Johnson Street Bridge, Victoria

Now Under Construction After Ten Years of Discussion—Part of Comprehensive Terminal Improvement Scheme—Piers Excavated by Open Caisson Method

By Our Victoria, B.C., Correspondent

THE Johnson Street bridge, in Victoria, B.C., which is now, after nearly ten years of discussion, under construction, will be an interesting structure in itself, owing to certain special features of design, and is also interesting as being a portion of a very comprehensive scheme of improvements in connection with Victoria's railway and shipping terminals. During 1912, the provincial government purchased from the Indians the tract of land across the harbor from the business portion of the city which had from the very early days been occupied by them as a reserve. It was planned to construct elaborate common terminals for the various railways on this site, as well as docks for the deep water trade, and the bridge in question was an essential part of the scheme, furnishing direct connection from the city to the terminals, and also to Victoria West and Esquimalt, at present reached by a much more circuitous route.

Many delays were experienced, due primarily to financial depression and the Great War, and great difficulty was encountered in drafting a final scheme for the bridge and its approaches which would meet the wishes of all parties. The original terminal scheme itself has only been commenced during these years, a portion of the grading having been carried out, until the emergency of the war led to the land being used without further improvement as shipbuilding sites. The experience so gained will doubtless lead to radical changes in the layout, the bridge itself having been altered in many details as well as in location.

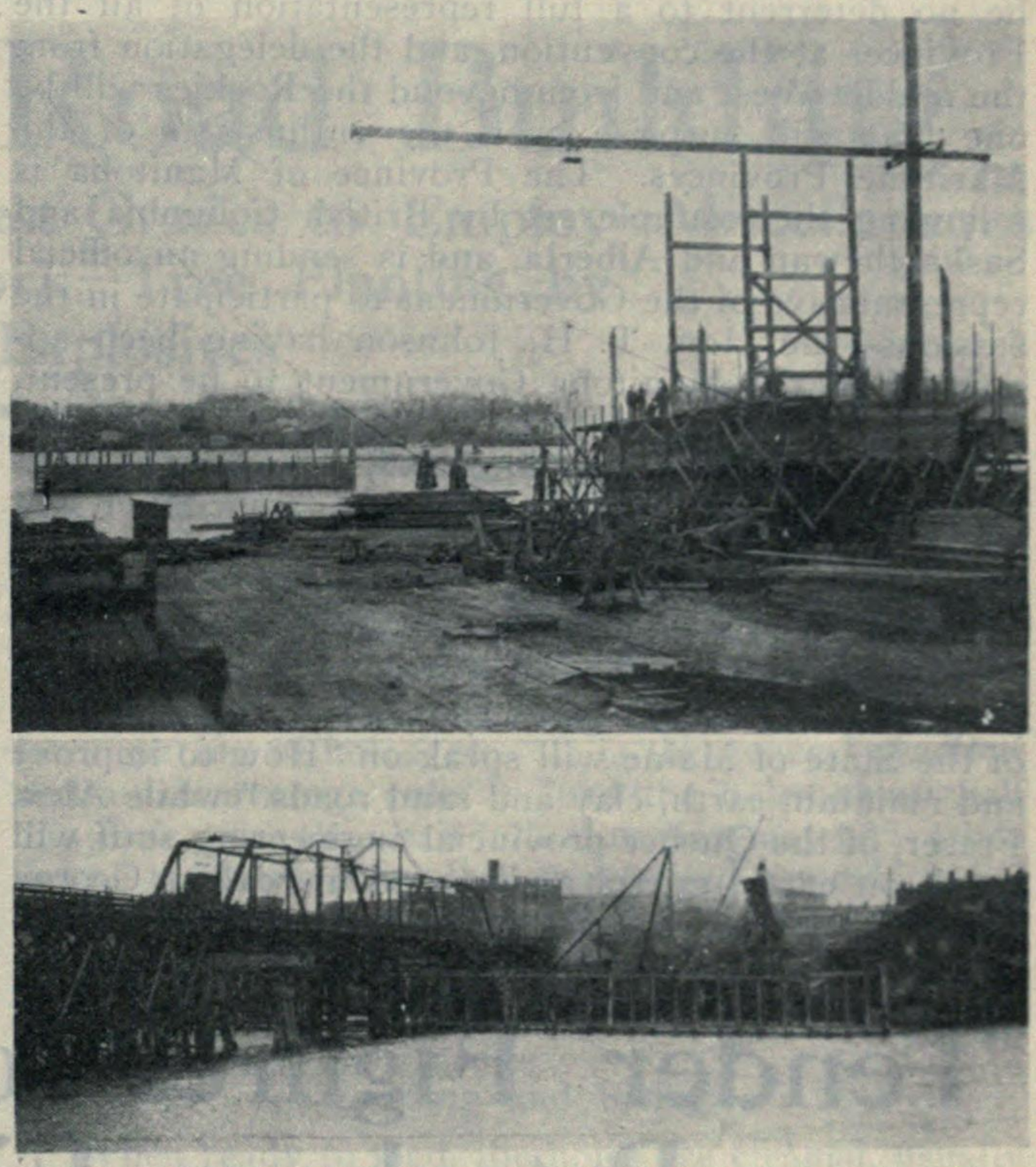
A Compromise Scheme

As now being built, this portion of the scheme is frankly a compromise. It is to consist of practically two independent structures as regards the steel work, the southern portion to be for highway traffic but carrying tracks for street cars and a single line for steam traffic; the northern portion to be purely for railway traffic—exclusively for the use of the Esquimalt and Nanaimo Railway Co. which owns the present bridge and has its station on the city side of the harbor.

