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A CHANNEL BRIDGE

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Despite successive delays it appears the Channel Tunnel will open in the foreseeable future. There have, of course, been various schemes for a fixed crossing of the Channel, some of which have actually been started.

Our member, Mrs Dod, has some documents (with a hand written date of March, 1895) concerning a proposed railway bridge across the Channel. These papers came from Mrs Dod's grandfather, Robert Douglas Jesty, who worked for a firm of solicitors in that Mecca for Victorian engineers, Great George Street, Westminster.

No company is named in the documents, but it appears this proposal originated in France.

Unfortunately, the documents only cover the broad outlines and the detailed reports and drawings are not available;

nevertheless, it is possible to form an idea of this ambitious project.

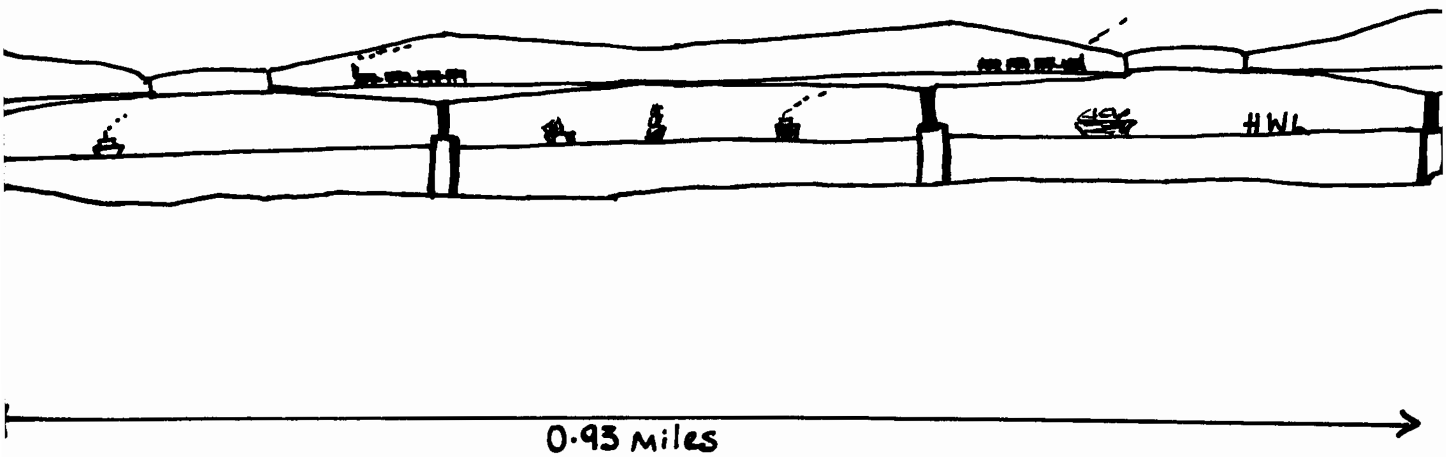
The proposed routes was between North Foreland (England) to Sangatte in France, the shortest distance between the two countries - 20 ¾ miles.

The design of the bridge is based on the idea that the bed of the channel is firm solid chalk swept clean of deposits by the currents so that sites for the pier caissons could be levelled without difficulty and without diving work or work in compressed air.

There were to have been 72 piers, giving 37 spans of 1,312 feet between support centres and 36 spans of 1,640 feet. The piers would have been located in depths as much as 168 feet at low water.

The method of construction was to be based on the use of 'Removable Platforms'. These devices anticipate the 'jack-up' type of platform used in the modern deep sea oil industry. They would have been 280 feet long and 198 feet wide, with a depth of 90 feet, comprising a lower buoyancy section supporting a deck well above water-level. This deck would give storage and lifting facilities, with workshops and living accommodation for the men.

The platforms would have been U-shaped, with a removable girder supporting a working deck across the open end, which would have been put in place after a pier caisson was floated in. At each corner would have been a 20 feet diameter cylindrical leg, which could be made as much as 240 feet long. This would have been extended to rest on the bottom. The buoyancy chamber would then have been flooded to let the weight of the platform be taken on the legs. Floating breakwaters were proposed to protect the platforms from the worst effects of heavy seas.



