for conveying concrete to points which could not be reached by chutes.

No extraordinary difficulties have been encountered in the construction of the upper 7,600 ft. of sewer, now completed; the location of the structure in the bed of the creek subjected the work to frequent temporary shutdowns due to floods, but these caused but little damage to the contractor's equipment and no damage to the structures.

The contractor then began the construction of the lower portion of the sewer. In this part of the work progress is comparatively slow, the lack of stability of the soil making necessary the use of steel sheetpiling and heavy bracing to prevent damage to railroad tracks and buildings from caving trench walls. Some 600 ft.

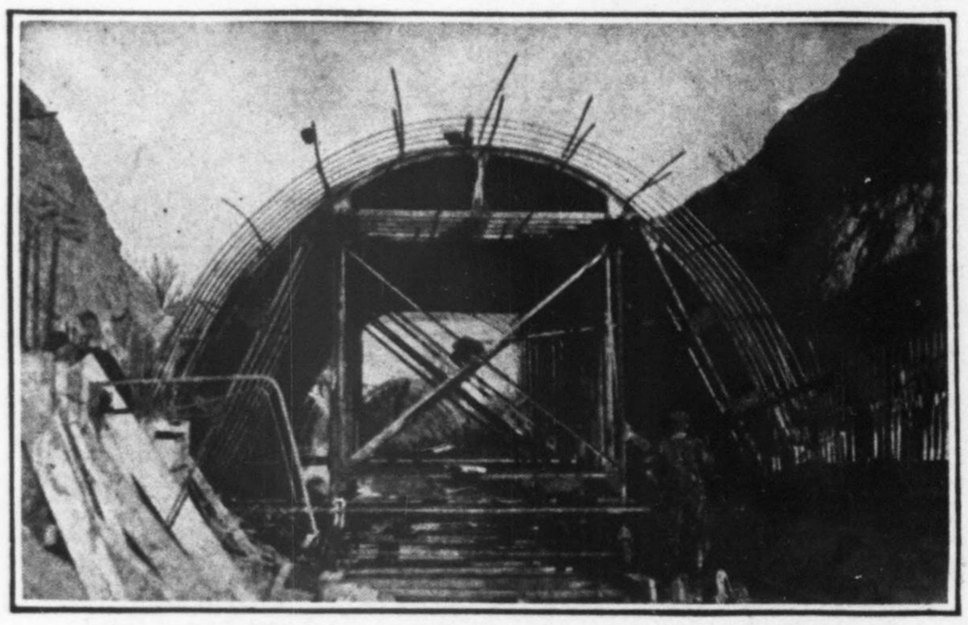


FIG. 5—ARCH STEEL FOR GOOSENECK SEWER WITH INSIDE STEEL FORM IN PLACE

of the sewer is located within the right-of-way of the St. Louis & San Francisco Ry., paralleling the main track at 32-ft. centers, trench depth being 26 to 30 ft.

The restricted space available at this point makes necessary the hauling of the excavated materials direct from the excavator, and the hauling of construction materials only as they are required for the construction of the sewer. The sewer crosses under the Frisco main track and switch lead, two Kansas City Terminal Ry. and Missouri Pacific connecting tracks, and two Missouri Pacific main tracks, all carrying heavy freight traffic. The railroad companies have constructed temporary bridges at these crossings, ahead of the excavation from the sewer, using their own bridge construction crews for this purpose.

The construction of the Gooseneck sewer was begun about Aug. 1, 1925. The contract completion date was March 1, 1927, when 91.5 per cent of the work had been completed. An extension of time to June was granted. The major quantities involved in the work included 28,630 cu.yd. of concrete in the main sewer structure; 2,330 cu.yd. of concrete in special structures; 2,162 tons of reinforcing steel; 126,600 cu.yd. of excavation; 89,000 lin.ft. of wood bearing piling, and 38,000 sq.ft. of steel sheetpiling. The total contract cost is estimated to be $1,270,000.

