

## DURA<sup>®</sup> TBG Tee Bridge Girder

### Description

**DURA<sup>®</sup> TBG** Tee shaped bridge girders are prefabricated using the revolutionary composite material of ultra-high performance concrete (UHPC) and high-carbon-high-tensile steel fibers. It is an excellent solution for bridge engineers looking for a cost effective, fast construction, light-weight, high load carrying capacity and high-durability option for jetty or motorway bridges with a span range of 12 m to 32 m, or pedestrian crossing up to 40 m.

### Features

- **DURA<sup>®</sup> TBG** are typically prestressed to 70~80% of the 'guaranteed' tensile strength of the strands. Strands used are 15.2 mm diameter 7-wire super strands (low relaxation) complying with AS 1311; with a guaranteed tensile load of 260 kN.
- The UHPdC of the **DURA<sup>®</sup> TBG** has mean compressive strength above 150 MPa, and mean flexural strength of 20 MPa.
- **DURA<sup>®</sup> TBG** eliminates the used of conventional steel reinforcing bars and stirrups, except at regions where jointing detail are needed during construction. All steel fibers used are made from high carbon steel wires with tensile strength of minimum 2300 MPa and high aspect ratio.

### Advantages of DURA<sup>®</sup> TBG

- **DURA<sup>®</sup> TBG** is highly durable and impermeable. It is therefore suitable for use even in extremely harsh environments such as chemical plants or marine environment.
- **DURA<sup>®</sup> TBG** is unique as the tops of the units make up the entire deck slab to form a "full-deck" beam thus eliminating the formwork of the superstructure. Together with carefully planned detailing, the construction process can be shortened considerably, resulting in overall cost and time savings.
- No scaffolding, props or formwork are required over the supports, thus reducing construction site activities, improving safety margins and eliminating in-situ casting work (except construction of the joints and minor details).
- Ease of handling/transportation and installation as **DURA<sup>®</sup> TBG** is significantly thinner in section and at least 50% lighter than conventional beams. This weight efficiency also leads to further optimization of the foundations and support structures; at the same time contributing to a sustainable development regime.
- **DURA<sup>®</sup> TBG** can be produced to required lengths with increment of 0.5 m. Spans outside the indicated range can be considered on request.
- Due to its high durability, high ductility and high fatigue strength, it provides excellent resistance against impact and abrasion loads.



Figure 1 – A 25m single span medium traffic bridge crossing Sungai Itek (Kg. Ulu geroh, Gopeng, Perak) using two pieces of DURA<sup>®</sup> TBG1325.

