

# Stock underpasses

## Concrete box culvert



Save time and money with a concrete box culvert underpass solution designed to meet Transit NZ requirements

### Applications

- On farm
- Rural roads
- Public roads
- Transit roads

### Features

- Durable
- Long lasting
- Strong
- Are designed to comply with HN-HO-72 Traffic Loading with any fill cover thickness
- Full range of sizes available – from 1.0 x 1.0m to 6.0 x 3.0m

### Benefits

- Quick, safe and convenient stock movement
- Less stress involved in stock movement
- Be able to move stock easily without having to worry about road crossings
- Save time and money
- Reduced labour costs associated with road crossings
- No effluent on road disputes





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### Design

The size of underpass required is determined by such factors as herd size, distance from milking shed, head room required and the height of the water table. The design is associated with the individual precast element only, not with the overall contract/job design (eg. installation, jointing, prestressing, post-tensioning, tie rods, etc.) If duct holes are to be provided they must be grouted to fill the cavity, unless specific detailing is provided to ensure minimum steel covers are maintained (30 mm). Talk to your local Humes representative about site specific conditions.

### Installation

Installation of the underpass is made easier by Humes box culvert lengths being 1.55 m long. This facilitates ease of handling and provides the ability to close only one side of the road at a time. The length of a cattle underpass is typically between 12 m and 20 m. This length is determined by the local body governing the road i.e. Transit or Local Council.

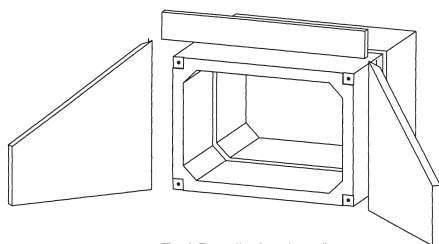
It is essential that shear keys in 0-600 installations are filled with dry pack mortar to transfer wheel loads across the deck joint, a key design assumption.

### Bedding

Safe Bearing Capacity shall exceed 100 kPa unless specific engineering foundation design is undertaken. The bedding material can be sand, cement or granular material. The compacted thickness of bedding can range from 100 mm for earth foundation to 150 mm for rock foundations. The base slab must be uniformly supported by the bedding material.

### Backfill

Backfill around the units should be placed and compacted in even layers on both sides simultaneously. Care must be taken to prevent movement of the units during backfilling.



End Details (optional)

- Shown with wingwalls and header-beam supplied separately.
- Apron slab design must accommodate starter steel from wingwalls.

### Fill cover

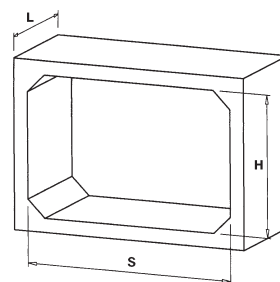
Fill cover is the depth of backfill over the culvert. Most Humes concrete box culvert underpasses are designed to withstand HN-HO-72 traffic loading with 0-2000mm cover. Alternatively units may be designed for site specific traffic loading (eg 0-85HN) and fill covers (0-2000mm) allowing cost reductions.

Buyers and users of the products described in this brochure must make their own assessment of the suitability and appropriateness of the products for their particular use and the conditions in which they will be used. All queries regarding product suitability, purpose or installation should be directed to the nearest Humes Sales Centre for service and assistance. © Fletcher Concrete and Infrastructure Limited 2006. Printed 11/17.

### Design standards

Precast box culvert elements are designed in accordance with the requirements of the Transit Bridge Manual and NZS 3101:Part 1:2006.

- design for durability is based on a specified intended life of 50 or 100 years
- unless otherwise specified all standard designs are based on exposure classifications B1 (deck inside and all outside steel) and B2 (inside wall and inside base steel)
- All 0-600 units incorporate deck shear keys and shear reinforcement in the deck slab as required by NZS 3101
- All designs apply the serviceability live load factor (1.35) required by the Transit Bridge Manual.



### Humes Underpass Range

S (m)	H (m)	L (m)	Approx mass (tonnes)*
1.0	1.0	1.55	3.0
1.5	1.0	1.55	3.6
2.0	1.0	1.55	4.1
2.0	1.5	1.55	4.7
2.0	2.0	1.55	5.3
2.5	1.0	1.55	6.4
2.5	1.5	1.55	7.13
2.5	2.0	1.55	7.9
2.5	2.5	1.55	8.7
3.0	2.0	1.55	8.7
3.0	2.5	1.55	9.4
3.0	3.0	1.55	10.2
4.0	2.0	1.55	11.0
4.0	2.5	1.55	11.8
4.0	3.0	1.55	12.6
5.0*	2.0	1.55	13.9
5.0*	2.5	1.55	14.7
5.0*	3.0	1.55	16.6
5.5	2.0	1.55	16.4
5.5	3.0	1.55	18.2
6.0	2.0	1.55	19.3
6.0	2.5	1.55	20.27
6.0	3.0	1.55	21.2

- Wall thickness varies due to traffic loads and site conditions.
- \*Non-standard, special designs required

#### NOTES:

1. All 0 – 600mm units incorporate deck shear keys and shear reinforcement in the deck slab as required by NZS 3101:1995
2. All 600 – 1200mm and 1200-2000mm units are designed for positive projecting embankment conditions
3. Masses included in table are based on nominal concrete density of 2400 kg/m<sup>3</sup>

### Manufacturing standards

Precast manufacture is to NZS 3109:1997 with surface finishes to NZS 3114:1987.