Constructing the Foundations For C. P. R. Bergen Cut-Off Bridge

June 1913

Huge Undertaking in Progress on Red River in Kildonan—Carrying Concrete Piers to Rock Bottom Far Below the River Bed Presents Many Complications For Engineers to Surmount.

A visit to the site of the new C.P.R. bridge which is being constructed in Kildonan, reveals a scene of activity little suspected by Winnipeg citizens whose duties keep them out of the suburbs. The C.P.R. crosses lot 58 on the east side of the Red river and lot 22 on the west side, and the new bridge furnishes a double track crossing on the freight cut-off which will eventually connect Bergen on the main line west of the city with the immense yards which are under course of construction in North Transcona.

Seven Concrete Piers.

The substructure, consisting of two concrete abutments and seven massive concrete piers, has been for some months under active construction by the Foundation Company, limited, contracting engineers of Montreal and Vancouver, and on completion of its contract the steel work will be erected by the Dominion Bridge company. Owing to the necessity of providing subways at the adjacent highway crossings on the east and west banks of the river, the track is carried over on a high level, making a distance of approximately 34 feet from base of rail to summer river level. This next, has offered the greatest difficulties.

diately west of pier number nine is also completed. It, too, rests on a pile foundation, but owing to increased span the design is much heavier than for the other piers already completed.

Open Cofferdam Method.

The foundation for these piers have all been constructed by the open cofferdam method. A compact wall of tongued and grooved timber sheeting is first driven by steam hammers to entirely envelop the pier site, and then the excavation is commenced. As the excavation is carried down the outside pressure due to the combined weight of the water and clay becomes very great and requires very substantial inside bracing with heavy timbers. It is necessary that the cofferdams be kept reasonably dry to permit of carrying on the work and pumping become an important factor. This is especially difficult if, as often happens, it is found on sinking that some of the sheeting on driving has sprung out of line and leaves an opening which it is often difficult to repair. On the completion of the excavation the piles are driven and concrete work is begun.

A Difficult Pier to Build.

Pier number seven, which comes

pecially designed for the purpose. On a contract of this size, handling of material is a big factor, and in this case the work has been very much facilitated by having a C.P.R. siding on each bank, over which the cement, gravel, stone, timber and other materials are switched to the site.

An Interesting Work

Although the work so far has proved very interesting both to the contractors and to visitors to the camp, by far the most interesting part is yet to come on the river piers numbers five and six, which are to be constructed by the pneumatic caisson process. This method of excavating for bridge piers and concreting under compressed air is almost new in Winnipeg, and the progress will be watched with very much interest. The only instance of compressed air having been used in Winnipeg for this purpose was on the C. P. R. bridge at Point Douglas, where the Foundation Company, limited, successfully sunk small caissons in 1912 in extending the piers to permit of the erection of a double track superstructure, and that contract was executed in record time.

What a Pneumatic Caisson Is

A pneumatic caisson consists of a massive structure, built of course upon course of 12x12 timbers. The inside dimensions correspond with the footing of the pier and the caisson is of similar shape. It is divided into two parts by a solid horizontal deck of,