Surveys have been actively in progress for some months past, following the agreement between the railways, city, and provincial government, and the tenders were called for during the end of 1920 for the first portion of the substructure. The city engineer tendered on behalf of the city and several other bids were received from well-known contracting firms. The city engineer's tender, which was about 15 per cent. lower than any of the others, was accepted, and the work is being carried on by day labor, sub-contracts in some cases being let for piling and other portions of the work.

The piers are to be built by the open caisson method, and one of the caissons is already completed and launched, while another is on the ways nearing completion. Dredging has commenced, and the material is being used to fill in the low ground under the east approach, the clamshell dumping direct in a chute, the lower end of which is moved about as required.

Bids will very shortly be asked for the steel work,



Upper: open caissons for piers of Johnson St. bridge, Victoria. Lower: start of construction; dredging for pier.

to consist of a bascule center span, with several steel girder approach spans. The city officials anticipate wide interest being taken in this bidding, and expect to receive some bids from fabricators in England, as well as from Eastern Canada and the States.

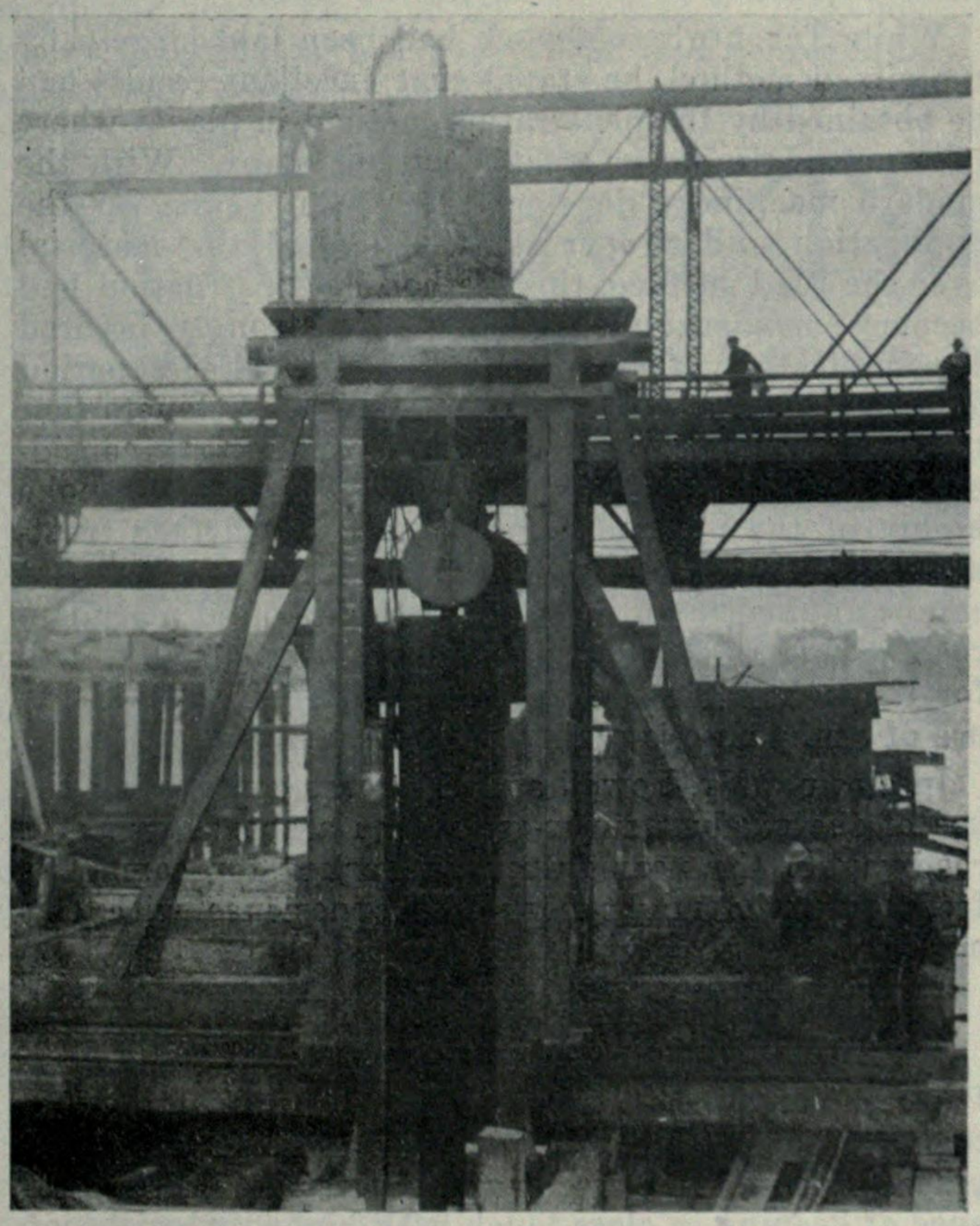
The American Society of Mechanical Engineers will hold their 1921 spring meeting in Chicago at the Congress Hotel, May 23-26. Well developed programmes will be presented by the professional divisions of the society devoted to forest products, fuel, machine shop, management, material handling, power, railroads and a specially important session will be devoted to training for industries. At the Materials Handling session the following addresses will be read: "Planning and Organization of a Road Job for the Mechanical Handling of Material," C. D. Curtis; "Road Plant Operations, with Practical Analysis of Operating Road Plants," B. H. Piepmeier; "What the Contractor Needs," General R. C. Marshall, Jr.