**DURA**<sup>®</sup> TBG

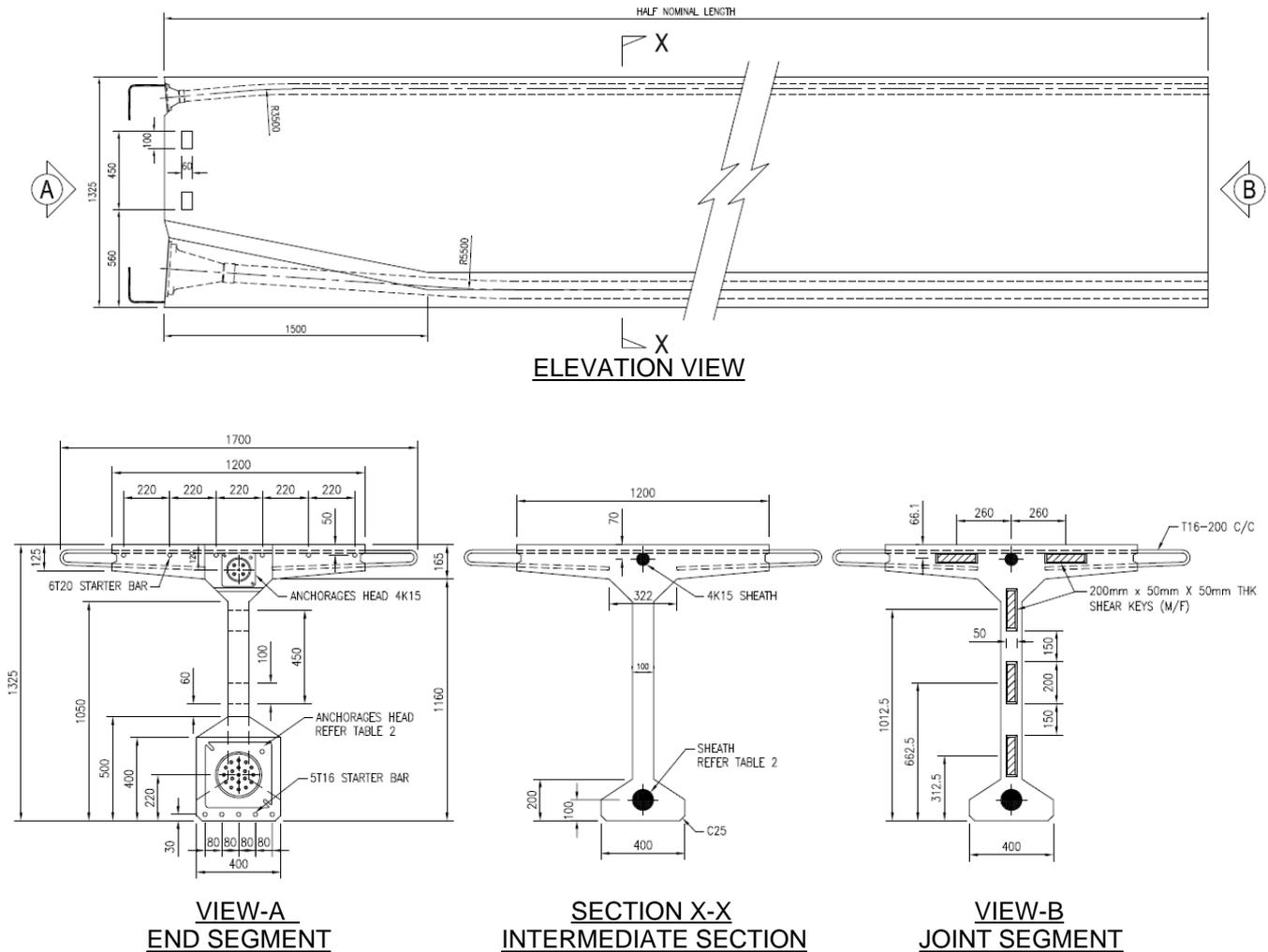


Figure 2 – Detail of DURA<sup>®</sup> TBG1325.

Table 1: Technical data for DURA<sup>®</sup> TBG.

|                             |                        | Unit                              | TBG875 <sup>↑</sup> | TBG1325 <sup>↑</sup> | TBG1000 <sup>↑↑</sup> |
|-----------------------------|------------------------|-----------------------------------|---------------------|----------------------|-----------------------|
| <b>Type of Prestressing</b> |                        |                                   | <b>Pretension</b>   | <b>Post-tension</b>  | <b>Pretension</b>     |
| <b>Length</b>               | <b>L</b>               | m                                 | 12 ~ 20             | 18 ~ 32              | 12 ~ 20               |
| <b>Weight</b>               | <b>W</b>               | kN/m                              | 8.3                 | 10                   | 7.8                   |
| <b>Sectional Area</b>       | <b>A<sub>g</sub></b>   | x 10 <sup>3</sup> mm <sup>2</sup> | 348.2               | 418.5                | 331.7                 |
| <b>Neutral Axis</b>         | <b>y<sub>top</sub></b> | mm                                | 300                 | 476                  | 416                   |
|                             | <b>y<sub>bot</sub></b> | mm                                | 575                 | 849                  | 584                   |
| <b>Moment of Inertia</b>    | <b>I<sub>xx</sub></b>  | x 10 <sup>9</sup> mm <sup>4</sup> | 34.16               | 98.186               | 44.302                |
| <b>Section Modulus</b>      | <b>Z<sub>top</sub></b> | x 10 <sup>6</sup> mm <sup>3</sup> | 113.87              | 206.07               | 106.47                |
|                             | <b>Z<sub>bot</sub></b> | x 10 <sup>6</sup> mm <sup>3</sup> | 59.41               | 115.71               | 75.87                 |
| <b>Web Thickness</b>        | <b>B<sub>w</sub></b>   | mm                                | 100                 | 125                  | 175                   |
| <b>Depth</b>                | <b>D</b>               | mm                                | 875                 | 1325                 | 1000                  |

Notes: ↑ TBG875 and TBG1325 are designed for normal highway loading as per BD37/01.

↑↑ TBG1000 is customized for abnormal excessive high loading as per clients requirement. It is ideal for jetty bridge construction.



Full scale flexure strength test for TBG1325-29.5m.  
Result certified by IKRAM QAS S/B: FS6A01/454/11 (F/002/11)



Full scale shear strength test for TBG875-8m  
Result certified by SIRIM QAS: J20085040386/(SQAS/CBMT/T.REC/CSL/15)



TBG1325 manufactured from high quality steel mould.



TBG875-20m assembled for stitching.



TBG1325-40m for construction of pedestrian bridge (Ipoh).

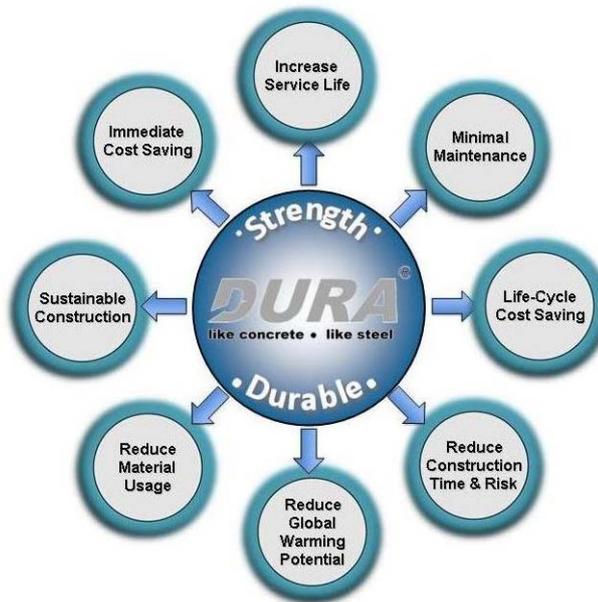


Rural bridge built within 3 months using TBG1325-32m.

Figure 3 – General photos of DURA<sup>®</sup> TBG.



TBG1000-12.1m used for Westport Malaysia access bridge 25.



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**Dura Technology Sdn. Bhd.** (721531-A)  
 Lot 304993, Jalan Chepor 11/8, Pusat Seramik Fasa 2, Ulu Chepor, 31200, Chemor, Perak, Malaysia.  
 T: + (605) 2016813, 2016823      F: + (605) 2016833      W: [www.dura.com.my](http://www.dura.com.my)      E: [dura@dura.com.my](mailto:dura@dura.com.my)