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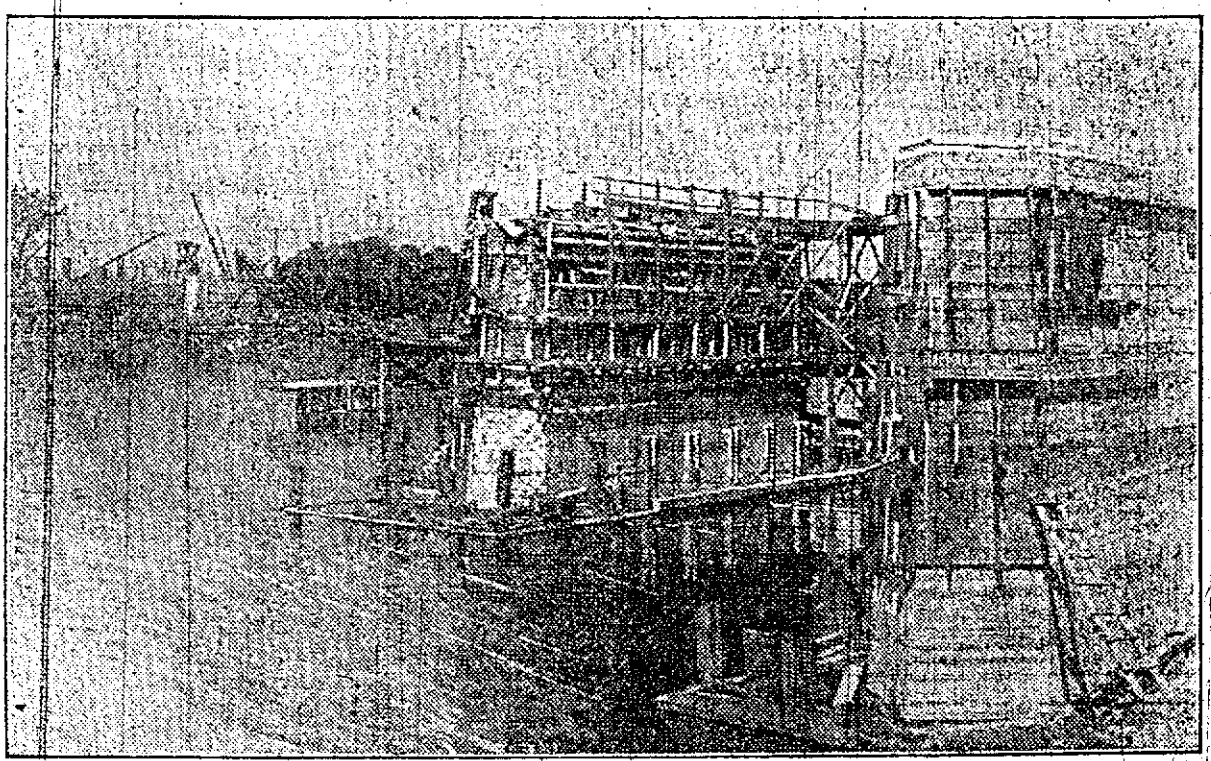

The piers for the new C. P. R. bridge over the Red river in Kildonan on the Bergen cut off. The work was commenced during the winter and is being rushed to completion as fast as possible. Some of the piers are carried down to rock bottom in solid concrete, while some are built on piles driven to hard-pan.

SELL DEBENTURES FOR

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rail to summer river level. This necessitates the construction of a very substantial substructure, and the problem of carrying down the excavation to safe bottom and running in concrete so far below the bed of the river presents many difficulties to the contractor, which often call for ingenious solutions.

Work Commenced in January.

The work was begun by the Foundation company in January in order to take advantage of the ease of access to the river piers on the ice, and in spite of the extreme cold was pushed ahead persistently night and day during the winter months, often under great discomfort owing to severe climatic conditions.

A modern double track railway bridge demands that the piers be built on a very firm foundation, solid rock if at all possible, and owing to the fact that the elevation of bed rock drops away towards the northern part of the city, the difficulties in this case are very much increased. Add to this the fact that the clay overlying the rock is permeated with seams of water-bearing sand and gravel, the despair of the contractor on foundation work, and you have a condition of affairs that calls for the utmost ingenuity and determination. That the efforts of the Foundation company are being crowned with success is evident to a visitor to the works. The first and last piers, known as piers number three and number nine, stand completed and stripped of their forms. These two piers are of similar construction, each resting on a compact footing of timber piles driven into hardpan, which immediately overlies bed rock. The concrete is carried down a distance of from 15 to 20 feet below the river bed to entirely eliminate any possibility of damage to the pier by scour in the years to come. The east abutment was finished last week and the one on the west bank is fast approaching completion. They, too, rest on a timber pile foundation, the preparation of which presented no very serious difficulty to the contractors. Pier number eight lying immediately next, has offered the greatest difficulties of any piers attempted so far. On this pier rests one end of the swing span, and owing to the increased load it was considered necessary to carry the concrete foundation down to bed rock. Interlocking steel sheeting was used in the construction of the cofferdam. It was driven in two courses, approximately five feet apart, the space between being later filled with a mixture of clay and gravel to form a puddle wall to facilitate pumping as the excavation was carried down. After the main excavation was carried to a point beyond all possibility of scour by the river, another set of forty foot steel sheeting was driven inside the cofferdam to rock, and excavation continued under severe pumping conditions. Concrete followed and the pier now stands well above water level, which permits pulling the steel sheeting to be used in another cofferdam.