Black & Veatch and Edward M. Stayton, consulting engineers of Kansas City, made the plans and specifications for this project and supervised its construction. The work was done by The Torson Construction Co., of Kansas City, Kan. All tests of materials were made by the Kansas City Testing Laboratory.

Montreal South Shore Cantilever Bridge Under Construction

Foundation Work Well Advanced—Expect to Erect Large Part of Superstructure During Present Working Season

WITH the clearing of the ice and the opening of the St. Lawrence River to navigation, construction was resumed on the Montreal Harbor bridge at Montreal. The 1926 season saw a considerable progress in substructure work, and also the erection of some 1900 tons of steel. Nearly halfway through the 1927 season (the seasons are but seven months long for river work in this vicinity) the situation is as depicted on the adjoined diagram, Fig. 1.

Starting from the south, thirteen piers are complete and the trusses, floor and bracing of ten short spans are in place. Piers 14 and 15 now have most of their stone facing laid, and will be completed by the beginning of September. The pneumatic caissons for 13 and 14 were successfully sunk to solid rock last summer, using a steam plant for power and with air up to 22 lb. pressure; the bottom was dredged level before placing the steel caissons, and the excavation was in gravel until the hard shale was reached. Piers 2 to 12 are in shallow water and were built within wooden cofferdams, unwatered by pumping. Piers 15 and 16 are on piles driven in hard-packed gravel inside wooden cribs and steel-pile cofferdams. Piers 16, 17, 18 and 19 were completed during the 1925 season, as was the north abutment and the footings of piers 1 and 15.

Across the island, in the main channel, substructure work is also well advanced. The main and anchor piers on the city side were finished in 1926 and all the other river piers started. The east main pier, 24, is founded on a steel caisson 127 ft. 9 in. x 50 ft. 6 in., the fourth or fifth largest known, and with steel sides 47 ft. high. The cutting edge was landed some 50 ft. below water level and excavation was continued deeper still. Electric power was here used for all purposes, and the air pressure reached 25 lb. The stonework is now all laid,