Rapid Progress on the Construction of the Johnson St. Bridge, Victoria

Concrete Operations on the Substructure are Proceeding Speedily —Special Scheme for the Underwater Pouring of Concrete—Caissons Sunk to Depth

By the Contract Record's Victoria, B. C., correspondent.

Construction is now proceeding rapidly on the substructure for the new highway and railway bridge being erected on Johnston St. by the city engineer's department of Victoria, B. C. The east abutment is completed as far as possible without disturbing the existing bridge, which is to remain in service until such time as temporary tracks can be laid across on the highway portion of the new bridge now being built. Forms have been built for the corresponding section of the west abutment, and concreting is in progress. Two caissons have been



Pouring concrete under water on Johnson St. bridge, Victoria.

sunk to depth and the larger of the two which will enclose the main trunnion pier, has been concreted to a depth of 14 feet. This caisson was not carried down to bed rock, which in this part of the channel is from 70 to 90 feet below ordinary low tide level, but piles have been driven at close intervals all over the enclosed surface to bed rock and cut off so that their tops are at a level about 5 or 6 feet below the harbour bottom. Previous to driving the piles excavation was taken down far enough to allow a projection of the pile tops, after cutting off as described, of about 4 feet, so that a thoroughly good bond would be obtained between the piles and the concrete filling of the caisson. The caissons have been so built as to allow the upper portion to be removed with very little trouble by simply releasing a few bolts, after the pier proper has been built.

For the purpose of pumping out the caisson a centrifugal pump of 5000 gal. per minute capacity, steam engine driven, has been installed, and has been successfully tried out. Several leaks developed in the walls of the caisson, but none was serious enough to suspend operations, although the diver's services were requisitioned to undertake some calking on the outside of some of the joints.

For keeping down the water after the preliminary pumping a four-inch centrifugal pump has been installed, belt driven from a traction engine, and in its try-out has proven entirely satisfactory. An attempt was first made to use an old Waterous fire engine in the possession of the city, but while this pump was in excellent condition, and gave good service as long as clear water only was being pumped, it gave out when the attempt was made to pump water containing a large proportion of silt.

Special Method for Concreting Under Water

To overcome the difficulties of concreting under water, the city engineer, Mr. F. M. Preston, in collaboration with the resident engineer on the bridge, Mr. F. H. Allwood, worked out a very simple and effective arrangement which appears to have satisfactorily solved this somewhat vexed problem. The arrangement partakes of the characteristics of the closed bucket and of the tremie systems of underwater concreting, and consists of a cylinder, closed at both ends by movable traps, which are so constructed as to be practically airtight when closed. A batch of concrete is put in the cylinder with the lower trap closed, then the upper one is closed and the whole lowered to about two or three inches above the point where the concrete is to be placed. Air pressure is then applied above the concrete before the lower trap is opened, so that the batch is forced out rapidly and evenly, with as little contact with the surrounding water as is at all practicable. Samples of the concrete detached by the diver after setting show a dense firm structure of satisfactory hardness and with all the grains of sand and gravel well coated with cement. As applied in this job, the concrete cylinder is supported between guides after the manner of a pile driver, and is skidded about as required. It would seem to be entirely within the bounds of possibility to use the contrivance at the end of a line controlled by a derrick, which would increase its flexibility considerably for some classes of work.

Johnson St. Bridge, Victoria, B. C.

