

Long Steel Bridges Added to Washington Highway System

OF THREE steel highway bridges recently designed by the bridge department, Washington department of highways, two are now under contract and the third is scheduled for construction at an early date. One of the three is a 550-ft. through cantilever span near the site of the Grand Coulee Dam, where it will serve construction purposes and later will be used as a highway structure. The other two, being built as a single project, are to be adjacent structures spanning Deception Pass in Puget Sound, to connect the road system of Whidby Island with the mainland. The Deception Pass spans are 350 and 550 ft. respectively; the latter has the same span length as the Grand Coulee Bridge but is of the deck type. Each of the 550-ft. spans is a cantilever with a 200-ft. central suspended span.

In all three bridges the silicon steel, which is to be used extensively, has been figured for a working stress of 24,000 lb. per sq.in., in comparison with 18,000 lb. allowed in carbon steel members. In general, the loading for all

three bridges is the standard H-15 highway loading prescribed by the American Association of State Highway officials. On the Grand Coulee Bridge, however, where heavy construction equipment may concentrate, the flooring and floor framing were figured on the H-20 basis.

The two 550-ft. spans were designed for cantilever erection of the suspended span from both ends, meeting at the center. Jacking members are provided in upper and lower chords at both ends for this purpose, and these members will remain in place after erection but will carry stress only during erection. The total weight of steel in the Grand Coulee Bridge is approximately 1,300 tons, and in the Deception Pass Bridge, of equal span, the steel order amounts to 1,130 tons. The arch bridge will use 465 tons of steel.

Because the Deception Pass structures are about 180 ft. above channels where swift tidal currents flow, false-

work was impracticable, and both spans will be erected by the cantilever principle. The 350-ft. span is designed as a three-hinged arch for dead loads, and after erection is complete the central hinge will be riveted up, making the bridge a two-hinged arch for live load.

The cantilever spans will have all connections riveted except that the suspended spans will be supported at their four corners by pin-connected links to allow for changes in the length due to live load and temperature. However, in all positions these suspended spans will be locked against transverse movement by a shear lock in the bottom lateral system. Pin-connected links at the ends of the anchor arms connect the truss to the anchorage shoe, while upset rods extending into the anchor pier and secured by a grillage transmit the stress from anchorage shoe to pier.

The Deception Pass bridges are under contract to the Puget Sound Construction Co. for a total figure of \$304,000. The Grand Coulee Bridge was designed for the Columbia Basin Commission and will be built by the U. S. Bureau of Reclamation in connection with the Grand Coulee project.

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THREE new highway bridges designed by the Washington state highway department.

