A road drainage culvert drains water from a water table to the outside of a road. It is often made of corrugated PVC. It is also common practice to construct a sediment trap immediately before a culvert inlet.

Culverts used to cross rivers are described in FPG Crossings series (1–6).

Road drainage culvert outlets that drain onto stable non-modified ground require no additional erosion and sediment controls, although using slash to armour the culvert outlet from potential erosion is good practice. Road drainage culverts may have additional sediment control measures down slope of their outlet including flumes, sediment traps, soak holes or sediment retention ponds.
2.4 Road Drainage (Stormwater) Culverts

**Where and when to use**
1. Use road drainage culverts to divert stormwater under a road.

**Where not to use**
Not applicable to this FPG.

**Design**
1. Plan the location of road drainage culverts as part of the overall road or landing engineering design. Avoid water tables that discharge directly into a river or into a water body – aim to install a road drainage culvert a short distance up gradient of a river crossing.
2. Space and locate road drainage culverts correctly. Culvert spacing is often determined by topographical requirements as culvert outlets are best located on solid ground and not on fill. Culvert spacing is also dependent on the location of the road, for example a mid-slope road would require more culverts than a road on a ridge.
3. Intensity of rainfall should also be taken into account. A greater frequency of culverts, deeper water tables and larger culvert sizes may be required.
4. Use culverts of the correct size for the location.

**Construction**
1. Provide the contractor with details on the required road drainage culvert specifications and location as part of the overall construction specification (prescription).
2. Install to the pipe manufacturer’s specifications.
3. Install road drainage culverts during road construction and prior to metalling the carriageway.
4. Consider building culvert inlet bunds so that water does not bypass the entrance.
5. Consider building culvert inlet protection to stop slash and debris blocking the culvert.
6. Armour culvert inlets and outlets if necessary.
7. Construct culvert inlets with associated silt traps so they are easy to clean out with an excavator. Make sure the dimensions allow easy bucket access so that the culvert mouth does not accidently get damaged when collected sediment is removed.
8. Compact the culvert bed and ensure there are no rocks or objects sharp enough to damage the pipe in the backfill. Compact soil around and on top of the pipe.
9. Do not use untreated wood or pine logs on permanent road drainage culverts.
10. It is recommended to use a culvert marker or scrape a clear identifier in the cut batter and GPS their location (to enable them to be easily relocated when the road verges are overgrown).

**Maintenance**
1. Prepare a routine maintenance plan including heavy rainfall response measures.
2. Road drainage culverts need regular maintenance, especially on new construction as the inlets can easily block. Blockage may occur with deposited material or soil that has eroded from a cut slope.
3. Check culverts for functionality after heavy rain.
4. Check that the culvert spacing is sufficient to adequately drain the stormwater run-off. If not, construct additional culverts.

**Other methods**
1. For low volume roads, other construction practices such as the use of water bars or broad-based rolling dips can effectively move water from the cut bank side of the road to the outside edge.
2. For sensitive receiving environments, use sediment and/or stormwater control measures such as rock armouring, slash filters, flumes, sediment traps or soak holes or, if necessary, a combination of these.
3. Consider larger pipes and rock armouring at culvert inlets and outlets where culvert spacing is wider than ideal due to topographical constraints.
Technical specification guidelines

Culvert spacing guide:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Soil or rock erodibility and distance spacing guide (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>18% (1 in 6)</td>
<td>40</td>
</tr>
<tr>
<td>14% (1 in 7)</td>
<td>50</td>
</tr>
<tr>
<td>12% (1 in 8)</td>
<td>55</td>
</tr>
<tr>
<td>11% (1 in 9)</td>
<td>60</td>
</tr>
<tr>
<td>10% (1 in 10)</td>
<td>65</td>
</tr>
<tr>
<td>8% (1 in 12)</td>
<td>80</td>
</tr>
</tbody>
</table>

1. Use culverts of the correct size:
   • 325 mm internal diameter minimum for NES-PF zones green, yellow or orange < 25°
   • 375 mm internal diameter minimum for NES-PF zone red or orange > 25°.
2. Set the culvert at a minimum 20 degrees across the road or at the same/similar road grade.
3. Ensure the culvert has a minimum 3% cross-fall to reduce the risk of blockage.

National Environmental Standards for Plantation Forestry

Relevant regulations for sedimentation are 26, 27, 31, 33, 56.
Examples

Culvert inlet with batter cut back to allow for maintenance.
2.4 Road Drainage (Stormwater) Culverts

**Culvert installation**

1. Constructing the inlet.
2. Digging the trench at an angle to the road.
3. Bedding in the culvert.
4. Compacting fill around and over the culvert.
Erosion and Sediment Control Measures
2.4 Road Drainage (Stormwater) Culverts

Contact
Forest Owners Association
Level 9, 93 The Terrace
Wellington 6143
www.nzfoa.org.nz

Other Practice Guides in this series
- 2.1 Water Tables
- 2.2 Cut-outs
- 2.3 Berms
- 2.4 Road Drainage (Stormwater) Culverts
- 2.5 Flumes
- 2.6 Sediment Traps and Soak Holes
- 2.7 Silt Fences
- 2.8 Sediment Retention Ponds

Visit: https://docs.nzfoa.org.nz/forest-practice-guides/ to view all guides