



Bangkok Subway Stabling

The Project

Maintenance and Stabling Platform Depot in Bangkok for the of Thailand Mass Rapid Transit Authority (MRTA).

Independent consultant Gordon Belton, working for Halcrow Asia, used Graitec UK's SuperSTRESS software to design the stabling platform and maintenance facility for the initial phase of the Bangkok MRTA project. The depot was built under a design and construct project by a Thai-Japanese consortium (lead contractor Kajima)

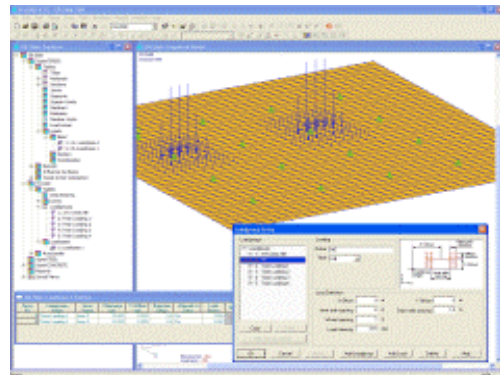


The Problem

The depot was constructed 3m above an undeveloped swamp area which had been de-watered and improved to permit access for construction plant. The depot also crossed two major drainage canals and had a plan area of 250,000 sq.m with a construction cost of around US\$ 150 million.

The Solution

The canal bridges were modelled in SuperSTRESS as grillages and the slab structure modelled as a space frame, simulating the slab with the supporting piles. Internal members were standard rectangular sections, whilst the edge members were modelled with skew edges to suit the on-site geometry. The structure was analysed with two assumptions for the pile heads, being fixed or pinned to ensure that the worst possible scenario of forces within the piles and deck slab was designed for.



Recent Project Developments

Design of the bridges and slab was to BS5400 but with modified rail loads comprising fully loaded trains with individual cars each having four 160 kN axles and with a 20 to 23m overall length. A maximum train length of 120m was specified with a track spacing of 3.73m. Other design loads for the structures included self weight, ballasted track work, rail loading, highway loading type HA plus 37.5 units of HB.

The H-LOAD software was used to simulate these train and highway loads crossing the platform and bridges. Gordon said 'The graphics were particularly useful in checking and visualising the applied loads'. Other loading applied to the structure included differential shrinkage and thermal loading which was simulated using the distortion loading type in SuperSTRESS.

Due to the small span of member, together with the requirement to provide for freedom of track/highway layout, the SuperSTRESS models were relatively large (typically 3-4,000 members) and up to 60 loadcases were simulated in the H-LOAD software. The Wood-Armer calculation facility within SuperSTRESS was used very effectively for analysing the skew slabs created by the triangular edge panels.

The actual construction of the deck of the canal bridges comprised precast pre-tensioned M type beams. The stabling platform was constructed of precast slabs supported on a 4 x 4m grid of 16,900 pre-cast concrete spun piles 60 cm diameter and 30 m long. The modular precast reinforced concrete slabs were supported on temporary clamps at the pile head and an in-situ concrete upper slab was poured to form a composite deck slab which minimised the need for formwork and support from the soft ground below.