Drafting and Design Presentation Standards
Volume 3: Structural Drafting Standards

Chapter 9: Bridge Deck Types

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Chapter 9 Amendments

Revision register

Issue/Rev No.	Reference Section	Description of Revision	Authorised by	Date
1	-	First Issue	Manager (Structural Drafting)	Apr 2011
2	-	Document name change	Manager (Structural Drafting)	Nov 2011
3	9.3 9.5 9.10	Extra “constraints” to deck types added Kerb dimensions updated to match SD2045 Width of footways defined for where traffic barriers are not present	Team Leader (Structural Drafting)	Sep 2017

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9.1 Glossary of terms

For a complete glossary of terms refer Chapter 1 - *Introduction*.

9.2 Figures and examples shown in this volume

The figures and examples shown in this volume are for presentation purposes only, and may contain some details that are now superseded. These details have been included for ease of reference, to illustrate typical solutions, and to show the required standard of drafting presentation. The details are not to be used without an engineering check and certification by a Structural RPEQ to confirm that the details are appropriate for the specific project.

9.3 General

This chapter clarifies the bridge deck profiles most commonly designed by Transport and Main Roads.

Bridges are designed to a given set of design criteria which varies for any given project. Many constraints are taken into consideration and contribute to the type of bridge superstructure designed. These may include, but are not limited to:

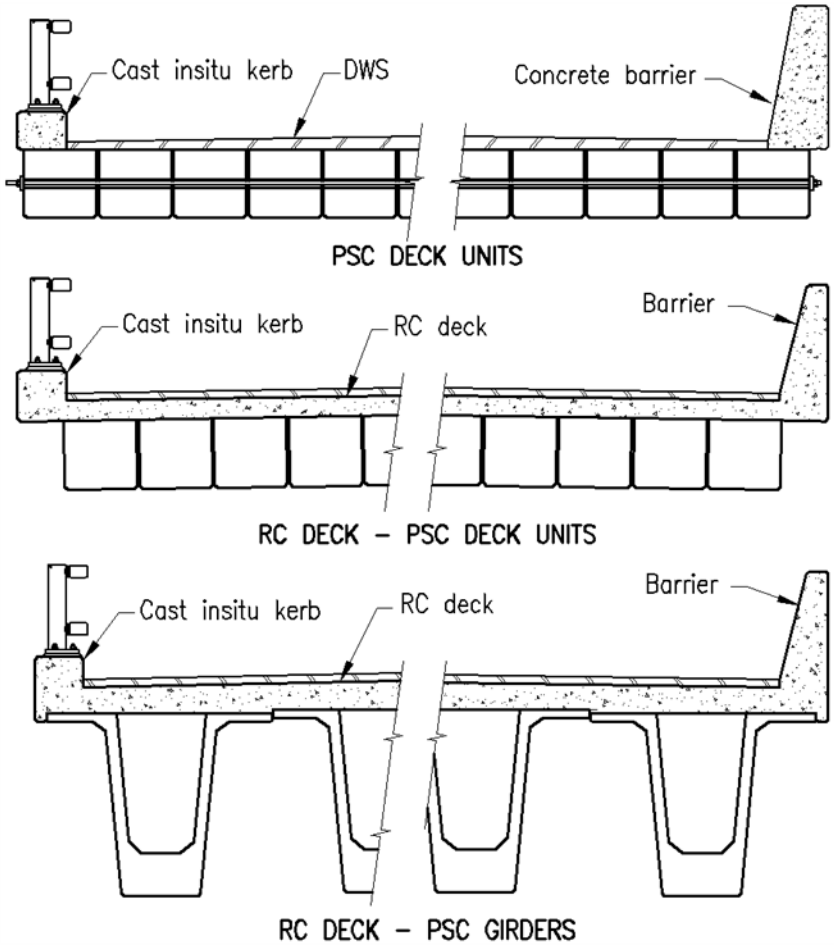
- bridge alignment
- vertical and horizontal geometry
- height above ground
- span lengths
- bridge over stream, road or railway
- footbridge / Shared user path / cycleway
- future bridge inspections and maintenance requirements
- geotechnical conditions
- ground conditions at the bridge site
- topographical features at the bridge site
- provisions for future widening
- services
- speed environment
- environmental requirements
- cultural heritage requirements
- availability of concrete to site
- ease of transport to site – physical length and tonnage may not be transportable on the road geometry
- urban vs rural environments, and
- local climatic and exposure conditions (for example, proximity to coast, high rainfall).