Substructure Practically Finished and Steel Erection to Commence Soon--Interesting Methods of Providing Bond Between Completed and Future Work

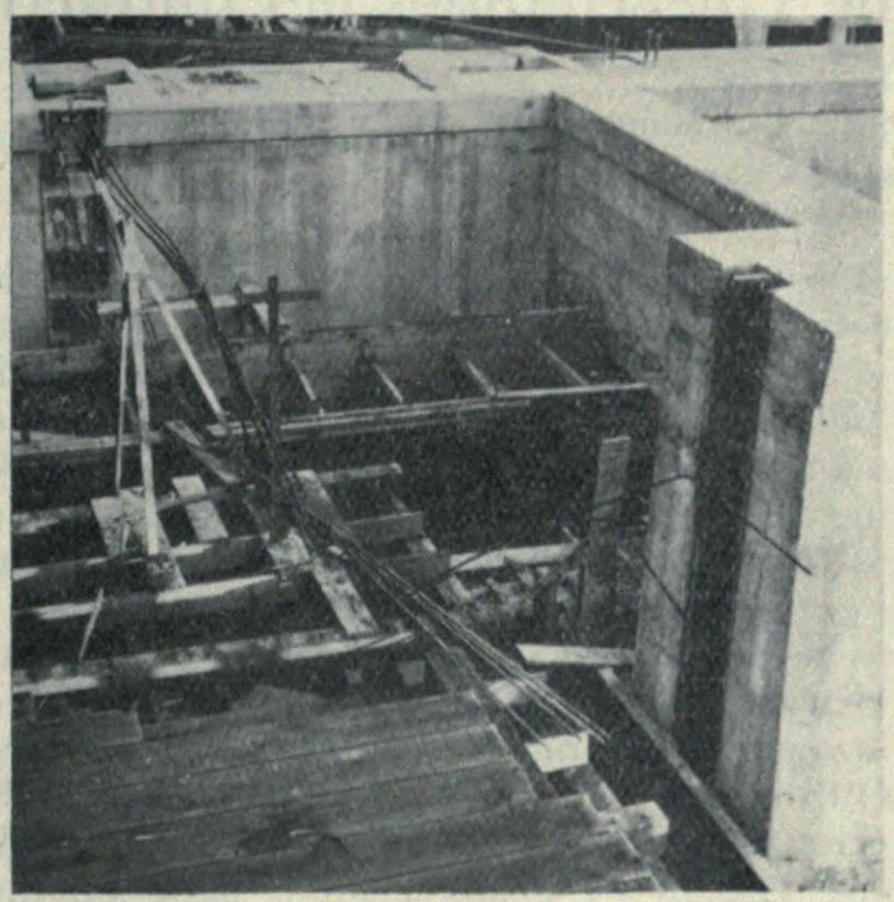
By the Contract Record's Victoria, B. C., correspondent.

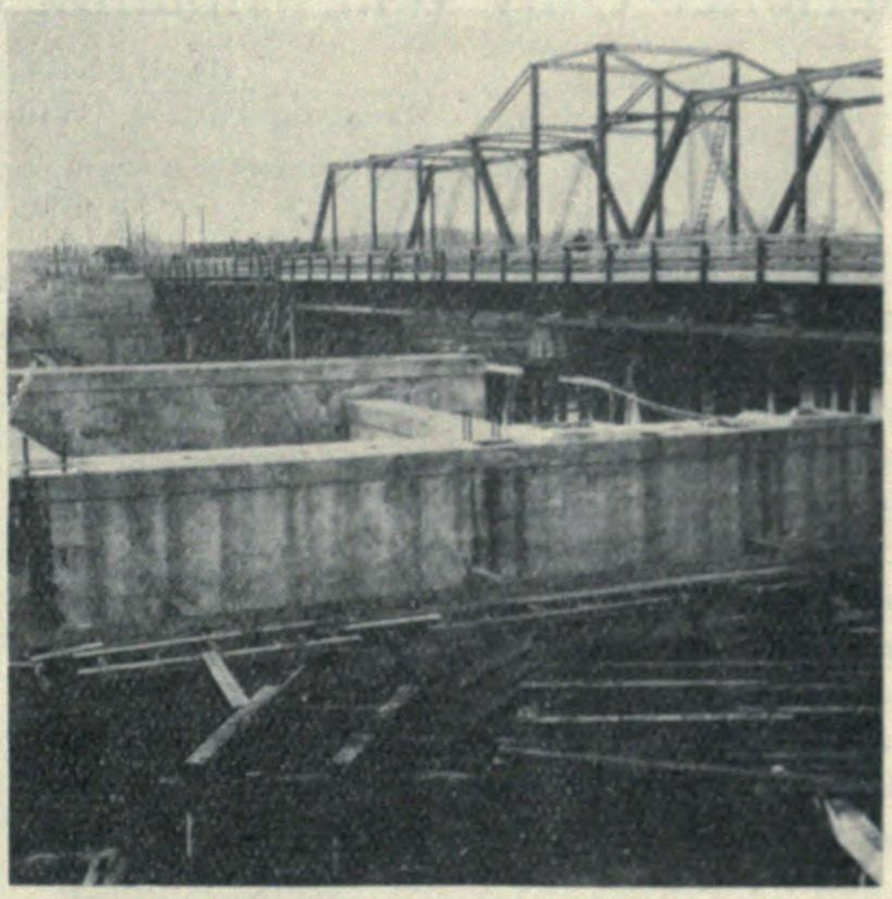
With the exception of work which must be left until after the demolition of the present bridge, work on the foundations and piers for the new bridge across Victoria Harbour is rapidly nearing completion. The west abutment is completed and is now being filled in with the material excavated from the site of the western pier. The main pier is almost completed, but cannot be finished at present, as the old swing-span centre pier is in the way. The photographs clearly show the portions built, with the arrangements for bonding the remaining portions when construction proceeds.