Pier number four immediately east of number three is the mate to number eight and will be constructed in much the same manner, with the exception that steel sheet piling will be employed instead of timber sheeting in the construction of the cofferdam. This alteration is necessary owing to the fact that the summer river level is approximately six feet above winter level, the lowering of the curtain at St. Andrews' dam during the summer months accounting for the difference in elevation.

Shovelled by Hand.

The excavation for the above mentioned piers and abutments was carried out by shovelling by hand direct into buckets of one cubic yard capacity, and these buckets were in turn hoisted and swung clear of the dam by stiff leg derricks, and the clay suitably disposed of. Two concrete mixers of one cubic yard and one and one-half cubic yards respectively have been employed in mixing concrete, and it in turn has been transferred directly by derricks to piers within reach and to piers farther out over temporary pile trestles, the concrete being wheeled out in buggies es-

SELL DEBENTURES FOR LOCAL IMPROVEMENTS

Rosetown, Sask., June 20.—Rosetown, Sask., has just closed a deal with a Toronto firm for the sale of a $23,000 block of debentures. This money will be used in the town for local improvements: $5,000 for fire fighting equipment, $3,000 for drains and ditches and $15,000 for a municipal hospital. The town has recently purchased a Watrous gasoline fire engine which has been tested and found satisfactory. The plans are under way for the new hospital, which will be managed by the English church railway mission for three years. In addition to this the people will be asked to vote on three other bylaws on June 23 for the purpose of raising $13,500 to be expended as follows: $7,500 for the construction of a municipal skating and curling rink, $4,000 for grading and road making, and $2,000 for sidewalks. The Presbyterians of the town have commenced operations on a new church, which will cost between three and four thousand dollars.

GAS FIND IN ESTEVAN EXCITES MUCH ATTENTION

Estevan, June 20.—The fact that gas is to be found underlying Estevan as shown by the drilling of a well in the Empress hotel is creating considerable attention. It has long been claimed that underlying the coal strata an abundant supply of gas would be obtainable, but hitherto it has never been proved out. The estimated depth at which it would be found was placed at between 2,000 and 3,000 feet and as the well in which a flow of gas is now showing is just over 2,000 feet it would seem to show that the prophets were right. With natural gas to add to its other large resources the inhabitants of Estevan believe they will have one of the largest manufacturing centres in the country. Exhaustive tests as to the quality and amount of gas will probably be undertaken in the near future.

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12x12 timbers built in, six feet from the bottom. The bottom section, known as the working chamber, is carefully lined inside and out with dressed sheeting which is afterwards caulked to make it air and water tight. The bottom course of timber of the working chamber is dressed to a bevel and is known as the cutting edge, for it is this edge which cuts down into the clay when in position, and allows the excavation to proceed. The top portion is an open cofferdam, and through it one or two steel shafts of about four feet in diameter are carried down to the working chamber. These shafts give access to the working chamber for men and materials, while in operation. The outside of the cofferdam is sheeted with dressed lumber.

Caisson is Launched.

The caisson is first of all built to a height of 12 or 14 feet on a launchway, and after being launched in the usual manner, is towed to the pier site, where it is held in position by a set of guide piles previously driven. Concrete is then run into the open cofferdam on to the deck, and the increased load causes the caisson to gradually sink. The walls of the cofferdam are built up in position as sinking proceeds, and as soon as the cutting edge rests on the river bottom, compressed air is turned into the working chamber, the air pressure being sufficient to keep out the water, which allows excavation to go on. Each shaft is fitted up at the top with a lock which has top and bottom doors, and in this lock the air pressure can be increased or decreased as desired. This provides access to and from the working chamber for materials and sand-hogs, as the men who work in compressed air are called. After the rock is reached the working chamber and shafts are concreted up and the pier completed to grade.

