HumeDeck® bridge system

Issue 1
The HumeDeck® bridge system is a cost effective decking system with fast and simple installation and requires minimal maintenance:

- The deck and girders are combined into one unit to enable efficient design and fast and simple installation. The combined deck and girder unit provides a span from 6 m to 12 m.
- Headstocks and abutments are either fixed to piles or bolted to existing piers for faster installation.
- Minimal longitudinal joints reduce installation time and maintenance requirements.
- It is efficient to transport and handle.
- Site work is reduced as post tensioning of units is not necessary.
- The top surface of the HumeDeck® units have a coarse broom finish which can be used as the road surface without the need for additional concrete topping or asphalt surfacing.

The standard HumeDeck® bridge system has a design life of 100 years, in accordance with the Australian Standard – Bridge Design (AS 5100 – 2004).

Bridge units can be designed to meet site-specific parameters and tolerances and can also incorporate cast-in fittings for the connection of different types and classes of barriers. Kerbs can be precast integrally with the HumeDeck® units or manufactured as separate precast units and bolted to the deck units on site.
Specifications

HumeDeck® system components

Figure 1 – A complete HumeDeck® system assembly

Table 1 – Superstructure components

| Deck and girder unit* | • Deck and girders are combined into one unit.  
|                        | • Can be produced in spans ranging from 6 m to 12 m.  
|                        | • Cross-sectional dimensions are dependent upon the span and applied design load.  
|                        | • Maximum unit width is 2,700 mm although additional width can be achieved by using an in-situ joint.  
|                        | • Available with and without kerbing.  
| Precast kerbs          | • The deck and girder units can be manufactured with integral or bolt-on kerbs.  
|                        | While continuous kerbing is applicable to some bridges, standard Humes practice is to have non-continuous, slotted kerbing for ease of drainage.  
|                        | • Kerb segments are typically 1,800 mm in length with a 200 mm block-out between each segment.  
| Barriers†              | • Designed to accommodate a variety of barriers that comply with Austroads and AS 5100 standards including AS 5100 low and regular performance barriers, and jersey kerbs.  

Notes:  
* Refer to Figures 2 and 3 on page 3.  
† Refer to Figure 4 on page 3.
Figure 2 – Typical deck and girder unit cross-section

Figure 3 – Cross-section detail of a complete HumeDeck® bridge system

Figure 4 – AS 5100 low performance barrier

Table 2 – Deck and girder unit cross-sectional dimensions and masses

<table>
<thead>
<tr>
<th>Span (m)</th>
<th>A (mm)</th>
<th>B† (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>Mass for 2.7 m wide deck* (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>550</td>
<td>150 - 180</td>
<td>280</td>
<td>300</td>
<td>15.41</td>
</tr>
<tr>
<td>9</td>
<td>650</td>
<td>150 - 180</td>
<td>274</td>
<td>300</td>
<td>18.60</td>
</tr>
<tr>
<td>10</td>
<td>725</td>
<td>150 - 180</td>
<td>270</td>
<td>300</td>
<td>21.74</td>
</tr>
<tr>
<td>11</td>
<td>825</td>
<td>150 - 180</td>
<td>264</td>
<td>300</td>
<td>25.40</td>
</tr>
<tr>
<td>12</td>
<td>900</td>
<td>150 - 180</td>
<td>260</td>
<td>300</td>
<td>29.03</td>
</tr>
</tbody>
</table>

Notes:
1. Refer to Humes Technical Services for decks spanning more than 12 m.
2. *Mass does not include kerb.
3. †Typical thickness between 150 mm - 180 mm.
Table 3 – Substructure components

<table>
<thead>
<tr>
<th>Piles*</th>
<th>Two types:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Rectangular reinforced concrete piles - measure up to 550 mm x 550 mm</td>
</tr>
<tr>
<td></td>
<td>wide. Piles can be potted or driven.</td>
</tr>
<tr>
<td></td>
<td>• Prestressed octagonal piles - measure from 400 mm to 550 mm diameter.</td>
</tr>
<tr>
<td></td>
<td>Both types are designed to be mechanically joined to meet designated length.</td>
</tr>
</tbody>
</table>

| Headstock and abutments† | Can be installed on newly erected piles or existing piers.               |
|                         | • Custom made to fit a variety of traffic profiles and to suit a specific bridge width. |
|                         | • A crossfall can be maintained in one or two directions.                 |

Notes:
* Refer to Figure 5.
† Refer to Figure 6.

