

Flood Damage



Flood Damage to Sealed Roads

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Flood Damage

Water Over Road



Flood waters can cause more problems than just road closures



Flood Damage

The Problem



Damage to sealed surfaces stops road traffic and costs money to repair



Flood Damage

The Problem



Failures include:

- potholes
- sub-surface failures
- piping failures
- removal of AC surface



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On the Positive



On a positive note, the AC often stacks itself neatly allowing easy removal



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Pothole Failures



Failure is commonly due to cars driving on flooded roads or wet sub-base

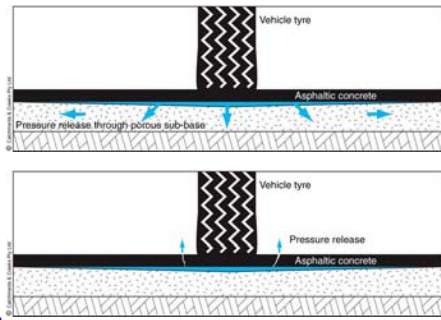


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Pothole Failures



If the hydraulic pressure cannot be released through the sub-base, then it can release through the AC



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Sub-Base Failures



Failure can result from traffic on flooded roads or the saturation of weak soils



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Piping Failures



Failures typically results from seepage along the edge of the pipe



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AC Failures



Failures typically result from a pressure differential across the pavement

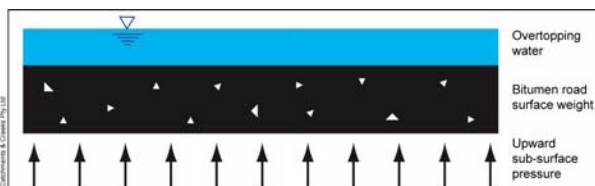


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AC Failures

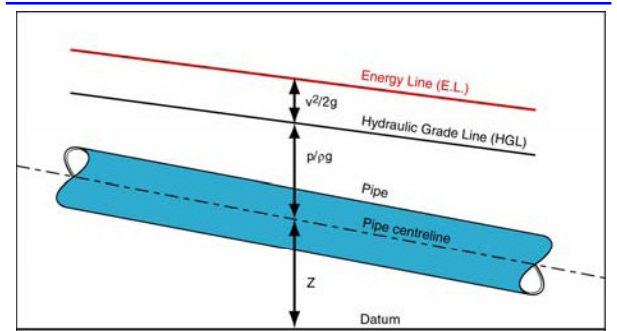


- Downward water weight and upward hydraulic pressure typically varies across the road surface
- Downward water pressure → water depth



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Pipe Flow

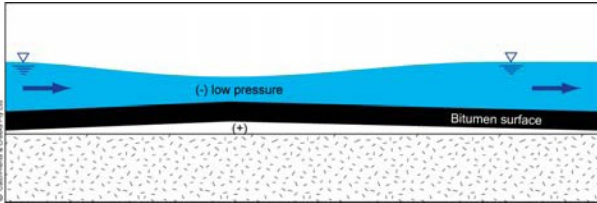


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AC Failures



Fast flowing, supercritical water passing over a raised crown can result in differential pressures which increase as the AC is lifted



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Overtopping Flows



Significant variations in water depth can occur across a flooded road



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Overtopping Flows



Blackfellow Creek, December 2010

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AC Failure Mode 1



Closely placed box culverts can still allow a pressure transfer between cells

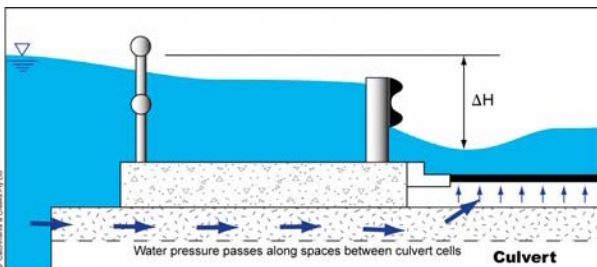


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AC Failure Mode 1



High pressures are transferred through the gap between the box cells



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AC Failure Mode 1



Options for preventing the pressure transfer include filling gaps & a top slab

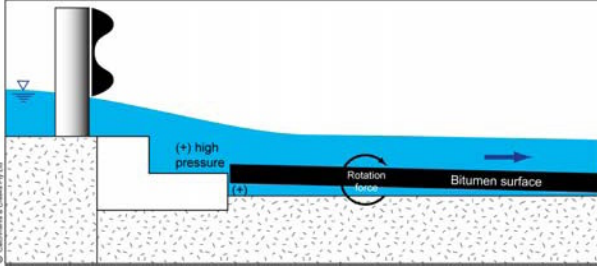


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AC Failure Mode 2



Once the AC lifts, +ve water pressure can pass under and lift the AC

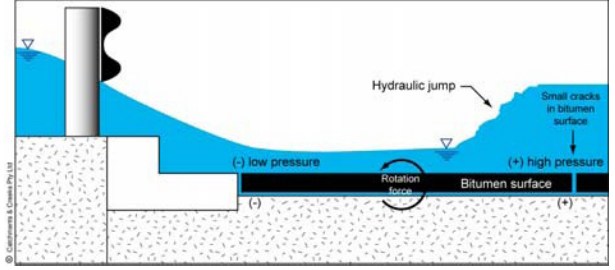


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AC Failure Mode 3



An unlikely, but problematic hydraulic condition!

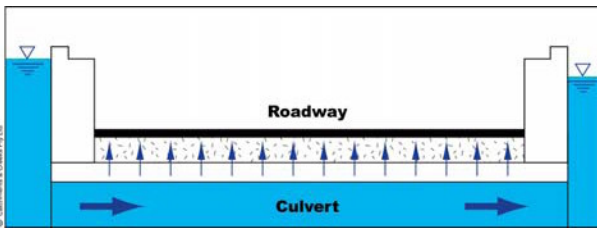


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AC Failure Mode 4



Waterway crossings formed in the shape of a channel can generate significant pressure difference if the deck is not properly sealed

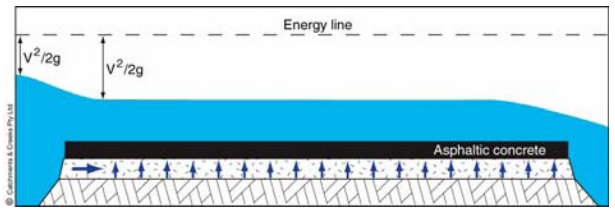


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AC Failure Mode 5

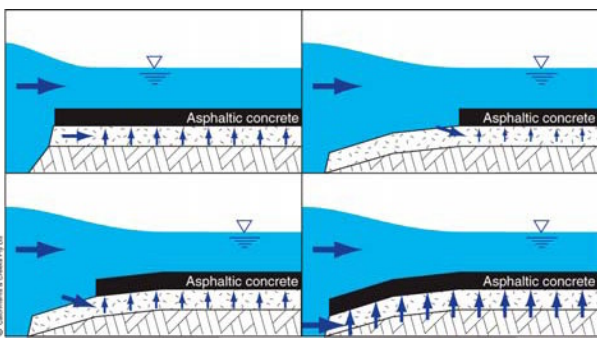


- The upward hydraulic pressure is related to the water depth at the upstream edge of the AC
- The velocity head is not relevant in this case



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AC Failure Mode 5



Flood Damage

AC Failure Mode 5