Sketch of the Channel Bridge

The idea was that when a pier was completed, the removable platform would have been re-floated and towed to another site. Five of these platforms were proposed, which seems rather a small number for 72 piers. The piers themselves were to have been based on iron caissons. These would have had slightly tapering sides, to give, at high water level, a width of 74 feet (along the length of the bridge) and a length of 156 feet over semi-circular ends (at right angles to the axis of the bridge). The caissons would be built to a depth of 28 feet and floated out into the open end of a platform and moored. Masonry walls about 7 feet thick would be built round the inside of the caisson with cellular cross walls and extra plating would be added to the sides, and more masonry built as the structure sank lower, until it landed on the bottom. Chutes would have been built in to allow grout to be poured down to the sea bed.

At about high water level, the walls were to be domed over and a solid mass of masonry 46 feet thick would have been built on top of this.

On the top of the masonry there were to be two steel plate columns 120 feet high, tapering from 32 feet 9 inches diameter at the base, to 28 feet 6 inches diameter at the top. On top of these columns would be the bed plates for the main girders.

Unlike the Forth Bridge with each main girder cantilevered out equally on each side of its own pier, this design called for each main girder to be carried on two piers with a cantilever section at each end outside the pair of piers. A connecting section would have been supported between adjacent cantilevers, as in the case of the Forth Bridge.

The cantilevers of the Forth Bridge were erected symmetrically on each side of their pier so that the structure was always balanced. It is not clear how this a-symmetric structure would have been built. Neither is it clear how materials would have been brought out to the girders after the removable platform had been taken away.

The main girders were to have been of the lattice type, 207 feet deep over the supports (i.e. 373 feet above high water level!). They reduced to 114 feet deep midway between pairs of piers and 36 feet deep at the end of the cantilever sections.

On the longer spans, the main girders were to be 2,542 feet long with a suspended girder 410 feet long between the adjacent cantilevers. These suspended girders would have been 61 feet deep at the centre and 38 feet deep at the ends. Special provisions were to be made for expansion. The minimum clearance was to be 177 feet above high water level.

The horizontal spacing between the main girders varied along their length and through their height. Over the piers, they were to be 82 feet apart at the bottom and 16 feet 6 inches apart at the top; in mid-span between piers, these dimensions were 59 feet at the bottom and 22 feet 6 inches at the top, and, at the end of the cantilevers, 39 feet 6 inches at the bottom and 27 feet 6 inches at the top. This would be quite a pretty piece of geometry to build over the Channel! There would have been heavy cross-bracing, of course.

The lessons of the first Tay Bridge were remembered, and main members were to be fitted with light fairing plates, claimed to reduce wind forces sufficiently to permit a reduction of main steelwork weight by 16%.

After the details of this enormous superstructure, it comes as something of an anti-climax to learn that the double rail-track on a troughing bed would be supported by 'lattice girders at convenient intervals' between the main girders. There was to be a steel lattice fence to protect the trains from excessive wind forces (Tay Bridge again!). The potentially fine view of the shipping would have been rather restricted.

The documents mention detailed reports on hydrographic and geological factors, currents and waves, details of the piers and superstructures, proposals for lights and buoys, potential traffic and financial aspects of the scheme, but unfortunately these are not available.

The promoters expected the bridge to take 7 years to build, and the total cost of the construction was estimated at £39,200,000. It was estimated that revenue from traffic would be £3,948,000 per annum and after paying interest on loans and maintenance charges, £1,668,000 per annum would be available for distribution (about 4½% of the capital expended).

Obviously a lot of work had been put into preparing this proposal and it would be interesting to learn the results of the attempt to float a company. There would certainly have been political reaction - especially if it **was** a French scheme.

The information in the available documents shows that Victorian engineers could think big.

Editor's Note: The Channel Tunnel Group Ltd (Eurotunnel) have just announced the publication of From Charing Cross to Baghdad - A History of the Whittaker Tunnel Boring Machine and the Channel Tunnel, by Paul Varley. It no doubt mentions details of the alternative attempts to make a crossing of the channel.