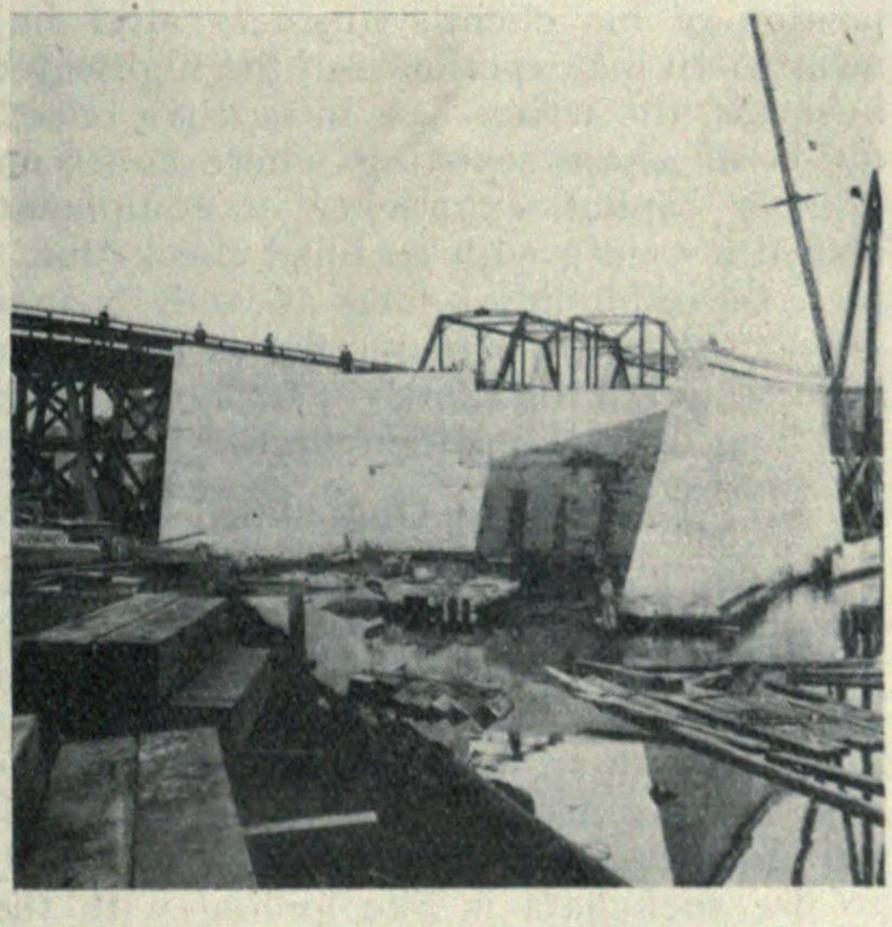
A rather interesting detail in this connection is the method adopted with the steel reinforcement, which it will be noted has been installed complete for the missing longitudinal cell-wall and is supported by timbers etc., in the meantime. A more useful practice would have been to leave stubs of generous length for wiring on the steel when the forms were built, but it was considered in this case that an additional degree of safety would be attained by making the steel continuous.

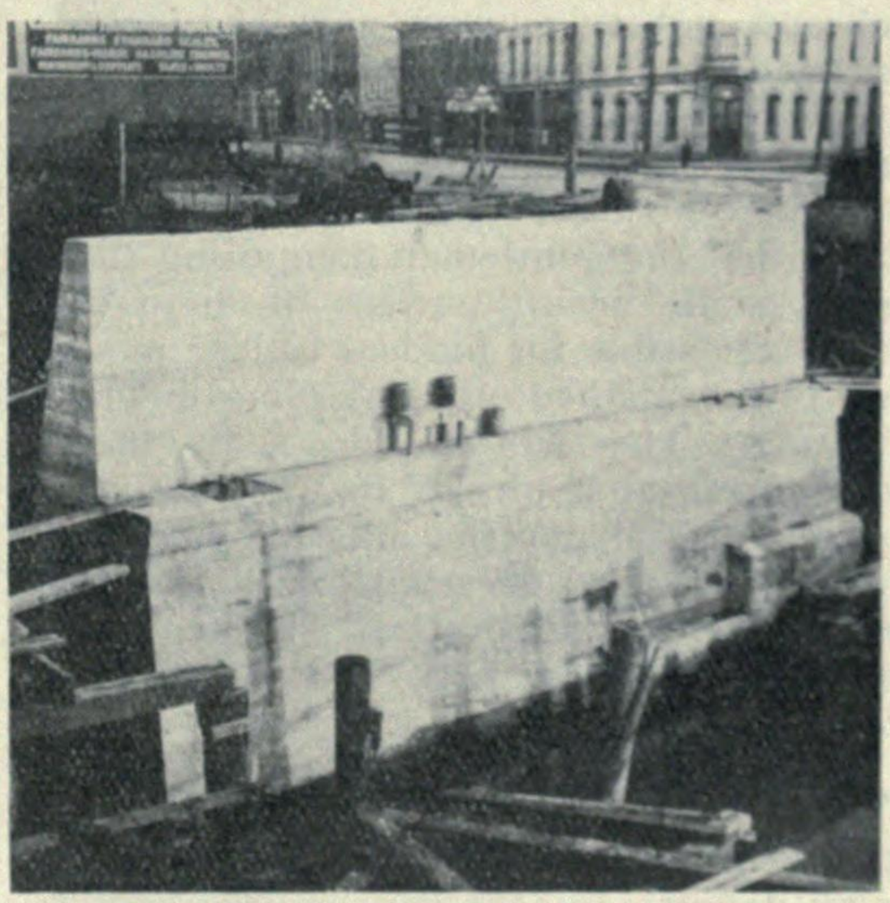
A portion of the east abutment has also been left for future construction. This being built of mass concrete, no attempt has been made to provide a steel connection between the two portions, but, large keyways about two feet in depth have been left in the cross section of the wall, which will provide sufficient bond.

