.

Stage Four: Seal patched areas with asphalt emulsion to improve bonding with the surrounding existing asphalt.

**Below the Road Surface:** The material below the asphalt of a road surface are critical to the long-term stability of the road. Sub-grade is the native prepped soil or rock ready for fill with sub-base or direct surfacing for a roadway. Sub-base is the strata of material between the underlying native sub-grade and upper road base materials.