

Typical Drainage Problems		
<u>WHAT YOU SEE</u>	<u>WHAT IT MEANS</u>	<u>WHAT YOU SHOULD DO</u>
#1 Alligator cracking	<ul style="list-style-type: none"> <li>-The sub base/sub grade is soaked (and has been for a long time).</li> <li>-Trucks are too heavy for the road to carry.</li> </ul>	<ul style="list-style-type: none"> <li>-Regrade shoulders. Deepen and clean ditches.</li> <li>-Regrade ditch. Install interceptor drains, if considered economical.</li> <li>-Keep passable with minimum maintenance and schedule reconstruction.</li> </ul>
#2 Rutting, longitudinal cracking	<ul style="list-style-type: none"> <li>-Earlier stage of the above.</li> </ul>	<ul style="list-style-type: none"> <li>-If saturated soils is the problem, try steps above.</li> <li>-If occasionally damp, might save by recycling surface and build-up road thickness.</li> <li>-If steps in #1 work, shim ruts and resurface.</li> </ul>
#3 Edge cracking	<ul style="list-style-type: none"> <li>-Road too narrow, shoulder poorly drained, or no edge support.</li> </ul>	<ul style="list-style-type: none"> <li>-Keep shoulders graded and pavement edge supported by shoulder.</li> </ul>
#4 Potholes	<ul style="list-style-type: none"> <li>-Extensive - last stage before "death".</li> <li>-Occasional - pocket of frost susceptible soil?</li> <li>-Gravel road - not enough crown, needs more frequent grading.</li> </ul>	<ul style="list-style-type: none"> <li>-Administer artificial respiration with temporary patches and put on reconstruct/recycle list.</li> <li>-Patch carefully - some of the "expensive" new materials are proving to be more economical.</li> <li>-Reshape road properly for longer lasting crown.</li> </ul>
#5 Scoured gravel shoulders	<ul style="list-style-type: none"> <li>-False ditch left by grader, turf, guardrail not cleared underneath.</li> </ul>	<ul style="list-style-type: none"> <li>-Regrade and slope shoulders.</li> <li>-Cut/remove turf and false ditches. Clean under the guardrails.</li> </ul>
#6 Standing water	<ul style="list-style-type: none"> <li>-Paved (in roadway surface) - localized "weak" sub grade, ruts or no crown.</li> <li>-Gravel road - no crown!</li> </ul>	<ul style="list-style-type: none"> <li>-Repair with a shim patch-layered.</li> <li>-Check for clogged drain.</li> <li>-Reshape high shoulder.</li> <li>-Clean, deepen ditch or repair localized area.</li> <li>-Regrade to establish crown.</li> </ul>
#7 Washouts along edge of road	<ul style="list-style-type: none"> <li>-Substandard shoulder maintenance or poor materials.</li> </ul>	<ul style="list-style-type: none"> <li>-Grade out the false ditches!</li> <li>-Bring low shoulders up to grade of new pavement.</li> <li>-Use proper shoulder material and compact it!</li> </ul>
#8 Piping holes in gravel shoulder/road	<ul style="list-style-type: none"> <li>-Pipe incorrectly installed.</li> <li>-Inlet needs head wall or other form of protection.</li> </ul>	<ul style="list-style-type: none"> <li>-Properly bed and compact fill when installing pipe.</li> <li>- "Seal" embankment around inlet.</li> </ul>

<b>#9 Frost boils</b>	-Frost susceptible soils in roadway and source of free water.	-Deepen ditches or install under drains to try to lower water table. Replace frost susceptible soil if localized. Use open-graded (few fines) material in the sub grade.
<b>#10 Unstable roadway</b>	-Excess water in the sub grade.	-Try solutions in #1 above. -Install a geo textile and gravel surface on the crowned and ditched roadway.
<b>#11 Sinkholes</b>	-Fast flowing underground water tunnels through the sub grade causing eventual local collapse.	-Install interceptor drains to cut off the underground flow.
<b>#12 Scour at inlet</b>	Too steep ditch grade, poor location / alignment, clogged pipe, improper or no end protection.	-Rip rap to deflect water. -Realign. Clean.
<b>#13 Scour at outlet</b>	-Too much grade. Pipe too small or in poor condition, no end protection.	-Build stone energy dissipator. -Check invert for wear/rust. -Schedule for replacement. -Rip rap end and check to see if water flows through pipe and not around it.
<b>#14 Culvert washouts due to over topping</b>	-Culvert too small. -Both culvert and road low point at same location.	-If it washes out, first install larger or multiple culverts, or build road up. -Armor the upstream <u>and</u> downstream slope for full width of the topping. -Regrade ditch so low point not coincide with road low point.
<b>#15 Reduced culvert outlet flow</b>	-Clogged pipe, broken joints, collapsed pipe. -Beavers!	-Inspect pipe and clean, repair or replace as necessary. -Get rid of beaver!
<b>#16 Culverts heaved by frost</b>	-Sub grade freezes earlier and deeper below the culvert than adjacent sub grade.	You can try: -Installing styrofoam panels in the bottom of the excavation before placing the culvert; Blocking air flow through the culvert with caps or fabric (be sure and remove before spring!). -Reset culvert and use similar backfill to adjacent soils.
<b>#17 Improperly installed driveway culvert</b>	-Obstructs roadside drainage. -Channels water onto road. -Disrupts shoulder slopes. -Ponded water between culvert and edge of road.	-Require driveway permits and/or install them properly.

<p><b>#18 Erosion of slopes and ditches</b></p>	<p>-Too much water in concentrated form. -Flow too fast for channel lining.</p>	<p>-Use berm ditches to intercept surface water on high slopes. Use ditch turnouts. Reshape ditches. Install check dams in steep ditch. Revegetate ditches or line with erosion control materials or pave.</p>
<p><b>#19 Slides or slip outs on slopes</b></p>	<p>-Subsurface water seeping from a slope or moving parallel to the surface.</p>	<p>-Install one or more subsurface drains to lower the groundwater table. Undercut the slope and place a thick blanket of stone or rock on the slope - (good only for shallow slope) so that the wet slope is stable.</p>
<p><b>#20 Pounded water in inlet ditch</b></p>	<p>-Clogged culvert or ditch. -No ditch grade. -Culvert inlet too high.</p>	<p>-Check for broken/collapsed pipe and replace if necessary. -Clean out culverts and ditch and grade ditch to minimum of 1% (1 foot drop in 100 feet). -Reset pipe.</p>
<p><b>#21 Natural channel to wetland obstructed</b></p>	<p>-Sediment and debris has filled brook channel causing flooding periodically.</p>	<p>-Live with the problem. -Apply for DEP permit to reopen channel when you have a free week.</p>