Steel erection is expected to commence as soon as the first shipment of bridge secions, which is now en route, comes to hand. The grillages and anchor bolts









Upper left: Showing reinforcement and keyways left for second stage of construction. Upper right: Trunnion Pier showing relation to old bridge. Lower left: West abutment completed. Lower right: Completed portion of east abutment.

for embedding in the concrete were received some little time ago and are already in place on the substructure. Tenders are now being called for the remaining half of the steel superstructure, which includes the railway traffic section. The electrical and mechanical portions are being handled by the Canadian General Electric Company, who are collaborating with Messrs. Fraser and Frew of Vancouver, electrical and mechanical engineers, on the erection and problems of the design of the operating machinery.

Although the two parts of the bridge will be structurally independent, they will be linked for operation, and only one operating house will be provided.

Where Paper Profits in Highway Construction Disappear

Various Factors Which, if not Properly Taken Into Account by Contractors, Will Cause Supposed Profits to Turn Into Losses—Careful Study and Experience Only Will Minimize the Uncertainties of Contracting

By HENRY H. WILSON
Managing Partner, Winston & Co., Muncy, Pa.

Paper read before the Associated General Contractors of America.

In the first place, and dismissing such extraordinary considerations as war and post-war conditions, it is safe to say that more losses have been encountered by highway constructors through careless estimating and failure to analyze and anticipate many factors to be encountered than from all other causes. If a contractor is to be successful, he must exercise in the preparation of his bid the same degree of diligence and intelligence that he is willing and expects to exercise in the prosecution of the work after the contract is awarded him. Every contractor, who would be a successful bidder, in the final meaning of that term, must be "from Missouri". He must ascertain, from careful study, just what he is doing when he submits a bid and not rely upon somebody else's judgment. In time past, there has often been a tendency among contractors to take engineers' estimates on work as final criteria of the costs of same and to figure their bids below those estimates, with the apparent conviction that the gentlemen computing these estimates possess some occult powers of divination and that it was not possible for bidders to lose money so long as their bids remained within hailing distance of these estimates. This will not do. Engineers have an almost universal tendency to underestimate costs, because they do not pay the bills for work and it is difficult for anyone who does not pay the bills to take into account the many theoretically hidden items of expense which, in practice, discover themselves to the contractor.

Engineers' Estimates Mislead Contractors

Further than this, the estimator of one of the leading highway departments of the country said to me some years ago: "In making estimates, I do not attempt to figure what I think the work should really cost but what I think the contractors will bid. If I turned in estimates to my department, based on my own judgment of the costs involved, the contractors would soon make my figures look foolish". This statement is pregnant with suggestion as to where many paper profits of constructors have disappeared in the past. It is believed that one of the greatest steps taken in recent years with a view to eliminating the irresponsible constructor, has been the refusal of some highway departments to give out engineers' estimates in advance of the letting of work.

In addition to the losses resulting from a too high regard for engineers' estimates, cases are not wanting where would-be constructors have been willing to leave the preparation of their bids to some material or bonding man, who was instrumental in interesting them in their efforts to secure work. None of us who have worked for any considerable number of years in the highway industry have failed to be conscious of the annual crop of new concerns with more enthusiasm than practical experience and who have, oftentimes, been brought "into the field" through the efforts of some vendor bent upon securing a portion of his client's business after he secures an award. In his experience in the highway construction business, the writer has, more than once, seen a condition of affairs existing where concerns practically without capital, experience or equipment, were furnished not only with certified checks but with a complete set of bidding figures as well, by some interested vendor. It is almost superfluous to say that the paper profits figured for many constructors of this type were not long in winging their flight.

Tenders by Unqualified Estimators

Much loss has also been experienced due to attempts of unqualified estimators to apply cost data gleaned from hand books and trade literature upon the subjects. Such data are good for bidding purposes only in so far as one is qualified, by study and analysis, to properly interpret and apply them to new conditions. Unless one is so qualified, an attempt to use such data is like fooling with the proverbial "buzz-saw",and it is not surprising that many paper profits so arrived at have promptly disappeared.

