10 Floodway design

10.1 Introduction

Section 4.1 of the Austroads *Guide to Road Design* – Part 5B is accepted for this section subject to the following amendments.

Addition(s)

1. Floodways are sections of roads which have been designed to be overtopped by floodwater. An example of a flood is shown in Figure 10.1.

*Figure 10.1 – Little Annan River floodway*

These overtopping floods usually have a 5% Annual Exceedance Probability (AEP) or higher (Average Recurrence Interval (ARI) 20-years or lower), but any crossing can be designed as a floodway. The *Manual of Uniform Traffic Control Devices* (QG 2003) describes floodways as sections of road over which water may flow for short periods in times of flood but the road remains trafficable with care.

Chapter 2 outlines many factors which should be considered before deciding on the design flood immunity for new road works.

10.2 Additional considerations

Section 4.2.1 of the Austroads *Guide to Road Design* – Part 5B is accepted for this section subject to the following amendments.
Addition(s)

1. Floodways may offer environmental advantages over culverts or bridges, since they will tend to spread flows more widely. This means that the risk of scour to waterway and surrounding land is generally reduced because flow is less concentrated.

10.3 Geometric and safety issues

Section 4.2.2 of the Austroads Guide to Road Design – Part 5B is accepted for this section subject to the following amendments.

Addition(s)

1. Exceptions to the level grading in Queensland occur where bridges have been built significantly higher than the flooded approaches on both sides. The bridges have been built on the basis that the approaches will be raised sometime in the future.

2. For further geometric requirements of width, crossfall, vertical and horizontal alignment, refer to the relevant chapters of the department’s Road Planning and Design Manual. Signage of the floodway is also important and designers are referred to the latest release of the Manual of Uniform Traffic Control Devices (QG 2003) for warrants/guidance.

10.4 Environmental factors

Section 4.2.3 of the Austroads Guide to Road Design – Part 5B is accepted for this section.

10.5 Hydraulic design

10.5.1 Floodway terminology

Section 4.2.4 of the Austroads Guide to Road Design – Part 5B is accepted for this section.

10.5.2 Flow over the road

Section 4.3.1 of the Austroads Guide to Road Design – Part 5B is accepted for this section.

10.5.3 Full floodway design calculations

Section 4.3.2 of the Austroads Guide to Road Design – Part 5B is accepted for this section.

10.6 Time of submergence/closure

Section 4.4.1 of the Austroads Guide to Road Design – Part 5B is accepted for this section.

10.6.1 Time of submergence

Section 4.4.2 of the Austroads Guide to Road Design – Part 5B is accepted for this section.

10.6.2 Time of closure

Section 4.4.3 of the Austroads Guide to Road Design – Part 5B is accepted for this section.
10.6.3 Issues related to times

Section 4.4.4 of the Austroads *Guide to Road Design* – Part 5B is accepted for this section subject to the following amendments.

**Addition(s)**

1. Average time of submergence or closure may be assessed for a range of selected grade levels and a plot of average time of submergence against level may be produced as in Figure 10.6.3.

*Figure 10.6.3 – Typical deck level/time of submergence relationship*

In many cases, the plot will reveal a particular grade level above which a relatively large increase in level will result in only a small decrease in time of submergence, and a small reduction in level results in a large increase in average time of submergence. Such a level may be selected as a starting point for economic analysis.

10.6.4 Calculation of time of submergence or closure

Section 4.4.5 of the Austroads *Guide to Road Design* – Part 5B is accepted for this section.

10.6.5 Procedure for estimating AATOC/AATOS

Section 4.4.6 of the Austroads *Guide to Road Design* – Part 5B is accepted for this section subject to the following amendments.

**Addition(s)**

1. Refer to Appendix 10A for example AATOC/AATOS calculations.

10.7 Floodway protection

10.7.1 Types of protection

Section 4.5.1 of the Austroads *Guide to Road Design* – Part 5B is accepted for this section.

10.7.2 Floodways with grassed batters

Section 4.5.2 of the Austroads *Guide to Road Design* – Part 5B is accepted for this section.

10.7.3 Floodways with other than grassed batters

Section 4.5.3 of the Austroads *Guide to Road Design* – Part 5B is accepted for this section.
10.8 **Worked examples**

Section 4.6 of the Austroads *Guide to Road Design* – Part 5B is accepted for this section.
10A Appendix: Worked examples

AATOC examples

The design floods have been calculated for the bridge for a range of probabilities. In this case, the bridge is overtopped for a flood with a discharge of 400 m³/s, so has a flood immunity of approximately Exceedances per Year (EY) 0.33 (ARI 3-years).

The design floods are plotted in Figure 10A(a).

*Figure 10A(a) – Plotted design floods*

The times of submergence are listed in Table 10A.1

*Table 10A.1 – Times of submergence*

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<th>ARI – years</th>
<th>TOS – hours</th>
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<td>100</td>
<td>7.5</td>
</tr>
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</table>
The average annual times of submergence (AATOS) are calculated as shown in Table 10A.2, assuming that the time of submergence for the PMF is 12 hours.

**Table 10A.2 – Average annual times of submergence**

<table>
<thead>
<tr>
<th>ART (years)</th>
<th>ToS (hours)</th>
<th>FT(t)</th>
<th>fT(T)</th>
<th>Area</th>
<th>Area*ToS</th>
</tr>
</thead>
<tbody>
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<td>1.000</td>
<td>0.002</td>
<td>0.010</td>
<td>0.098</td>
</tr>
</tbody>
</table>

AATOS 1.357

End of example