9.4 Deck types

The most common deck types used in bridge design fall into three main categories:

- PSC deck units with cast insitu kerbs or concrete barriers.
- PSC deck units with a reinforced concrete deck and kerbs or barriers.
- PSC or steel girders with a reinforced concrete deck and kerbs or barriers.

Figure 9.4 – Typical Deck Cross Sections



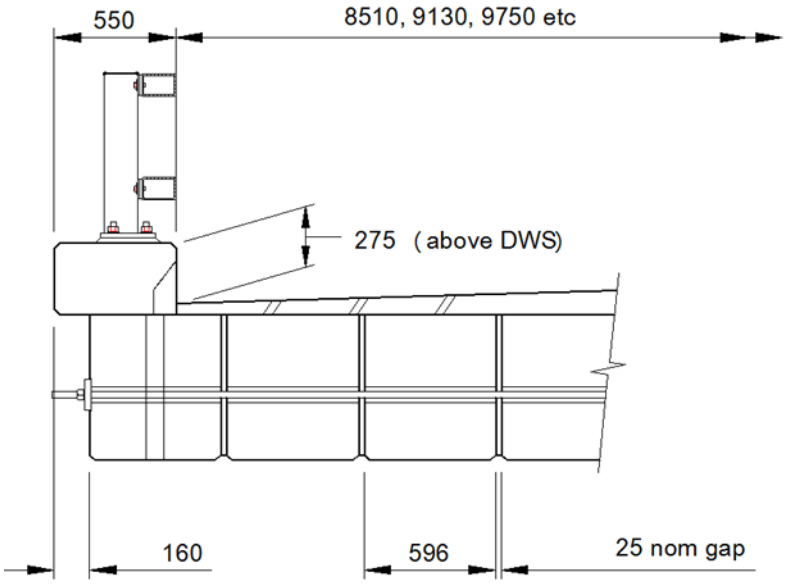
9.5 PSC deck units with cast insitu kerbs (Transversely Stressed)

Nominal widths between kerbs for this type of bridge are calculated using the following data:

- kerb width: 550 mm
- overhang: 160 mm
- deck unit width: 596 mm
- width between units: 25 mm (nominal).

Nominal widths between kerbs are therefore 8510, 9130, 9750 etc. depending on the number of deck units used. Refer Figure 9.5-1 - Cast Insitu Kerbs. For more extensive details refer Chapter 17 – *Cast Insitu Kerbs*, *Decks and Parapets* and Standard Drawing 2045 – *Standard Details of Cast Insitu Kerbs for Transversely Stressed PSC Deck Units.*

Figure 9.5 – Cast Insitu Kerbs



Gap between deck units (Transversely Stressed)

The standard gap between deck units as previously described is 25 mm nominal.

Tapered gaps may be necessary on bridges constructed on horizontal curves, or with a varying width between kerbs. In this instance, the average width of the gap over the length of the deck unit shall not exceed 30 mm, where the maximum width of gap is not greater than 40 mm at any point.

The Drafter shall check that the transverse stressing bar will fit through the deck unit stressing bar holes without touching the inside of any holes. The transverse stressing bar must not be bowed.

9.6 PSC deck units (with a reinforced concrete deck)

Reinforced concrete decks provide greater flexibility to accommodate defined geometric constraints such as roadway and footway widths and curved alignments. Reinforced concrete decks also allow for increased deck widths. For limitations on maximum deck widths refer to “Design criteria for bridges and other structures”.

