

The hand-rail upon the trestle is made up of 4-inch x 4-inch posts 6-foot 6-inch centres, two side rails 2 inches x 6 inches and a top rail 4 inches x 4 inches.



Fig. No. 5.—Bridge Site at Start of Work

Bridging, 2-inch x 2-inch, is used at intervals of 6 feet 6 inches across the width of the floor for the purpose of securing additional rigidity.

#### Construction

For the concrete aggregates the following materials were specified and used:—

**Sand.**—Sand shall consist of particles, graded from coarse to fine, of sizes that will pass, when dry, a screen having one-quarter inch diameter holes; not more than 20 per cent. shall pass a sieve having fifty meshes, and not more than 4 per cent. shall pass a sieve having one hundred meshes per linear inch. It shall be of hard silicious material, clean, free from dust, soft particles, vegetable loam or other deleterious matter.

**Broken Stone.**—All broken stone shall be clean crushed granite, trap or limestone of approved hardness and

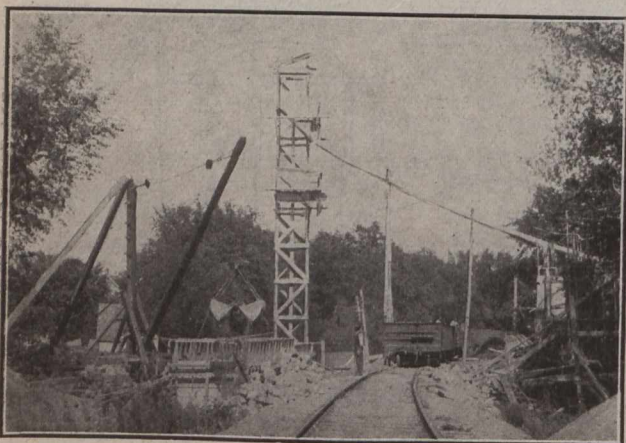


Fig. No. 6.—Tower and Chutes; Dredging Outfit Shown at Left

toughness, free from dust, dirt and other deleterious matter. It shall have a uniform, even gradation of particles between the sizes specified.

**Class A:** For piers below the springing line of arches, and for pedestals—From a size that will pass through a ring  $2\frac{1}{4}$  inches in diameter to a size that will be retained upon a screen of  $\frac{1}{4}$ -inch mesh.

**Class B:** For sidewalk and curbing veneer layers, sidewalk balustrade and lower 2 inches of slabs—Crushed granite or trap rock of approved color or colors from a size that will pass through a screen of  $\frac{1}{4}$ -inch mesh to a size that will be retained upon a screen having 100 meshes per linear inch.

**Class C:** For all portions of the work not included in Classes A and B—From a size that will pass through a ring 1 inch in diameter to a size that will be retained upon a screen of  $\frac{1}{4}$ -inch mesh.

Crushed stone having more than the following content of objectionable material will be rejected: (a) More than 1 per cent. of earthy or clayey matter; (b) more than 10 per cent. of fine stone or stone dust of less size than minimum given in the above grades; (c) more than 5 per cent. of soft stone.

In case of the above defects occurring in combination, the percentages will be modified as the engineer may direct.

**Reinforcement Metal:** Reinforcement material shall fulfil the chemical and physical requirements of the Standard Specifications of the American Railway En-

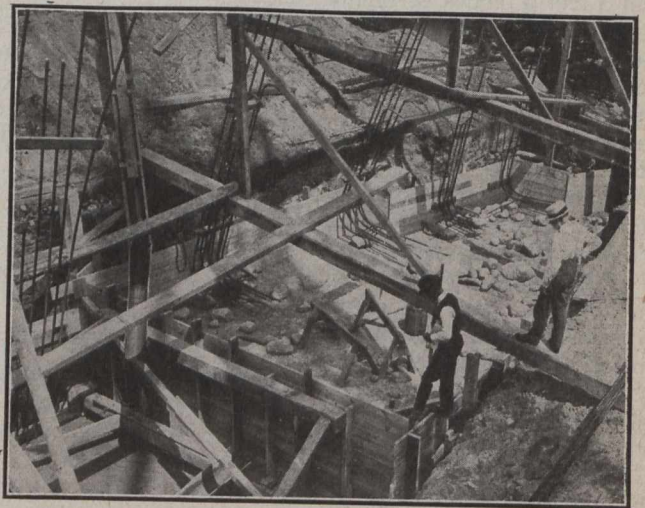


Fig. No. 7.—Footing of West Wing of North Abutment; Reinforcement Rods for Counterforts

gineering Association. No so-called re-rolled material will be accepted.

Bent rods shall be bent true to dimensions, and when required by the engineer shall be bent to templet.

All reinforcement material shall be free from rust, loose scale, and other coatings of any character, which will reduce or destroy the bond between concrete and steel.

Specifications for the mixing, placing and finishing of concrete were in part as follow:—

The ingredients of concrete shall be mixed in an approved machine of the batch type. They shall be thoroughly mixed to the desired consistency by revolving in the mixer not less than one minute after all the ingredients have been placed in the mixer, or longer if required, to thoroughly distribute the cement and render the mixture uniform in color and homogeneous.

The degree of consistency or wetness shall be as the engineer may direct; but, in general, it shall be wet enough to be poured from the mixers or the wheelbarrows, and to settle into place without being rammed, although it may require to be spread with a spade.

Concrete, after the completion of the mixing, shall be handled rapidly to the place of final deposit, and under no circumstances shall concrete be used that has partially set.