From the above it is evident that the committee has arranged an unprecedented opportunity to visit, without undue waste of time, some of the most noted engineering works in Canada, works the widely varying nature of which typifies in a remarkable degree the present stage of Canadian practice.

At the request of the Canadian committees, Mr. C. W. Allen, engineer of the Dominion Water Power Branch, in charge of the water power exhibit in the Canadian Pavilion at the Panama Pacific International Exposition has arranged to make the final preparations for the trip.

UNIQUE BRIDGE ACROSS PANAMA CANAL.

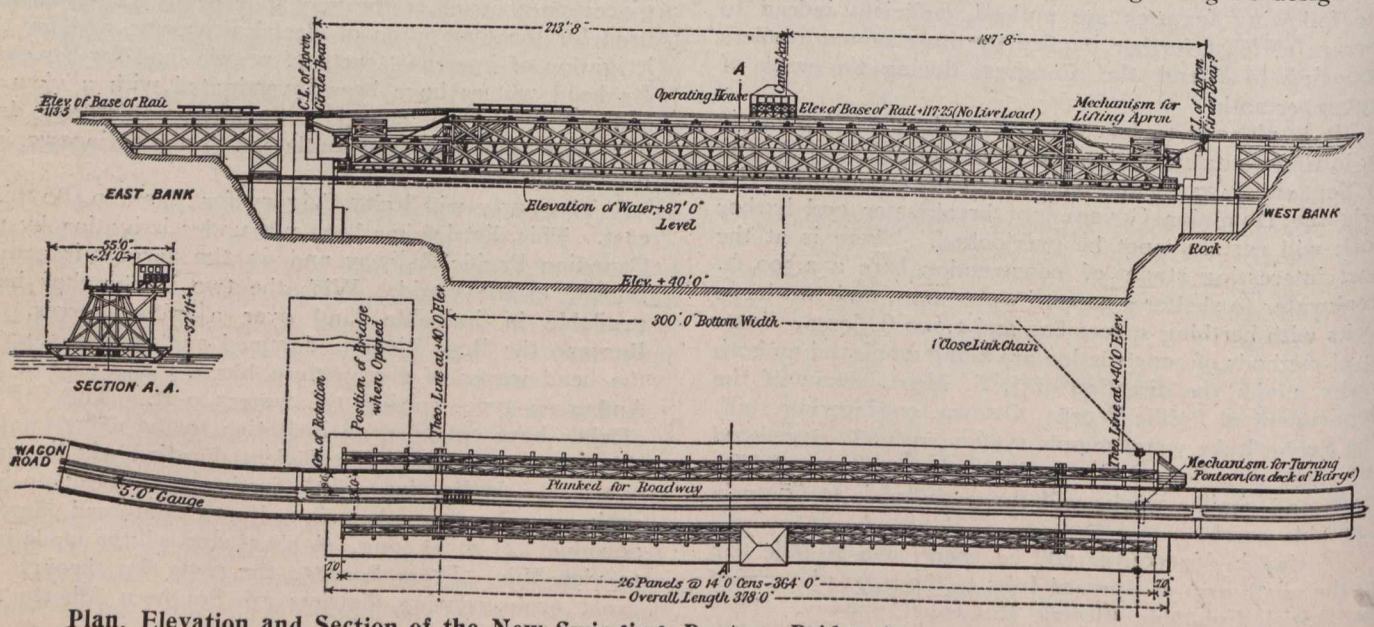
There is at Paraiso, on the Panama Canal, a swinging pontoon bridge of very interesting construction. It is used both as a railway and highway bridge, and consists of a timber barge, or pontoon, supporting a continuous framed trestle carrying the roadway. The pontoon is arranged to swing about one end, so that it may either bridge the canal or lie alongside the east bank, leaving an open waterway. Concrete piers are built at each bank of the canal, and the pontoon is pivoted about a heavy steel tube fastened to the east pier. Steel apron-girders are provided, connecting the piers with the bridge when it is closed, and the piers are connected to the banks by pile-trestle approaches. The bridge is operated by means of a 1-in. anchor-chain fastened at each bank; this passes round an electrically driven winch on the deck of the pontoon near the west end.

The pontoon is 378 ft. long over all, 55 ft. wide, and 6 ft. 3 in. deep at the centre line, and when it is open there is a clear 300-ft. channel in the canal. The frames of the pontoon are spaced 24 in. apart, the floor and rake timbers are 4 in. by 12 in., and the deck beams are 4 in. by 10 in. At intervals of 14 ft. there are trussed frames consisting of three ordinary frames bolted together, and braced with 1⅜-in. steel rods. The trestle sills are carried on these trussed frames. Six solid longitudinal bulkheads of 8-in. timber extend the full length of the pontoon. The height of the trestle structure was fixed so as to give a moderate gradient on the approaches. The rail base is 30 ft. 4 in. above water level, or 32 ft. 11 in. above the bottom of the pontoon. The trestle-bents each consist of a 12-in. by 14-in. sill, 40 ft. long, six 12-in. by 12-in. posts and 12-in. by 14-in. caps, 18 ft. long. The outer and intermediate posts are inclined, distributing the weight over the whole width of the pontoon. All the trestle-bents are braced together, as shown on the accompanying elevation. Under each rail there are two 10-in. by 16-in. and one 8-in. by 16-in. stringers, while there are additional 8-in. by 16-in. stringers on each side for carrying the roadway floor.

As the pontoon has but little longitudinal stiffness, the trestle structure was designed to act as a stiffening truss to take the bending moments and shear which come into play with a moving train on the bridge. The track stringers are fitted with plate-splices so as to form a continuous chord, and a similar chord is provided by heavy timbers at the bottom of the pontoon. The trestle bents act as verticals for the truss, while the diagonals are 2-in. rods with upset ends and turnbuckles. There are two diagonals per panel in each direction in each truss. The trestle is further stiffened by horizontal members, and a double bracing of 3-in. by 10-in. timbers on the outer posts on each side. It was found necessary to add braces and hog-bars to stiffen the framing and prevent distortion of the ends of the pontoon below the approach-aprons. The timber is Douglas fir and long-leaf yellow pine treated with carbolineum.

The apron-girders at each end provide automatically for a variation of 6 ft. in the water-level of the canal. They are 64 ft. long, and rest on hinged supports at each end. They consist of spare lock-gate parts. When the bridge is turned, the girders are lifted clear of the concrete piers by an electrically driven mechanism, and are temporarily supported by blocking on the ends of the pontoon. The mechanism for lifting the girders, moving the bridge by means of the anchor-chain already referred to, and operating the rail-latches and the main latch at the west end, is controlled from a central house on the bridge. It takes 10 minutes to turn the bridge, and about 45 minutes for a complete operation, including unlocking, opening, closing, and re-locking.

We are indebted to Engineering (London) for the illustration and for these notes regarding its design.



Plan, Elevation and Section of the New Swinging Pontoon Bridge Across the Panama Canal at Paraiso.