

Zeitschrift: IABSE structures = Constructions AIPC = IVBH Bauwerke
Band: 7 (1983)
Heft: C-28: Recent structures: Part II

Artikel: East Coast Parkway (Singapore)
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DOI: <https://doi.org/10.5169/seals-18285>

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11. East Coast Parkway (Singapore)

Authority: *Public Works Department,
Republic of Singapore*

Client and Contractor: *Sato Kogyo Co Ltd, Tokyo*

Consulting Engineers: *Maunsell Consultants Ltd*

Value: *\$US 70.5 million*

Design period: *1976-1978*

Construction period: *1977-1981*

Maunsell was responsible for the design of major elements of Phase IV of the Parkway which serves the new Changi airport. Phase IV includes a 5.6 km length of eight-lane expressway which skirts the central business area of Singapore and provides connecting links with it.

The Public Works Department invited international tenders for a design and construct contract which was awarded to Sato Kogyo Co Ltd of Tokyo, Japan. Maunsell acted as consulting engineers to the contractor for design of the project including highway alignments, interchanges and viaduct structures. The high-level viaduct spanning the Singapore River and Kallang Channel is 1,800 m long and four slip-road elevated ramps are each 350 m long. There is also a 400 m-long low-level viaduct.

The high-level viaduct consists of a series of 84.5 m spans comprising 38.4 m-long trestle decks supporting suspended spans of 46.1 m. Trestle decks are formed of precast prestressed concrete segmental box girders supported by H frames with inclined upper and lower legs. Suspended spans consist of wide flange precast prestressed concrete girders. In situ slabs and diaphragms transversely join trestle deck box girders and suspended span girders. Slip-road elevated ramps are continuous prestressed

concrete spine beam box girders with span lengths varying from 29 m to 40 m. The low-level viaduct is a continuous reinforced concrete voided slab structure supported on rows of circular columns generally at 24 m centres. Structures are geometrically complex as they accommodate high curvatures and superelevation, varying width at slip-road connections and skew crossings of ground-level roads.

The Parkway traverses recently reclaimed land, so all structures are supported on piles of steel H section or driven steel casings filled with concrete. The consulting engineers played an important role in the development of erection methods and design of temporary works. Responsibilities included detailed design of structural steelwork centring and handling equipment for construction of trestle decks, and attendance during initial erection and commissioning. Provision was made in the design of permanent works for support of centring and manœuvring of precast units.

Close liaison was maintained with the specialist subcontractor for beam lifting. Beams weighing up to 170 tons were transported from casting yards at ground level and lifted by jacks positioned on an erection girder. Permanent works were designed for loadings imposed by this erection method and incorporated many special details to meet complexities of alignment at the main interchange. The advantages of a package deal contract are well illustrated by the integration of permanent and temporary works design in many areas of the Works.

The main viaduct received the Tanaka award in 1981. This award is made annually by the Japan Society of Civil Engineers for outstanding achievement in structural engineering.

(Maunsell)