Cases are not wanting where bidders have submitted prices merely made to beat the previous low bidders, evidently and solely in the child-like faith that the previous low bidders could have made no mistake. Bids have also been submitted which were nothing more than an average of the bids submitted upon a number of other projects, all of which might have been entirely dissimilar from the projects they were used to average on. Such practices as the last

as to divide the load equally on each loop. The loops are likely to vary somewhat in length, and even if this variation is extremely slight the load is always thrown upon the shortest one first; and unless the job were done with the greatest care and skill, and the several turns of rope stretched by exactly the same amount, the short loop might have to carry the entire load. Furthermore, if the loops are short the strain to which they are subjected may greatly exceed the weight of the load, in accordance with the principle involved in the use of slings, where the angle which the sides of a sling make with the load is an exceedingly important factor in calculating the actual stress that the sling has to sustain.

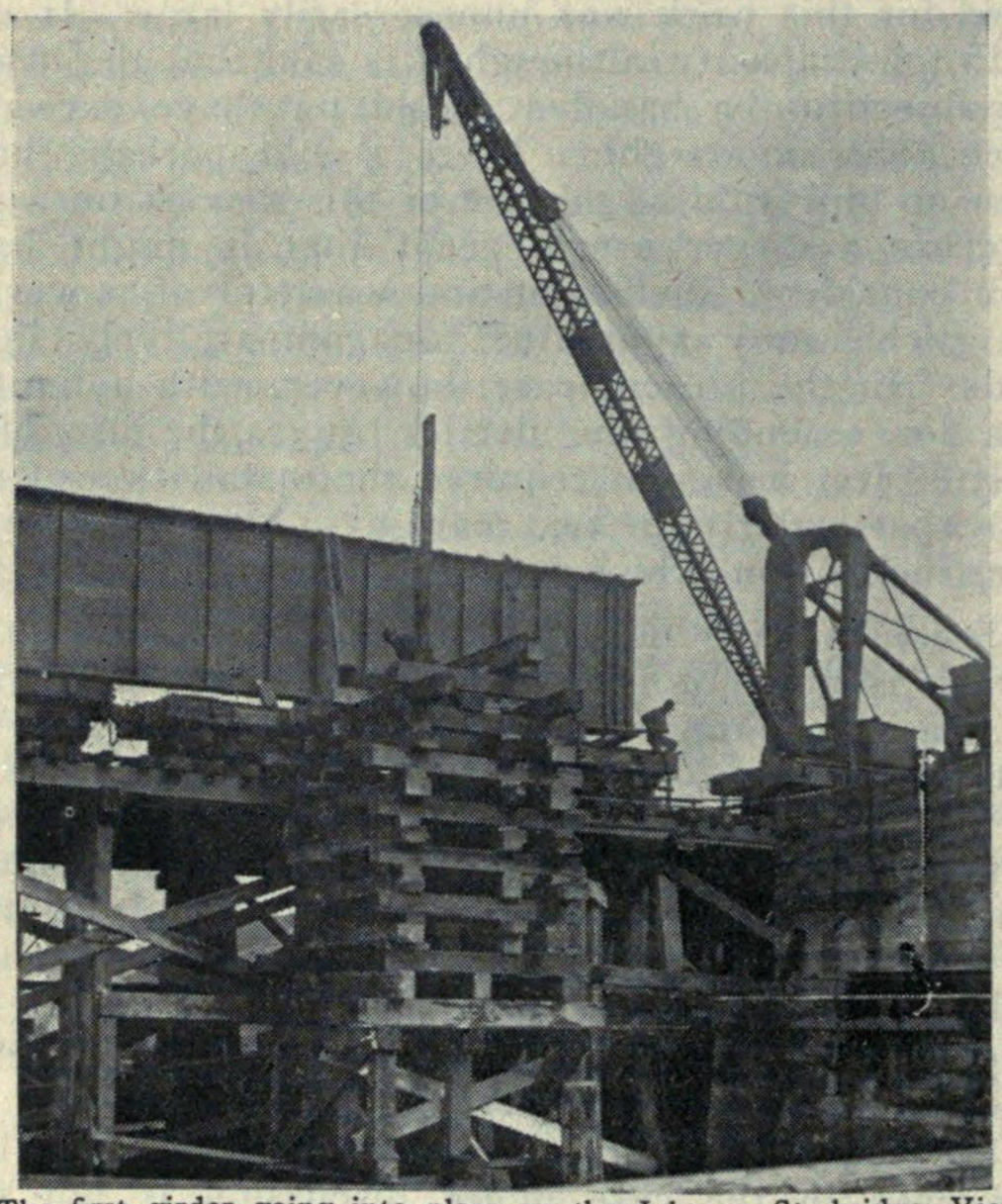
Steel for Johnson St. Bridge, Victoria, is Now Being Erected

The Canadian Bridge Co. are Now Working on the New Bascule Structure—Tenders for Railway Section are Above Estimate—Concreting is Proceeding

By the Contract Record's Victoria, B.C., correspondent

Work on the steel for the new bascule bridge at Victoria has been commenced by the contractors, the Canadian Bridge Co., of Walkerville, Ont. Their superintendent, Mr. W. O'Brien, arrived on the job early in February, and has been busy with the preliminaries including the erection of a temporary trestle leading from the railway tracks of the Esquimalt and Nanaimo Railway Co. to the trunnion pier. This trestle follows very nearly the line which will be taken by the permanent tracks and is being used by the bridge company's travelling crane.