Transverse stressing of the deck units is not required where a reinforced deck is used.

Some advantages of this type of construction are as follows:

- greater flexibility in laying out deck units for bridges on tight radius horizontal curves.
- generally, mortar is only required between the top 75 mm of the deck units. Overpass structures require mortar between the outer deck units only to strengthen them in case they are impacted by vehicular traffic
- the ability to provide for varying roadway cross sectional profiles over the length of the bridge structure
- a smooth running surface due to the constant thickness of DWS, and
- greater durability than transversely stressed bridges.

The deck provides an impervious barrier to water seeping through the bridge structure. Refer Chapter 17 – *Cast Insitu Kerbs and Decks*.

9.7 Span lengths - PSC deck units

Standard deck unit lengths range from 10 m (9950 mm actual unit length) to 25 m (24950 mm) in 1 m increments. A number of Transport and Main Roads PSC Deck Units Standard Drawings are available for industry reference. RPEQ Certification responsibilities remain with the project designer. The series of Standard Drawings commences at SD2042 design assumptions and continues from SD2050 – 10 m PSC Deck Unit published January 2017.

A 9950 mm long unit results in a 10 m intermediate span due to 50 mm longitudinal gaps between units at the piers. Standard unit lengths are to be used as the preferred option, this is for economy and consistency. Only in extenuating circumstances shall non-standard length units be considered for use.

Intermediate spans are the nominated span length, while end spans are slightly shorter due to the geometric configuration at the abutment headstocks. Refer Chapter 15 – *PSC Deck Units*.

9.8 PSC girders (with a reinforced concrete deck)

PSC Girders are generally utilised for spans ranging from 25 m – 35 m. Reinforced concrete decks are always used for PSC Girder projects.

In the future longer span lengths may be available soon for spans up to 46 m and girder masses up to 150 tonnes. Limitations will be present for casting yard locations, transport and handling and superstructure depths. The product must be determined appropriate for the Site and geometry.

The reinforced concrete deck may be constructed to any desired width conforming to the requirements of the roadway design. Refer Chapter 17 – *Cast Insitu Kerbs and Decks* and taking into account maximum widths stipulated in the Design Criteria for bridges and other structures. Bridge Jacking must also be taken into account when detailing deck widths as special considerations are required where the maximum no of 10 jacks per span end are exceeded. For example a longitudinal deck joint may be appropriate. Where possible it is desirable to have separate carriageways for each traffic direction to avoid exceedingly wide decks.

9.9 Span lengths - PSC girders

Deck spans on girder bridges can be set at any length within the span limitations of the girders but even metre spans are desirable.

For efficiency of design, girders of the same length should be used on the end spans as well as the intermediate spans. Refer Chapter 14 – *PSC Girders*.

9.10 Bridge footways and bikeways

Width and construction details of footways built directly onto deck units are restricted to the modular widths of the deck units and gaps between them. There are fewer restrictions when the footway is built on a reinforced concrete deck.

For minimum design requirements regarding the height of barriers refer Chapter 19 – *Bridge Barriers* and Chapter 4.9 of the *Design Criteria for Bridges and Other Structures*. These requirements are a combination of AS 5100 *Bridge Design*, the Transport and Main Roads *Road Planning and Design Manual* (RPDM), and Austroads Part 14: *Bicycles*. The nominated width of a footway / bikeway is the minimum clear distance between the inside faces of handrails / safety rails / barriers. Where a barrier is not installed between the carriageway and the footpath the nominated width of the footpath + 450 mm is to be provided. This is to provide some clear distance for vehicles overhanging the kerb

and to provide a potential barrier installation opportunity in the future. Refer to Chapter 7.10.2 of the RPDM for further information.

Refer to “Providing for Bicycles at Structures” – Chapter 5, Section 5.5.5 of the RPDM.

Figure 9.10 – Footways and Bikeways