

new work 2,622,000 bushels. The storage addition will be ready for grain this fall.

A description of the important features of the work follows:

Structures.

Dimensions.—The elevator, including the storage addition, is 456 feet 8 inches long by 100 feet wide, and 220 feet high to the tops of the leg towers.

Foundations.—The elevator is built on filled ground and in part is above old wooden wharves long since buried by the gradual making of land along the river bank. The range of water level in the St. Lawrence at this point is approximately 25 feet. The rail elevation is at high water level, but to provide for deep receiving pits it was necessary to carry a considerable portion of the excavation for the main elevator down to a depth of about 20 feet; accordingly, the entire area of the main building was excavated to low water level and 7,730 wooden piles were driven. The driving was found to be exceedingly difficult owing to the boulders, old cribs, etc., beneath the site. Two

large drivers with No. 1 Warrington steam hammers were employed. On top of the piles a reinforced concrete slab 3 feet 6 inches thick was laid, extending over the entire foundation area. An idea of the foundation problem may be gained when it is known that loads as high as 1,270 tons had to be carried on some of the columns.

Concrete piers and walls were built on top of the foundation slab and carried up to the track level. The track girders are of reinforced concrete, except over the receiving pits, where they are of steel. Boot tanks and track hoppers are of steel.

The foundations of the 850,000-bushel storage addition were differently treated. As there were to be no elevator legs, and consequently no boot tanks, in this portion of the elevator, the deep excavation necessary for the main elevator was not required. Consequently 1,535 reinforced concrete piles were used. These were of the Simplex moulded inserted type, with their tops about four feet below base of rail. Above them the foundation concrete was placed.

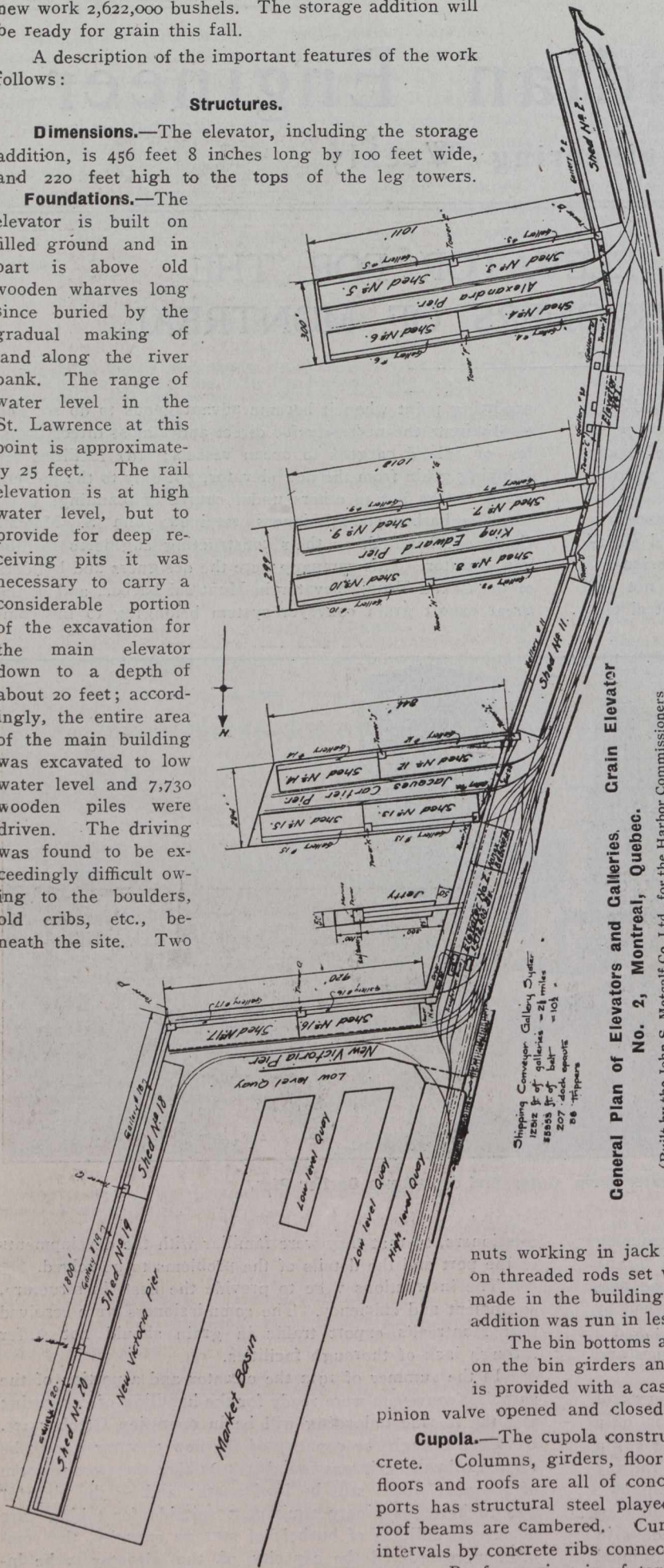
First Story.—Four railroad tracks extend through the entire elevator. The bin openings are 22 feet 6 inches above the tracks. The columns supporting the bins are of reinforced concrete, about 24 feet centres, in general, each way. Some of these columns are as large as 6½ feet by 5½ feet. They are surmounted by the heavy concrete girders supporting the bins. These main girders are 5 feet deep and 6½ feet wide. The first floor is of concrete except at hopper and grain openings, where steel gratings are employed. Curtain walls are of concrete, with a large area of fireproof windows. The track openings are closed by rolling steel doors.

Bins.—The bins are of reinforced concrete, are rectangular in form, and 86 feet deep. Bin walls are in general 8 inches thick. Bin capacities range from 6,800 bushels to 14,300 bushels; and the total number of bins is 278, exclusive of shipping bins. Along the water side of the elevator the upper portion of each bin is used as a shipping bin. An intermediate concrete bin bottom is placed about mid-height of the bin, the upper portion of the bin discharging to the shipping conveyers and the lower portion being used as an ordinary storage bin.

The bins were constructed by the use of moving forms. The forms were raised by nuts working in jack castings attached to the forms, the nuts travelling on threaded rods set vertically in the concrete walls. Rapid progress was made in the building of the walls; the height of 86 feet in the storage addition was run in less than 14 days, day and night work.

The bin bottoms are of reinforced concrete, in part supported directly on the bin girders and in part suspended from them. Each bin opening is provided with a cast iron and steel revolving turnhead, with rack and pinion valve opened and closed from the floor below.

Cupola.—The cupola construction is a remarkably fine example of reinforced concrete. Columns, girders, floor and roof beams, wind bracing, stairs, curtain walls, floors and roofs are all of concrete. In fact, only in the case of machinery supports has structural steel played any important part. The lower sides of floor and roof beams are cambered. Curtain walls are 2½ inches thick, supported at short intervals by concrete ribs connecting to the floor beams. Windows are of fireproof type. Roof covering is of tar, felt and gravel, except on the leg towers, where the



General Plan of Elevators and Galleries, No. 2, Montreal, Quebec.

(Built by the John S. Metcalf Co. Ltd., for the Harbor Commissioners of Montreal.)