8

PROVIDING PUBLIC, PRIVATE AND LIVESTOCK ACCESS

8.2 Watercourse crossings

RIVER COLE

LOCATION – Coleshill, Oxon/Wilts border, SU 234935
DATE OF CONSTRUCTION – Autumn 1995
COST – concrete culvert £8.7k
– steel culvert £3k

New concrete culvert crossing under construction

DESCRIPTION

Two new crossings were required to suit farm vehicles and river maintenance plant. The design needed to be functional but at the same time to be visually acceptable without incurring excessive additional costs to achieve this balance. The use of readily available pre-fabricated materials was favoured, since this typified the practice of most farmers and landowners who need such crossings - the aim was to demostrate easily replicable and cost effective design concepts.

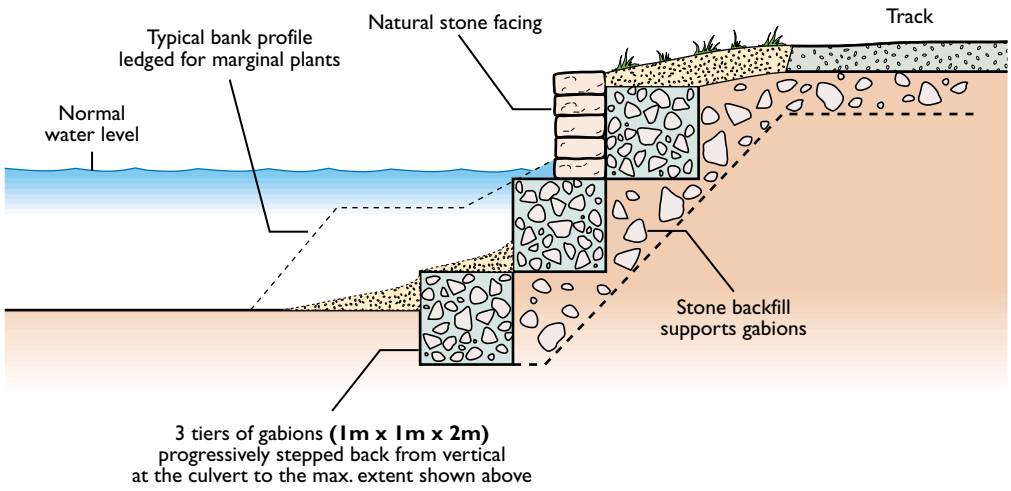
One structure crosses the c. 10m wide mill leat, and the other a newly enlarged drain feeding floodwaters from the main river channel out onto the adjacent meadows *(see 6.1 for description and location)*.

DESIGN

Mill leat crossing (fig. 8.2.1)
The structural elements comprise a pre-cast concrete box culvert 3m wide and 2.1m high that is flanked at each corner with stone filled box gabion wing walls. This arrangement is functionally satisfactory but is most unsightly so great care was taken to detail the wing walls such that visual amenity and habitat potential were improved.

Three tiers of gabions were needed to achieve the full wingwall height from invert to track level. The lower two were set just below the retained water level in the mill leat where they are permanently out of sight. These two layers were set out in plan to follow a

Figure 8.2.1
SECTION THROUGH WINGWALL OF BOX CULVERT CROSSING



90 degree curve creating a wider river cross-section than the culvert. They were progressively stepped back from the vertical to create a ledge at the top of the first tier.

The upper tier followed a similar curve but was continuously stepped back sufficient to allow a stone wall to be built around the front face - this wall is the only visible element and it is decorative rather than structural. By stepping back the gabions the sloping river banks adjacent could be brought smoothly into line with the gabions and also accommodate an underwater ledge for aquatic marginal plants. The combination of marginal plants

Completed 'bridge'

