

Farm bridges: design and building process

Why have bridges?

Crossing stock and vehicles through streams can contribute significant amounts of sediment and nutrient to the waterway. Crossings of waterways should therefore have culverts or bridges which are designed to prevent mud and animal waste getting into the water. Bridges generally have less impact than culverts on stream beds, stream banks and water flows.

Bridge design

Bridge design must take account of the stream bank materials and profiles, the stream hydrology including flood flows, the intended use of the bridge and the construction materials.

1 Intended use

Decide on the intended use of the bridge as this impacts on size and design. For example, stock only, light vehicle, silage wagon, fertilizer truck or fuel tanker. Large dairy herds may benefit from a wider deck surface.

2 Identity

Determine the legal identity and ownership of the proposed bridge site.

3 Site inspection

A site inspection is required by a Civil Engineer to assess

- stream hydrology, channel capacity and flood risk
- soil foundation stability (penetrometer test)

4 Design

A Civil Engineer will produce a bridge design based on the site conditions and loading requirements. The design will need to comply with NZ Industry Standards.

The Engineer will also provide "Producer Statements" to cover the design, materials, and construction methods.

Using standardised plans and construction materials can greatly reduce the time and cost of design.

5 Costings

Costing estimates can be provided for materials, plant, labour and for obtaining consent.

Standardised designs allow more accurate costing estimates.

A ten metre single span stock bridge





Large dairy herds may benefit from a wide deck surface

6 Consent

All structures over waterways require resource consent. Check the consent requirements for the proposed bridge with your District Council and with Environment Canterbury.

District Councils may require:

- land use consent to prepare the site for the bridge
- building consent for construction of the bridge

Environment Canterbury may require:

- land consent for alteration of streambanks
- water consent for the bridges impacts on stream flows

Resource Consent application should include:

- *Description of the proposed bridge including*

- location plan and engineering design
- abutment placement and protection work
- installation, and maintenance work
- water diversion required
- machinery to be used
- timing and duration of construction

- *Description of the environment including*

- details regarding the water body
- details regarding the surrounding area
- physical resources of site
- ecosystem information
- recreational use of area

- *Details of consultation*

- to help identify potential adverse effects
- to obtain effected persons approval
- Fish & Game
- Department of Conservation
- Local Rununga
- Ngai Tahu
- river user groups
- downstream users or residents

- *Assessment of adverse effects on*

- flood carrying capacity
- stream velocity
- erosion of the bed and banks
- release of sediment
- trapping of debris
- riparian vegetation
- fish passage and bird nesting
- Mahinga kai
- artificial structures and stopbanks
- landscape and amenity values
- natural character
- water quality
- water quantity

- *Details of mitigation measures, for example:*

- machinery will not enter flowing water
- no fuel storage or refueling in the riverbed
- works shall not impede fish passage

7 Construction

Involves a tender or pricing process followed by the actual construction work. Using standard designs with precast abutments and deck slabs can reduce the time and cost of construction.

8 Post Construction

- Bridge signage erected with weight and speed restrictions.
- Construction "Producer Statement" written for local District Council.
- Regular maintenance and repair of bridge structure and waterway.

Further information

For information on resource consents and businesses involved with farm bridge design and construction, contact Environment Canterbury Customer Services at the numbers listed below.