Pumicestone road overpass (Australia)

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2. Pumicestone Road Overpass (Australia)

Owner: Main Roads Department, Queensland
Engineer: Main Roads Department Staff
Contractor: Main Roads Department Staff

Dimensions:

span length: from 9 to 21 m
bridge width: 7,3 m
angle between axes highway/overcrossing: 60 o to 90 o
maximum grade: 4 o/o

Quantities of materials used pro m2 of bridge:

0.46 m3 concrete for superstructure (span 18 m)
0.39 m3 concrete for substructure (usual foundation conditions)
140 kg steel
6,33 kg steel for prestressing

Work's duration: 10 months
Service date: 1970

Introduction

The Bruce Highway forms the National Route from Brisbane to northern cities and developing recreation beaches. Reconstruction and relocation of the highway has necessitated the construction of overpass structures across the highway.

The Pumicestone Road Overpass is a structure combining a commonly available standard I beam precast prestressed girder section with a cast-in-situ concrete deck made continuous under live load.

Design

The bridge was designed in 1969 with spans of 8.9 m, 18.3 m, 18.3 m and 9.3 m, continuous. The prestressed concrete girders were pretensioned and designed as simply supported for Dead Loads. The deck was made continuous under Live Load by providing extra reinforcement in the deck slab over the piers. This reinforcement and the connection of the precast girders over the piers was designed with reference to a publication of the Portland Cement Association [1]. Allowance was made for the effect of creep and shrinkage on the positive span moments and the negative pier moments.

To eliminate a headstock protruding below the deck soffit, the cross girder over the piers connecting the five precast girders was designed as a beam supported on neoprene bearings under two of the girders. The overhanging outer girders required the cross girder to be post tensioned using 8 no. 35 mm threaded high tensile bars.

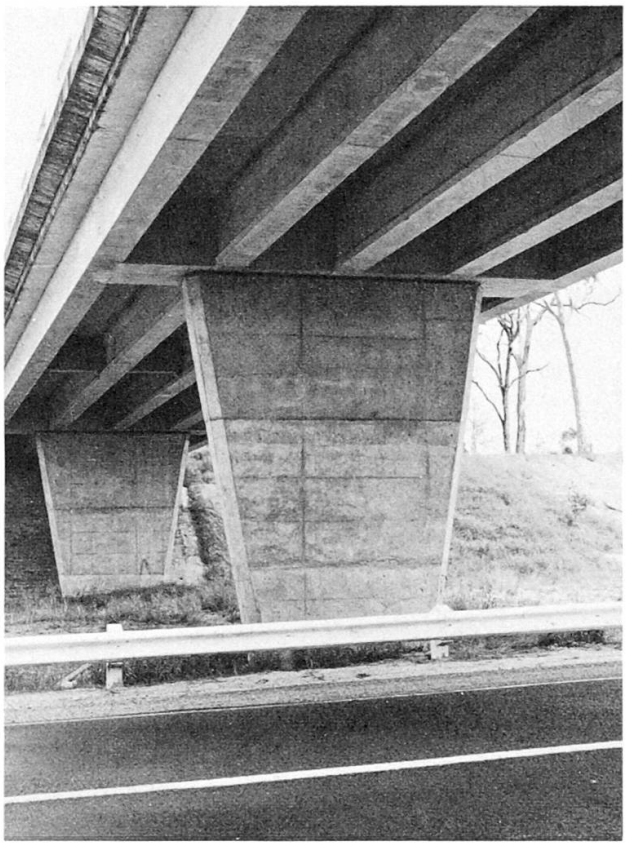
Deck Erection and Construction

The overpass structure was constructed prior to the main highway being open for traffic, allowing for simpler scaffolding and falsework. Falsework bearing on the pile cap was used to support the girders in correct alignment and just in contact with the bearings on the piers, to allow for temperature moments during construction.

The projecting reinforcement bars in the bottom flanges of the girders were welded to form the connection over the piers. The deck and cross girders were cast in the sequence shown. Following post tensioning of the cross girders, the superstructure load was transferred to bearings.

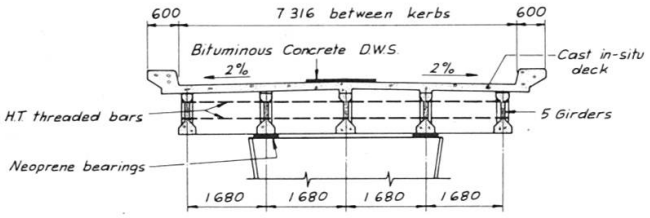
Shrinkage and temperature movement from the four continuous spans is accommodated at the Western Abutment. The deck expansion plates were constructed using profile cut 'finger plates', from 32 mm thick mild steel plate. A neoprene sheet is draped beneath the plates across the expansion joint to act as a drainage trough.

(Main Roads)

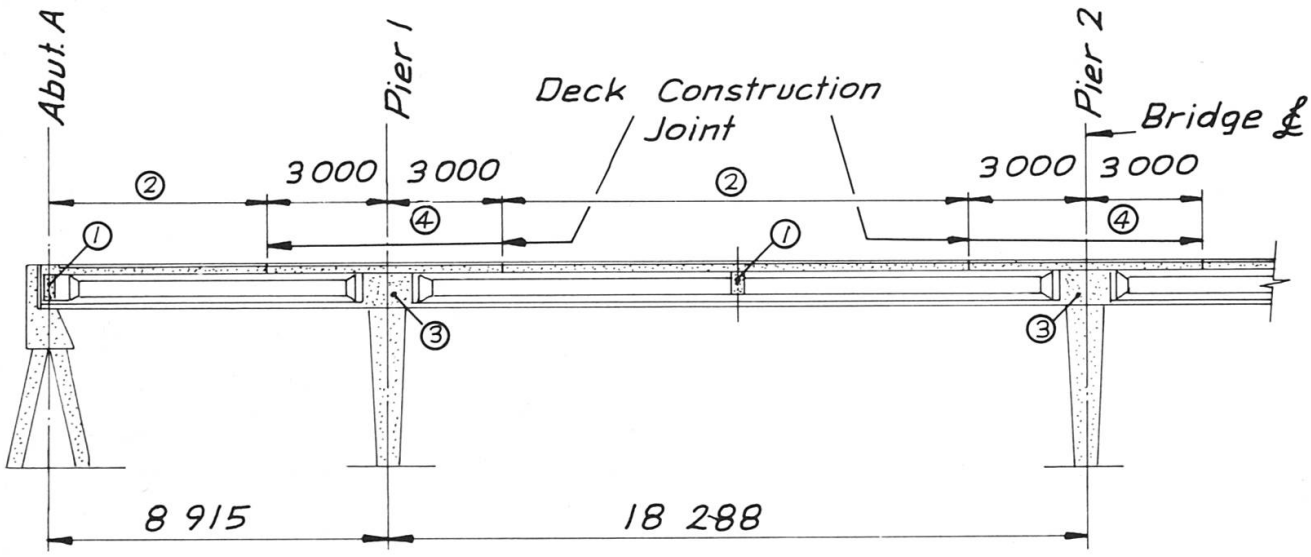


Reference 1.
'Design of Continuous Highway Bridges with Precast, Prestressed Concrete Girders'. Engineering Bulletin, August 1969
Portland Cement Association.

Design Code
'Highway Bridge Design Specification'
National Association of Australian State Road Authorities, 1965.



Type Deck Cross Section



Casting Sequence *Symmetrical about Bridge ℄*