2.3.1 HIGHWAY BRIDGES

2.3.1.2 BULB-TEES

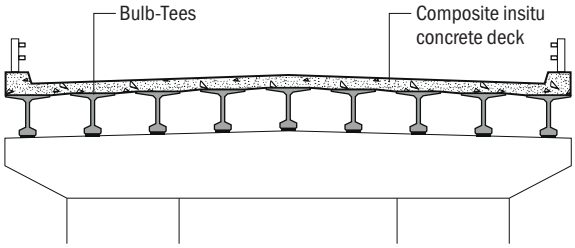
GENERAL DESCRIPTION

Bulb-Tees are precast, prestressed T-beams with a bulb-shaped bottom flange.

They are usually used in conjunction with a deck slab which acts compositely with the girders. The wide top flanges can reduce or eliminate the amount of formwork required for the insitu deck slab. These flanges also provide significant resistance to lateral bending. The bulb-shaped bottom flange provides for a well-balanced design and contributes to torsional rigidity.

Bulb-Tees are suitable for long-span structures, ranging from 18 to 40 m.

TYPICAL ARRANGEMENT



COMPONENT DETAILS

Bulb-Tees

Three standard depths are available and are designated T1 to T3. Dimensional details are shown in *Standard Sections*.
Flange widths are variable from 1200 to 1600 mm, with 1200 mm being common. Properties for sections with 1200-mm top flange are given in *Section Properties*.

No intermediate external diaphragms are necessary, resulting in a pleasing appearance.

They are usually produced using a Special Class concrete, strength grade S50. Strength at transfer of prestress should be 32 MPa, with a maximum of 37 MPa.

Prestressing strands are 15.2 mm diameter, 7-wire, stress-relieved type with approximately 30% of strands debonded or deflected. The deflection is at about 35% of the span from each end of the girder, in the web, evenly distributed in the upper section of the web at each end.

Deck Concrete

It is important to use a high-quality concrete in the deck together with best placing and curing practices. A typical deck concrete is Special Class concrete, strength grade S40.

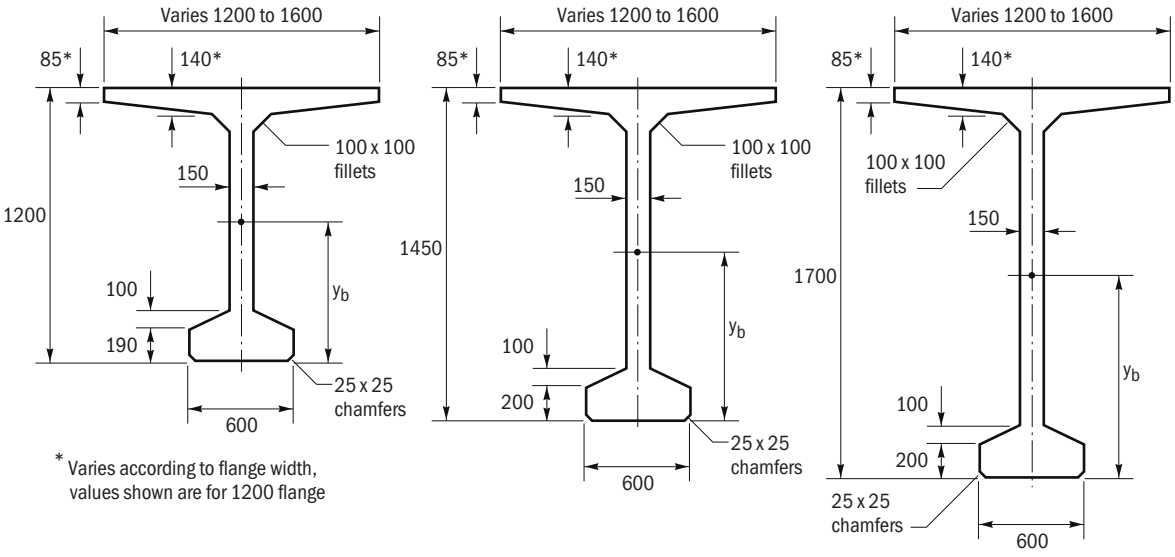
Typical deck thicknesses range from 160 to 250 mm.

SECTION PROPERTIES*

Property	Type T1	Type T2	Type T3
Span range (m)	18–32	25–33	30–40
Overall depth, D (mm)	1200	1450	1700
Area, A (mm^2)	421.6×10^3	463.6×10^3	501.1×10^3
I_x (mm^4)	83.99×10^6	135.96×10^6	201.70×10^6
y_b (mm)	645.9	769.0	896.0
Z_t (mm^3)	151.6×10^6	199.6×10^6	250.9×10^6
Z_b (mm^3)	130.0×10^6	176.8×10^6	225.1×10^6
Mass (t/m)	1.100	1.200	1.300

* Section properties for top flange width of 1200 mm

STANDARD SECTIONS



TYPE T1 – 1200 deep

TYPE T2 – 1450 deep

TYPE T3 – 1700 deep