

How flexible pavements fail:

All roadway pavements are subjected to a variety of loads, ranging from pedestrians to bicycles and motorcycles to light passenger vehicles to large semi-truck loads. The weight of vehicles is transferred to the pavement as wheel loads, thereby concentrating the stresses along a portion of the pavement width. These wheel loads, together with other factors, can result in a number of failure modes for the pavement, including but not limited to the following.

- Potholes often form as a result of errors during construction (such as segregated hot mix asphalt, poor compactive effort, or poor temperature control) or may result after initial cracking has allowed water intrusion into the subbase stone layer.
- Utility excavation of flexible pavement can allow intrusion of water into the subbase stone and subgrade unless the backfill of these excavations is carefully executed.
- Thermal cracking can result as asphalt ages or because of extreme variations in temperature; cracking allows water to intrude into the subbase stone and exacerbate into other, more significant distresses.
- When excessive flexing of the pavement occurs (e.g., when subgrade strength is lost due to water intrusion), structural support is lost and alligator cracking will occur; this condition allows even greater water intrusion and the concentrated wheel loads will escalate the failure of the road section.
- Rutting or shoving of hot mix layers are usually surface defects that may not affect the structural strength of the road section, but cause discomfort to vehicle passengers and can pose safety concerns (e.g., ability to brake dependably).
- Bleeding is usually a manifestation of poor hot mix production or poor installation, such that the asphalt binder material rises above the aggregate and creates a slick surface, again creating skidding concerns for vehicles.

Suggested Further Reading and References:

- Distress Identification Manual:
http://www.faa.gov/airports/great_lakes/airports_resources/certification_bulletins/media/09-07%20Attachment.pdf
- Distress Identification Manual (Old Version): <http://onlinepubs.trb.org/Onlinepubs/shrp/SHRP-P-338.pdf>
- FHWA Flexible Pavement Distress:
http://training.ce.washington.edu/wsdot/modules/09_pavement_evaluation/09-7_body.htm



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