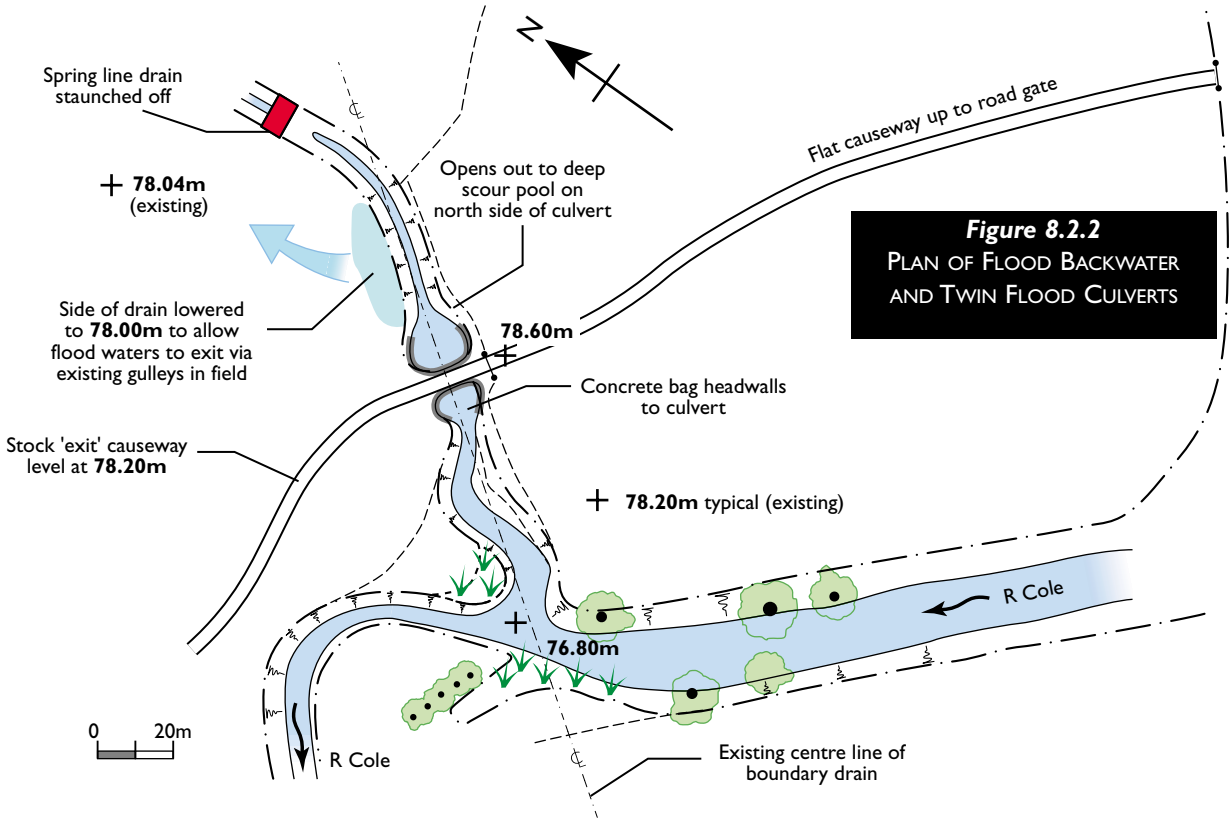


Figure 8.2.2
PLAN OF FLOOD BACKWATER AND TWIN FLOOD CULVERTS

and stone walling are intended to draw the eye away from the concrete box which is a relatively minor feature of the overall visual aspect evident in the photo.

Flood drain crossing (fig. 8.2.2)
This crossing is located downstream of the main road adjacent to spillway S4 *(see 6.1 for plan and details of the drain).*

The flood drain is only 1m deep and two pipes of this diameter were needed to provide sufficient area to pass floodwater. Corrugated galvanised steel pipes were selected by the contractor; they are readily available and easy to install. When laid side-by-side they measure about 2.5m across, which is wider that the drain. The design of the headwalls at both ends, therefore, needed to form a smooth transition between the 'over-wide' pipes and the relatively narrow trapezoidal channel.

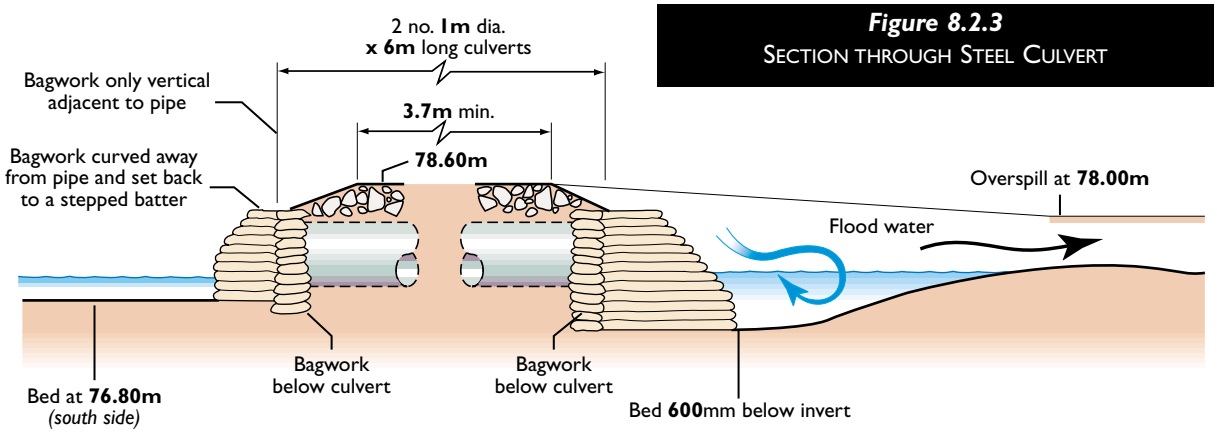


Figure 8.2.3
SECTION THROUGH STEEL CULVERT

Flood drain crossing seen from bank of R. Cole. (bagwork wing walls incomplete)

Concrete filled hessian sandbags were used to achieve this complex geometry. Another consideration was that the pressure of floodwaters passing through the pipes might produce high velocities and turbulence on exit. A distinct scour pool was excavated that was 'onion' shaped in plan and section to dissipate this energy. This is preferable to heavy revetment to contain the scour. Such pools can be attractive and also provide habitat potential.

The bagwork is built vertically across the face of the pipes and then curved gently outwards through 90 degrees or more with a slowly increasing batter until it merges smoothly into the sloping banks of the drain. The slopes are achieved by stepping the bagwork rather than laying it flat on the banks; the ledges thus formed attract silt and plant growth. The height of bagwork was curtailed close to the level of the pipe soffits.

Concrete bagwork is a versatile method of achieving complex shapes and it can rapidly take on a reasonably aesthetic appearance. This is because the concrete is invariably less dense than pre-cast or poured concrete alternatives and therefore provides a suitable surface for a variety of vegetation. The hessian rots away in a year or two, but in the short term it attracts silts which help to establish vegetation, particularly if the hessian is not impregnated with preservatives.

SUBSEQUENT PERFORMANCE 1995/98

Both crossings have functioned entirely satisfactorily and present a reasonably attractive appearance within their respective settings.

The design is deliberately utilitarian in concept to demonstrate that even the most basic engineering materials, such as steel and concrete, can be enhanced at little extra cost.

Clear span bridges of good design are generally preferable in all respects to culverts but the additional cost involved could not be justified at Coleshill where short culverts afforded adequate flow area with little risk of problems caused by blockages.