Compressed air is furnished by a series of three compressors set up on shore, one of which is kept as an auxiliary in case of emergency.

The caisson for pier five has already been launched, and is being built up in position, and according to the superintendent, air will shortly be turned on and excavation started. The caisson for pier number six, the pivot pier, is at present being built on the launch-

The Foundation company has carried down many of the difficult foundations for skyscrapers in New York and other American cities, and at the present time is executing eight large contracts in Canada, including bridge piers for the C. P. R. at Pitt River, B. C.; Harrison Mills, B. C.; Newcastle Bridge, N. B., and have difficult contracts in Montreal, St. John, N. B.; Mud Lake and Little Current, Ontario. way. The Foundation company are experts in this class of work and the construction of bridge piers by this method is attracting a good deal of attention both to local contractors and the general public, and a very interesting and instructive afternoon can be spent by a visit to the works.

Camp on River Bank.

A large camp to accommodate the entire crew is located on lot 58, on the east bank of the river, adjacent to the bridge site. It consists of a number of comfortable bunk houses for the men, with a commodious and well equipped dining room and cook house, together with separate houses for the superintendent and foremen. Most of the foremen are old company employees and have come to this job from other contracts.

Dec 1939

CAN'T HAPPEN HERE

Army Engineers Plot Ruin Of C.P.R. Bridge at Bergen

Members of the 12th Field company, Royal Canadian Engineers, Thursday, plotted the destruction of the Canadian Pacific railway bridge over the Red river at the Bergen cut-off and incidentally got in some needed practice in the art of demolition.

However, nothing more dangerous than a little black powder was used to lend realism to the performance which saw 60 members of the company, under Lieut. M. J. Woods, brave below-freezing temperatures to calculate the potential power needed to end the railroad's sturdy structure.

Watching over the recently-recruited engineers was Sergeant-Instructor G. Conrad, of the permanent force.

Complete demolition of such a bridge, built of steel and reinforced concrete, would take 5,000 pounds of gun cotton and two days' hard work, he calculated. Actually, however, the 12th field company was only required to cripple the structure and temporarily end its use to the enemy.

This was done by planning to cut the bridge at vital points. When the required amount of gun cotton had been determined, crews then fixed up the charges, using wooden bricks instead of explosives and string instead of fuses.

Sergeant Conrad explained that one pound of the cotton would cut one-inch-thick steel. After a while, he said, increased experience would enable the engineers to judge the necessary amount without involved and lengthy calculations.

Fog Still Holds Catton in North

Again halted by heavy fog which blanketed the northern portion of the province, Pilot Bill Catton of Canadian Airways was still grounded at Gods lake at noon Friday.

"If the weather improves at all, he will start out for Winnipeg some time today," airway officials said.

Since Nov. 23, Capt. Catton has been bucking inclement weather, for on that day he set out on a 1,500-mile flight to Repulse bay, on the fringe of the Arctic, where he picked up Rev. Father Joseph A. Bullaird, northern missionary, who had been badly frozen. He is bringing the priest to St. Boniface hospital.

Grenadiers Hear Appeal By Priest

An appeal for unity between the French and English speaking races of Canada in defence of a common ideal against a common danger, was expressed by Rev. A. D'Eschambault Thursday afternoon in an address on French-Canadian history to officers and men of the Winnipeg Grenadiers. The talk, one of a series of educational lectures to

Turgeon Warns

Practical Training for Engineers

Dec 1939

Permanent force instructors are busy instilling the principles of modern warfare in Canada's newly-recruited army. The engineers are no exception and, Thursday, members of the 12th Field company, Royal Canadian Engineers, adjourned to Bergen cutoff for a theoretical demolition demonstration. The C.P.R. bridge over the Red river was the make-belief victim. Above, Lieut. M. J. Woods, right, talks it over with Sergt. Instructor George Conrad, while a detail of the 12th works out necessary explosive needed to destroy a section of bridge.

LOOKING BACKWARD

CAN'T BLAME HERE

1939 Turkey Crop