railway portion of this span is to be 168 ft. in length and the highway portion will be approximately 108 ft. long. This makes up a total length of 3,449 ft. for the railway section of the bridge and 2,364 ft. for the highway section. The skew bridges are connected with the south end bearing of the swing span of the main bridge by short plate girder spans. They give a clearance of 22½ ft. over the top of rail of the Canadian Pacific Railway line.

The bridge proper will carry between trusses a single railway track on the west side, and a 37½-ft. roadway between curves, including two electric car tracks on its east side. There will be an 8-ft. cantilevered footway outside of the eastern truss for the entire length of the bridge.

The foundation work will be expensive and rather difficult owing to the great depth of water and to somewhat unsatisfactory conditions of the river bed. The depth in the channel is 96½ ft. at ordinary tide stage, with a tide range of 13 ft. The north bank consists of gravel to a depth of 155 ft., overlain with about 5 ft. of silt. The south shore is composed of sandstone rock with a considerable overlay of soft mud. In mid-channel the two strata meet in a bed of gravel and boulders. In addition to the above the tide currents through the Second Narrows have a velocity of approximately 7 knots. Diving operations are rendered difficult owing to the continuation of the bottom flow for a considerable length of time after the turn of the tide.

According to the official design, there will be a clearance of 45 ft. above ordinary spring flood stages. The line of the swing span will afford a minimum depth at low water of 35 ft. under its north arm. At the swing span a clear waterway of 225 ft., measured square to the channel, is provided, as requisitioned by the Department of Railways and Canals of the Dominion government. There is a skew of 15° in the line of the bridge across the channel.

The span is to be supported by four wrought steel cylinders, filled with concrete and resting on piles. They are to be spaced 49 ft., centre to centre, both ways, and braced. The south end bearing will rest on a pair of wrought steel braced columns resting on cylinder piers 59½ ft. apart. The north end bearing will be supported by similar columns on a solid pier, full bridge width. The fender pier, in the plane of the swing span, when open will consist of six cylinder piers 24 ft. in diameter, with bracing and timber fender work between.

The operation of the span, the locking of the bridge, the opening and closing of the gates, as well as the signalling apparatus for river and land traffic, will be electrically controlled. The operating cabin is located above and at the centre of the span.

Delays in Proceeding.—The above plans, prepared by the English firm, provide a design estimated to cost $2,500,000. The Burrard Inlet Tunnel and Bridge Co., finding difficulty in the financing of such a large undertaking, appealed to the Provincial Government to take over the entire project. The latter declined, however, and announced that it was not prepared at that time to subsidize the enterprise to a greater extent than $400,000, previously arranged, and advised the company to build a less expensive structure.

Subsequently, Mr. C. P. Moss, local representative for the Strauss Bascule Bridge Co., submitted plans for a bridge of the Bascule type to the government, which, in turn, recommended them to the company as they involved a cost of approximately $1,500,000. This design had spans of 44 ft., centre to centre of trusses, and provided for two electric railway tracks in addition to the steam railway line, and a 16-ft. roadway. Outside of the truss line an 8-ft. sidewalk was provided on brackets for pedestrian traffic. The required width of 225 ft. in the channel, overhead clearance of 45 ft. between water at high level and under side of the spans over the navigable channel, and a clearance of 22½ ft. over the rails of the Canadian Pacific Railway were all provided for. The design suggested a movable span of the Heel trunnion type, with concrete counterweights. Electrical operation by two 90 h.p. motors, in addition to a 5 h.p. motor to operate locking mechanism, was called for. The time of opening or closing under normal conditions was stated to be 1½ minutes.

Acting upon the advice of the Provincial Government the company called for tenders for a cheaper structure, and a number of plans and specifications were submitted accordingly. Chief of these were the tenders of the Dominion Bridge Co., associated with Armstrong, Morrison & Co.; the Canadian Bridge Co.; and C. A. P. Turner, associated with the Western Foundation Co. These three designs were submitted to Messrs. Cleveland & Cameron, the consulting engineers to the company, for a report. The following is a summary of their findings and conclusions, many points of interest arising therein:—

Tender No. 1.—The design submitted follows the official design as to general outline.

The length of the plate girder spans for the north approach are slightly increased.

The two fixed truss spans are the same length and occupy the same positions.

The clear opening provided by the swing span is the same, but the length between end bearings has been reduced from 581 ft. 6 ins. to 578 ft. 0 ins.

Truss spans have been used for the south approach over the tracks of the Canadian Pacific Railway.

The substructure designs for the north approach substitute pedestals on pile foundations for the cylinder piers of the official design.

The pedestals are carried down to 10 ft. below the ground line for the first three bents, 8 ft. for the following three, and 6 ft. for the remaining bents; they are all carried on piles having a maximum load of about 16 tons per pile, which is good, conservative practice.

The design of the pivot pier differs from that of the official design in consisting of a single 56-ft. diameter cylinder in place of four 24-ft. diameter cylinders, spread at the base to 28 ft. The bearing pressure is about 6 tons per square foot.

The north rest pier, on Pier No. 4, consists of two shafts in place of the solid pier called for in the official design. Sufficient bearing area is provided, but the pier is not so well able to withstand the blow from a heavy vessel. With this exception, we consider the design for the substructure an excellent one.

Wooden caissons are used in place of steel for all piers, and the piers are carried to the maximum height and the steel bents under trusses eliminated.

The superstructure has been designed for the Dominion Government especial heavy loading on the steam railway track, two 40-ton electric cars on each tramway track, and the balance of the floor has been figured for 100 pounds per square foot for the floor system and 60 pounds per square foot for the trusses.

The floor system has not been designed for a concentrated load similar to the heavy motor trucks which it will have to carry.

A unit stress of 18,000 pounds per square inch has been used in the design of the west or railway side truss, and 20,000 pounds per square inch for the east truss. We are of the opinion that since this structure carries railway traffic as well as electric railway these stresses