

of manilla rope. The conveyor belts are four-ply rubber belting made of 30 oz. cotton duck pliable with hard surface stretched and spliced with Smith's patent No. 1 belt fastener. The conveyor belts are driven by light double leather belting, and the rope used in the various drives was tallow laid transmission ropes (Plymouth, 4 strand E.)

The building is lighted with 100 16 candle power, incandescent lamps, and provided with five extension cords for use in lighting lower part of bins. The building is also provided with signal bells and push buttons where required. The revetment was constructed according to the plans, except that the outside guard piles were 6 ft. centre to centre instead of 3 ft. The guard piles were of tamarac 40 to 45 ft. long, 3 ft. centres capped with 12-in. by 12-in. fir timber bolted to piles with bolts 1-in. diameter and 26-in. long, and two 6-in. by 12-in. fir stringers fastened with 1/2 by 12-in. boat spikes to outer row of piles, and two 8-in. by 12-in. fenders or wall streaks to outer or harbor side with 3/4-in. screw bolts and washers counter sunk lead on outer side. The sheet piling is 8-in. by 12-in. fir timber, 36 feet long, built with tongue and groove of two-inch fir lumber the full width of the 8-in. sheet piles, and secured with 5-in. steel wire nails, 8-in. centre, so as to form a sand-tight bulkhead. A steam jet was used to assist the pile driver in getting these piles in place to avoid heavy pounding. The whole of the piling is being especially pointed. The structural steel work received in the shop one coat of boiled oil mixed with 10 per cent. of lamp black, and after erection one coat of lead and oil. All woodwork around windows received two coats of lead and oil, and all sash two coats red lead and oil.

The work was carried to a successful completion under great difficulties, such as the insufficiency of skilled workmen, the exposed position of the elevators, the long distances the greater part of the structural material had to be brought, retarding the progress of the work and causing a great part of the cement and other work to be done in severe, cold weather which rendered it necessary to heat the water and take the frost out of the sand and mortar before using. The contractors deserve great praise for the energy and courage displayed by them in overcoming all obstacles and giving to the North-West an additional storage for a part of its enormous wheat crop of 1902, and at a time when the lack of just such a storehouse would have been seriously felt by the North-West farmers. It has also had the effect of bringing Port Arthur to the front as one of the most important grain and freight transportation centres of Canada. The following data regarding the work may be of interest: First pile driven in elevator, 11th June, 1902; concrete begun, 20th August, 1902; tile laying, 26th September, 1902; first wheat received into bins, 19th January, 1903. Quantity of material in each eight feet in height of bin: 378 tiles, 12-in. by 12-in. by 5-in.; 378 channel tiles; 216 facing tiles, outside bins only; 336 facing tiles, outside corner bins only; 250 brick; 375 pieces wire netting, 12-in. by 4-in.; 12 pieces wire netting, 4-in. by 8-in.; 126 pieces wire netting, 12-in. by 1-in. for facing tile; 12 clips, 12-in. by 1 1/2-in. by 1/8-in.; 6 crooked steps, 3-ft. 7-in. by 5/8-in. iron; 6 straight steps, 2-ft. 6-in. by 5/8-in iron; 4 tie rods, 11-ft. by 3/4-in. Each thousand tiles took 3/4 cubic yard grout 3 to 1. Each inside bin has four double channels 75 ft. long. Each outside bin has two double channels 75 ft. long. The hoops or bands in the channel tiles consist of 1 1/2-in. by 3-16-in. and 1 1/2-in by 1/8-in. steel bars, three complete hoops being used in the lower and two in the upper portion of the walls, thus varying the section to suit the pressure. Each brick-layer laid about 364 tiles per day of ten hours in the month of November. The capacity of each of the five top conveyor belts is 15,000 bushels per hour, and of each of the five lower belts 10,000 bushels per hour. The tiles were manufactured at Ottawa, Ill., by the National Fireproof Roofing Company. The steel bars for tank bands were furnished by the Carnegie Steel Company. The structural steel work by the Canadian Bridge Co., Walkerville, Ont. The machinery by Messrs. Skillin & Richards, Manufacturing Co., Chicago, Ill. The belting by the Gutta Percha and Rubber Co., Toronto, Ont. The roofing and sheet metal work was done by Irwin & Son, Hamilton, Ont. Most of the cement was furnished by the Owen Sound Co., some by the Rathbun, and a small quantity was imported from Chicago. The following is a

copy of a report by H. E. Smith, consulting engineer, of Minneapolis, Minn., upon a test made to determine the heat resisting properties of a section of hollow tile grain bin, built to correspond with the method used in the present elevator:

In order to make the test as practical as possible, some four weeks ago a section of wall was constructed, the details of which are shown in the accompanying blue print, to correspond to that which would be constructed for a 45-foot diameter grain elevator storage bin. Against this was built an oven or furnace, in which by means of fire the necessary heat could be brought to bear upon the outer wall of the experimental bin.

Time	Temperature
p.m.	deg. Fahr.
3.30	500
3.37	600
3.38	700
3.38 1/2	800
3.39	900
3.39 1/2	1000
3.40	1100
3.41	1200
3.42	1250
3.44	1270
3.46	1200
3.50	1150
3.51	1200
3.52	1250
3.54	1300
3.55	1330
3.56	1350
3.57	1365
3.59	1390
3.59 1/2	1400
4.01	1440
4.02	1470
4.03	1500
4.04	1540
4.05	1570
4.06	1620
4.07	1700
4.09	1800
4.10	1900
4.10 1/2	1950
4.11	2000

This table shows the time and corresponding temperature during the next 41 minutes of the test.

As the limit of the pyrometer was 2,000 degrees, the instrument had to be removed when this temperature was reached. The actual temperature of the furnace was, no doubt, considerably above 2,000* degrees at the maximum.

*This is the temperature at which cast iron melts.

At the maximum heat a solid body of flame rose to a height of about two feet above the tile chimneys, and flame was always visible during the greater part of the test.

The snow that was packed against the exposed iron band on the inside of the wall began to show signs of melting at 4.09 o'clock, when the temperature of 1,800 degrees had been reached, and, at the end of the test, a small amount of snow still remained at this point. The patches of snow on the interior of the wall showed no signs of melting at the end of the test.

A pyrometer tube was inserted near the top of the furnace and about six inches from the portion of the wall to be tested and directly in the path of the heated flame and gases which impinged on the wall. The pyrometer, when thus located, was believed to show the temperature to which the wall was subjected. On the date of the test the temperature of the outside air was fifteen degrees above zero. On the inside of the wall at the location of the exposed iron band in the wall, some snow was packed against the band and a number of patches of snow placed upon the tile wall itself, in order to observe the effect of the transmitted heat through the wall. A fire was started upon the grate of the furnace at 2.15 o'clock, and the temperature of the furnace rapidly rose to 800 degrees Fahr. After the fire had burned itself out sufficiently, the bin wall of the furnace was carefully examined and no trace of a check or crack could be found. In view of the fact that the fire had been continued for two and one-half hours, the heat to which the wall was subjected correspond, in my opinion, closely to that which would be produced by the burning of a wooden structure built against the side of an actual grain bin of this description. The results of this test seem to indicate that this kind of construction for grain storage would withstand any ordinary external heat due to adjacent fires, and would at the same time also prevent an undue transmission of heat to the grain stored within.

Respectfully submitted,

HARRY E. SMITH,

Consulting Engineer.

The cost of the building, including revetment, everything complete, except the earth filling around and under foundations was \$397,095.80.