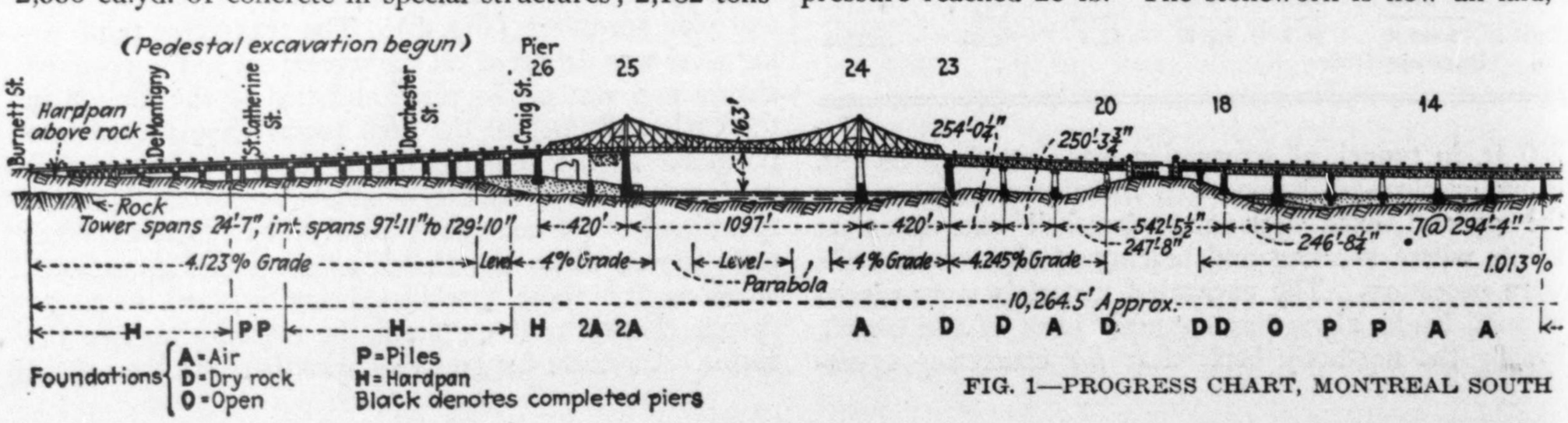


FIG. 1—PROGRESS CHART, MONTREAL SOUTH

and form construction for the upper concrete shaft is being rapidly pushed. The anchor pier, 23, is founded on the dry trap rock of Ile Ronde and was taken up high enough to receive the steel anchorage girders last November. The concrete shaft is now completely paved up to coping level. The footing of pier 22 was poured and the steel caisson for 21 was partially sunk last season, work being suspended in the late fall, in time to permit dismantling the plant before the freeze-up. The caisson has withstood the ice well, as indeed all the unfinished piers. The air plant, which was occupied elsewhere during the winter was reinstalled in May, and air work was completed by the middle of July. Stone is at present

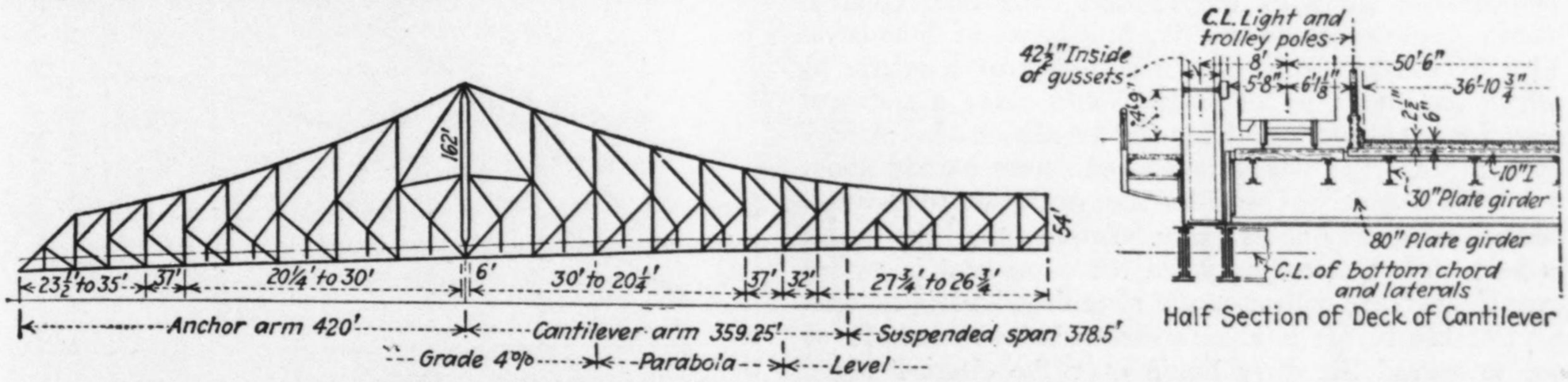


FIG. 2—HALF ELEVATION AND CROSS-SECTION OF CANTILEVER SPAN

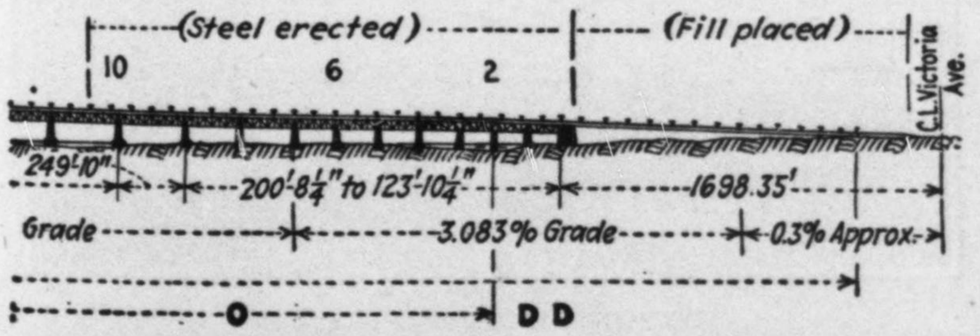
being laid on both these piers, 22 being virtually up to the last course. This limestone facing on the river piers is 42 ft. 10 in. high, extending from below lowwater to above high-ice line.