Figure 5 – Piles

Figure 6 – Abutment
Design information

Footing, abutment and pier design

Humes can provide design services, including foundations, for the bridge substructure. Geotechnical survey and evaluation can also be provided if ordered by the customer.

Connection to abutments and piers

HumeDeck® units are connected to abutments by Grade 8.8 hold down bolts. Galvanised pipe sections are cast into the units to allow for longitudinal movement at the free end, while restricting lateral movement. At the fixed end, the recess formed by the pipe section is grouted up. The hold down bolts are epoxy grouted into the abutments. Specific hold down bolt details are designed for individual site requirements.

Longitudinal joints

Where multiple units are placed adjacent to each other to provide the required carriageway width, a longitudinal joint will be required. The longitudinal joint may be either of the following:

1) Butt joint. This joint type is detailed with a nominal 10mm gap between units. The joint may be either sealed with a flexible sealant, or left open. Humes can provide a suitable design and detail of a sealed joint upon request.

2) In situ joint. The in situ joint is a reinforced concrete joint poured on site, after the units have been placed. The in situ joint provides a continuous concrete running surface across the width of the bridge. The longitudinal joint is reinforced with starter bars protruding from the sides of the HumeDeck® units. With additional longitudinal reinforcement, supplied by Humes, the joint can be completed. All onsite formwork and in situ concrete remains the responsibility of the customer.

Transverse joint

HumeDeck® units are manufactured with a galvanised channel cast into the ends of the units to prevent spalling of concrete along the transverse joint. Elastomeric sealant is placed between units in adjacent spans and also between end units and abutment walls to seal joints and limit individual units from longitudinal displacement due to braking loads.

Skewed installations

Skewed bridge structures are assessed individually to establish the appropriate design of HumeDeck® units. Skews in excess of 20° will require additional considerations, and alternatives may be suggested.
Contact information

National sales 1300 361 601
humes.com.au
info@humes.com.au

Head Office
18 Little Cribb St
Milton 4064 QLD
Ph: (07) 3364 2800
Fax: (07) 3364 2963

Queensland

Ipswich/Brisbane
Ph: (07) 3814 9000
Fax: (07) 3814 9014

Rockhampton
Ph: (07) 4924 7900
Fax: (07) 4924 7901

Sunshine Coast
Ph: (07) 5472 9700
Fax: (07) 5472 9711

Townsville
Ph: (07) 4758 6000
Fax: (07) 4758 6001

New South Wales

Grafton
Ph: (02) 6644 7666
Fax: (02) 6644 7313

Newcastle
Ph: (02) 4032 6800
Fax: (02) 4032 6822

Sydney
Ph: (02) 9832 5555
Fax: (02) 9625 5200

Tamworth
Ph: (02) 6763 7300
Fax: (02) 6763 7301

Victoria

Echuca
Ph: (03) 5480 2371
Fax: (03) 5482 3090

Melbourne
Ph: (03) 9360 3888
Fax: (03) 9360 3887

Tasmania

Launceston
Ph: (03) 6335 6300
Fax: (03) 6335 6330

South Australia

Adelaide
Ph: (08) 8168 4544
Fax: (08) 8168 4549

Western Australia

Gnangara
Ph: (08) 9302 8000
Fax: (08) 9309 1625

Perth
Ph: (08) 9351 6999
Fax: (08) 9351 6977

Northern Territory

Darwin
Ph: (08) 8984 1600
Fax: (08) 8984 1614
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