

The existing Grosvenor Bridge, carrying nine electrified tracks of the Southern Region over the Thames to Victoria Station. It was built in three stages, between 1859 and 1907

RECONSTRUCTION OF GROSVENOR BRIDGE

WORK on the reconstruction of Grosvenor Bridge—the trunk route across the Thames for the 1,000 Southern Region trains daily using Victoria Station—commenced in mid-May. In 1957 the British Transport Commission asked Messrs. Freeman, Fox & Partners to prepare a report on a new bridge and their recommendations were accepted in 1959.

The first bridge over the Thames was completed in 1860 by the Victoria & Pimlico Railway for the former London, Brighton & South Coast Railway and carried two tracks on four spans. In 1866 it was widened by five tracks for the South Eastern & Chatham Railway and, in 1907, two more tracks were added for the L.B.S.C.R. on the up-stream side, making nine tracks in all. It now comprises four tracks for the Eastern Section and five for the Central Section.

The existing structure includes three

separate bridges which are on common piers but with differing foundations, and the arches, although of the same profile, are different in design. The 1860 and 1907 bridges are on concrete strip foundations constructed in coffer dams and concrete caissons. The 1866 bridge is on four cast-iron cylinders sunk into the river bed and filled with concrete. The arches for the 1859 bridge are of wrought iron with hinge bearings, each arch supporting its own deck. The 1866 bridge had wrought-iron arches with fixed bearings and the deck was continuous over the four arches between the two abutments. The arches of the 1907 bridge were similar to the 1860 bridge but made of mild steel. In 1920 the three foundation groups were strengthened by relieving arches and the steelwork strengthened. The condition of the bridge, the oldest part of which is now more than a century old, is such that no further recon-

ditioning and strengthening is possible and a new bridge is necessary to cope with increasing traffic.

A comparison between the illustrations of the new bridge and the old show that the new piers are wider than the original ones and they are also longer. They are to be enlarged from 197 ft. x 31 ft. to 215 ft. x 45 ft. The new arches will have two ribs of all-welded box section and each set of four will carry the deck for one complete track. Each arch and deck will be constructed in two halves, bolted and welded together at the crown on site. The existing space of nearly 21 ft. between the four Eastern Section tracks and the five Central Section tracks will be used for an additional track on the new bridge, making ten altogether.

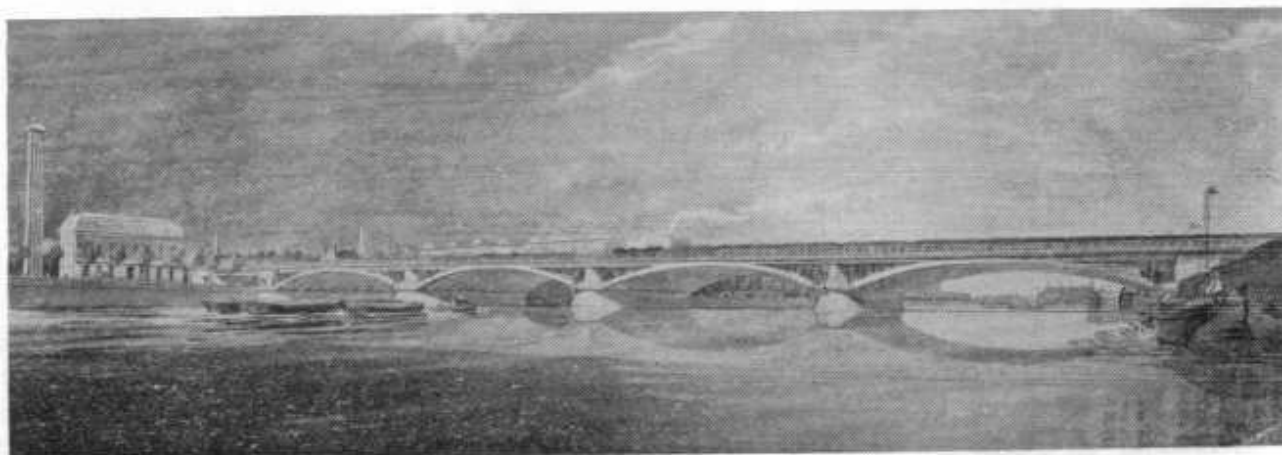
One of the stipulations made to the contractors is that eight tracks out of the present nine must be kept in normal service. By making each arch and its single-track deck a complete unit, the existing tracks and supporting steelwork can be demolished one at a time, and a new set of arches carrying the new track erected and connected up to the lines on each side of the river and put into service before demolishing the next. The method of reconstruction will enable this to be done without the use of any cranes on the tracks in service.

Reconstruction will be divided into two phases. The first phase, which is expected to last a year, will be concerned entirely with the enlargement of the foundations of the piers, no interference with traffic being involved. A sheet-pile coffer dam will be driven round each pier foundation to the

larger plan section—215 ft. x 45 ft.—and within this the existing foundations will be enlarged. The new concrete will be bonded into the old with steel reinforcement inserted into holes drilled into the old concrete. The sheet piling will be permanent up to river bed level, to which it will be cut off when each new pier foundation is complete. The two river abutment foundations require no strengthening, but they will be built out on the river side so as to give a profile similar to the new piers and to suit the bearings for the new arches.

When the bases for all three piers and abutments are completed, phase two will commence. The old piers have a core of brickwork faced with masonry, and the first step is to demolish the steelwork for one track and to strip off the masonry from the inner brick core. A new shaft, curved outwards to form the bearings for the new arches, will then be constructed in concrete bonded into the brick core and, when bearing level is reached, a narrow wall will be constructed up to deck level. The arches for the new track will then be placed in position, together with the new approach span steelwork, and the new track laid and connected up and put into service. The next track to be replaced will then be dealt with in the same way. The method of placing the arches in position is as follows. As already mentioned, each half arch and its deck is a complete unit of all-welded construction. They will be built at a site to be provided at Nine Elms, about three-quarters of a mile down stream. When the piers are ready the arches will be floated into position and erected on the

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An artist's impression of the new bridge, which will consist of ten separate bridges each carrying one track, the four arch rib spans being of 175 ft. each and the approach spans 70 ft. and 64 ft. 4 in., respectively

bridge bearings on the piers and abutments. The two halves of each arch, when positioned, will be bolted and welded together at the crown at site. The approach spans will consist of pairs of welded-plate girders to which a steel battledeck will be bolted. The Port of London Authority has given permission for one river-way at a time to be closed during the erection of the arches.

The north abutment is to be reconstructed to provide a colonnade footwalk in anticipation of the future widening of Grosvenor Road. While the reconstruction is proceeding the Southern Region Civil Engineering Department will be re-levelling and realigning the tracks on each side of the bridge, working in close collaboration with the contractors, and at the same time

all arrangements for re-signalling and the re-routing of trains and altering train schedules will be made. If the tracks from upstream to downstream are numbered one to nine, the order of replacement will be 9, 10, 6, 7, 8, 5, 4, 3, 2 and, lastly, 1.

The new bridge will be able to carry twice the loading of the old one. The reconstruction work involves the demolition of 9,000 cu. yd. of masonry, the addition of 25,000 cu. yd. of new concrete work and 400 tons of reinforcing steel, and the replacement of 5,000 tons of steel and wrought iron by 5,300 tons of new steelwork. The cost is estimated at £3 million over a period of four years. All work is being carried out by outside contractors working under the control of Mr. A. H. Cantrell, Chief Civil Engineer of the Southern Region.