

piles. The writer, having previously underpinned a building which had been built on piles 30 feet long, which, when cut off and capped, were entirely under standing water, but after the construction of a railroad tunnel were found to be free from water from top to bottom. It is well known, of course, that wooden piles have lasted for centuries in good condition when driven in water-bearing soil and kept submerged, but that the same piles would rot very quickly if the water were drawn off.

Besides, it would be almost impossible to drive wooden or concrete piles to rock on account of the sunken timbers, boulders, &c., which were indicated by the borings and afterwards removed through the air chamber of the caissons without going to such expense that there would be very little difference between the cost of the pneumatic caisson and the less reliable foundations.

The owners, therefore, decided to use caissons and accepted the tender of the Foundation Company for thirty-four circular caissons to be carried to bed rock for the lump sum of \$82,500, which sum included the engine and boiler rooms and coal pocket walls, floor, &c., below the curb line.

There are 15 caissons of 6' 6" diameter

3	"	6' 10"	"
7	"	7' 6"	"
8	"	8' 0"	"

or 34 in all

These caissons all had a steel working chamber, sides and roof, 3/8-inch thick.

The concrete being started on the top of the roof or deck, was built up about 20 feet at a time inside of removable circular metal forms. As soon as this concrete had set hard, excavation and sinking would be started and carried

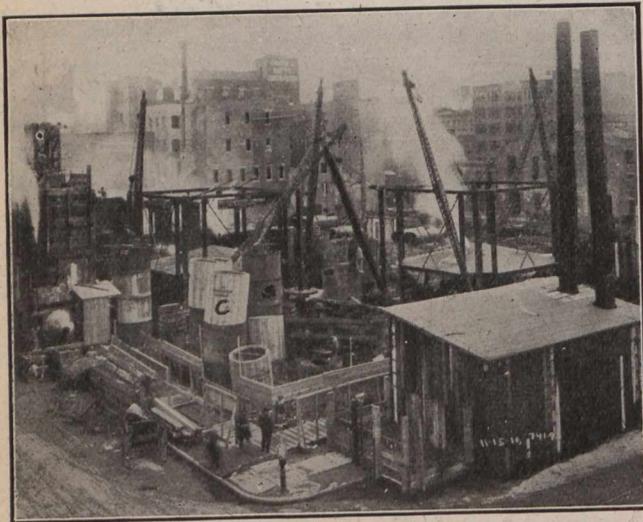


Fig. 3. Showing operation on November 15, 1910, also concrete mixer. "S" steel "Form" or shell removed before sinking. "C" Wooden Cofferdam.

on until the top of the concrete had nearly reached the surface of the ground when the men would be taken out and placed elsewhere while another "build up" of concrete was being put on. The pumping of compressed air had to be kept up of course all the time; the necessity for which was shown when the gauge tender allowed the air pressure to lower, which resulted in the air chamber being filled with sand to the deck when the cutting edge "ran away," of which more will be said later.

The working shaft for men and material was also formed by collapsible shafts which, however, were left in place until the sinking was finished and the air chamber

had been filled with concrete, so that nothing but concrete was left from the deck to the base of the column base or grillage. The concrete was made of one part of Portland cement, three parts of sand, and five parts of broken stone or gravel.

Some trouble was experienced in getting the concrete to set up quickly, due partly to the season of the year and other causes. The concrete eventually set up hard but caused more or less delay waiting for it to do so before sinking could be resumed. Considerable sand was used from the Woolworth Building, Broadway and Park Place;



Fig. 4. Showing work on December 29, 1910, with grillage on Caisson in foreground.

this sand contained more or less clay and other impurities but gave a higher tensile test than the finer "Cowboy" sand.

Dr. Charles F. McKenna made the chemical and tensile tests and reported in favor of the Broadway sand.

The contract was let on October 8th and work at once started, although some of the old buildings had not been entirely removed.

The caissons were sunk in the following order:—

No. 1	—	sealed on	November 21st	at a depth of	—42.5 feet.
" 3	"	"	25th	"	—52.6 "
" 2	"	"	29th	"	—46.8 "
" 21	"	"	29th	"	—55.4 "
" 31	"	"	30th	"	—54.7 "
" 7	"	"	30th	"	—43.3 "
" 16	"	December	1st	"	—60.8 "
" 20	"	"	1st	"	—51.2 "
" 13	"	"	3rd	"	—46.0 "
" 33	"	"	3rd	"	—66.3 "
" 17	"	"	6th	"	57.2 "
" 19	"	"	7th	"	51.9 "
" 27	"	"	8th	"	54.5 "
" 32	"	"	13th	"	61.2 "
" 26	"	"	15th	"	50.1 "
" 8	"	"	15th	"	51.9 "
" 25	"	"	17th	"	53.4 "
" 9	"	"	17th	"	54.7 "
" 34	"	"	18th	"	76.9 "
" 24	"	"	21st	"	66.1 "
" 10	"	"	23rd	"	58.2 "
" 18	"	"	24th	"	61.2 "
" 14	"	"	25th	"	54.3 "
" 15	"	"	27th	"	54.2 "
" 30	"	"	28th	"	69.9 "
" 11	"	"	29th	"	—60.0 "
" 28	"	"	31st	"	—64.7 "