Two caissons for temporary falsework towers were sunk on the Montreal side under the site of the anchor arm, these also being taken down to rock by the pneumatic process. They were about 85 ft. deep and called for pressures up to 31 lb.

Work of This Season—It is expected that all piers and practically all pedestals, concrete arches, girders, columns and retaining walls of the north approach will be completed this season. The program for steel erection contemplates placing falsework under the deep half of the city anchor arm, and the erection of perhaps 250 ft. of main truss structure, approximately as indicated by diagram in Fig. 1. The falsework towers and trusses are now in place, the main shoes on Pier 25 are laid, and the north anchor arm bottom chords for six floor panels, with their bracing, are erected and partly riveted. The shorter spans across the south channel will be continued and main material will probably be placed as far as pier 21, including the pavilion framing. By the end of the autumn possibly some 16,000 tons of permanent metal will have been placed.

The substructure when finished will comprise about 100,000 yd. of concrete and 36,000 tons of cut stone, while the approach fills will use over 120,000 yd. of gravel.

The superstructure includes 24 spans of Warren deck-truss construction on the south side, with lengths from



SHORE CANTILEVER BRIDGE

90 to 245 ft. There are twelve of the latter, all virtually identical. Floor panels are 24 ft. 6 in. throughout this portion, making for considerable duplication in minor parts. On the north side the approach trestle includes sixteen similar truss spans, carried on towers. The main span over the navigable channel of the St. Lawrence is a 1,097-ft. cantilever span with two 420-ft. anchor arms. The clearance above high navigating water is not less than 162 ft. for a 500-ft. fairway, and the height of steel above main piers about 180. ft. The total weight of steel will reach 30,000 tons, to which the main span will contribute almost exactly half.

The capacity of the bridge is ample for modern city traffic. It provides a 37 ft. 6 in. vehicular roadway wholly unobstructed, with independent rapid-transit tracks on either side, and footwalks outside, all these lanes being adequately fenced off from one another. The clear width between outer railings is 72 ft. 5 in. Silicon steel is used largely in the principal span and the trusses of the 245-ft. spans; the remainder of the metal is special carbon steel.

The bridge is being built by the Harbor Commissioners of Montreal, Senator W. L. McDougald, president, and will be financed by a bond issue. A system of mutual aid has been worked out between the federal, provincial and municipal governments with regard to meeting possible operating deficits in the early years, but the engineers estimate that after five or six years the income will meet interest, sinking-fund, operation and maintenance charges, and that after ten or twelve years, when the toll rates will have been somewhat reduced from initial figures, amortization of construction cost may be commenced.

Monsarrat & Pratley of Montreal and J. B. Strauss of Chicago are the designing and supervising engineers. Quinlan, Robertson & Janin and the Dufresne Construction Co., both of Montreal, are the contractors for the south and north halves of the substructure work, and the Dominion Bridge Co. of Montreal is the contractor for the fabrication and erection of the steelwork.

Salt Content of Colorado River Water

New data on the dissolved solids of the Colorado River water have just been published by W. D. Collins and C. S. Howard as water supply paper 596 B of the U. S. Geological Survey. The principal sampling was done at Grand Canyon and Topock, Ariz. For an entire year the weighted average of results shows that the river transports per day 28,000 tons of dissolved solids, and has a mean discharge of about 20,000 sec.-ft. (40,000 acre-ft. per day), so that the water carries about two-thirds ton of salt per acre-foot.