Friarton Bridge

Client
Scottish Development Department
Structural Engineers
Freeman Fox & Partners
Steelwork Contractor
The Cleveland Bridge & Engineering Co Ltd

Judges' comments
The apparently conventional solution chosen by the designers incorporates several improvements over its predecessors. Taking advantage of the narrower two-lane carriageway requirement, each carriageway is supported on a separate single steel box structure. Difficulties of cross connections on a curve, and associated erection problems, are in this way avoided. Another first is the structural lightweight aggregate composite concrete bridge deck. The resulting clean and slender superstructure, resting on the tall slim piers, is in sympathy with the landscape and does not intrude on the clear views across the valley.

Friarton Bridge is one of the first major steel box girder bridges to be designed from the outset on limit state principles. It will carry the loadings specified in the new BS5400: Part 2 and the steelwork design complies with the Merrison Interim Design Rules. Steelwork fabrication, inspection and erection also followed the Merrison Rules and recommended procedures. An important feature is that the structure is divided along the median, virtually into two independent units. The only points of transverse connection are at bearing level at the two abutments and at the two main river piers which are of portal form. Division of the structure has been beneficial from the fabrication and erection points of view involving, for this particular width of bridge, only a very small weight penalty while bringing about a clear overall economy.

Anchorage is longitudinal at each abutment and all thermal and stress movements are accommodated at a single expansion joint, located approximately half way along the bridge. Deck continuity is provided by a new type of expansion joint which will accommodate bridge movements of ±375mm and will carry 45-unit HB axle loads. The bridge is carried on steel knuckle bearings and the high piers are designed to flex longitudinally with bridge movements.

Except in the case of the largest units over the main river piers, the box girders are of a size which allowed transportation from works to site by road – so avoiding the need for site assembly. The transverse box joints were all site welded and the very deep boxes over the river piers were split at half depth with a horizontal joint friction grip bolted at site before erection.