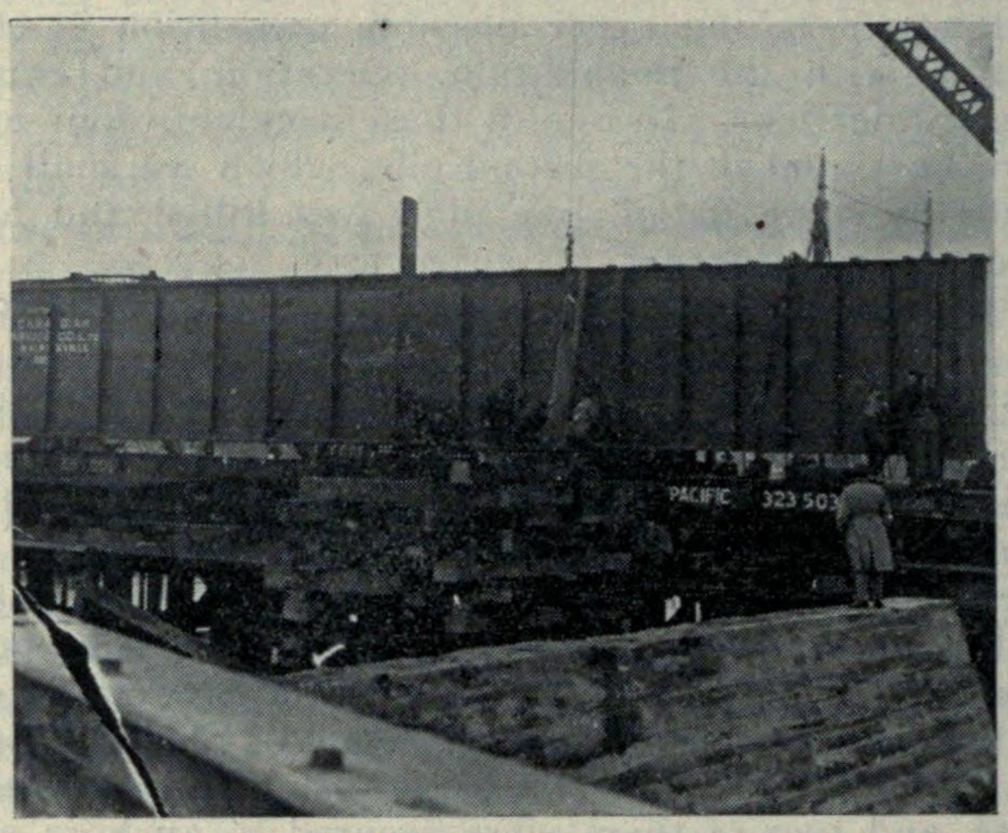
Concreting has been proceeding on the base of the rest pier at the west end of the bascule span, and as soon as this is set, the crib will be pumped out and



The first girder going into place on the Johnson St. bridge, Victoria

the forms for the pier proper will be erected. Work could be proceeding on the large amount of reinforced concrete to be contained in the approach at the west end, but this portion of the work is being deferred pending the settlement of certain outstanding differences which have developed between the provincial and Dominion government authorities concerned.

Tenders were opened on March 3 for the remaining portion of the steel work, viz., the railway section of the bascule span. The figures were as follows:—



The first girder is 113 ft. long over all, 10 ft. deep, and weighs 56 tons

Canadian Bridge Co.	
Fabrication and erection	$213,400
Fabrication only	159,900
J. Coughlan & Sons (Vancouver)	
Fabrication and erection	212,500
Fabrication only	175,00
Sir William Arrol Co., (Glasgow)	
Fabrication only	186,156
Dominion Bridge Company	
Fabrication and erection	253,750
Hamilton Bridge Company	
Fabrication and erection	249,600
Fabrication only	186,600
City engineer, tender for erection by day labor	75,000

The lowest figure for the complete job is that of J. Coughlan & Sons at $212,500, but the work has not as yet been awarded for the reason that this figure exceeds by $50,000 the amount allowed by the city engineer in estimating for this portion of the work. It seems probable that it may be necessary to submit a by-law to the electors for the raising of the additional sum of money, but it is likely that new tenders will be called for before this action is taken, in the hope that a second bidding would result in the receipt of a tender within the amount already authorized.

Revision of the Cost Estimates of the Johnson St. Bridge, Victoria

New Figures Indicate that the Structure Will Cost at Least 15% More Than the Original Estimate— Increased Cost is a Reflection on Day Labor Methods

By J. B. HOLDCROFT, A.M.E.I.C.
Contract Record Correspondent

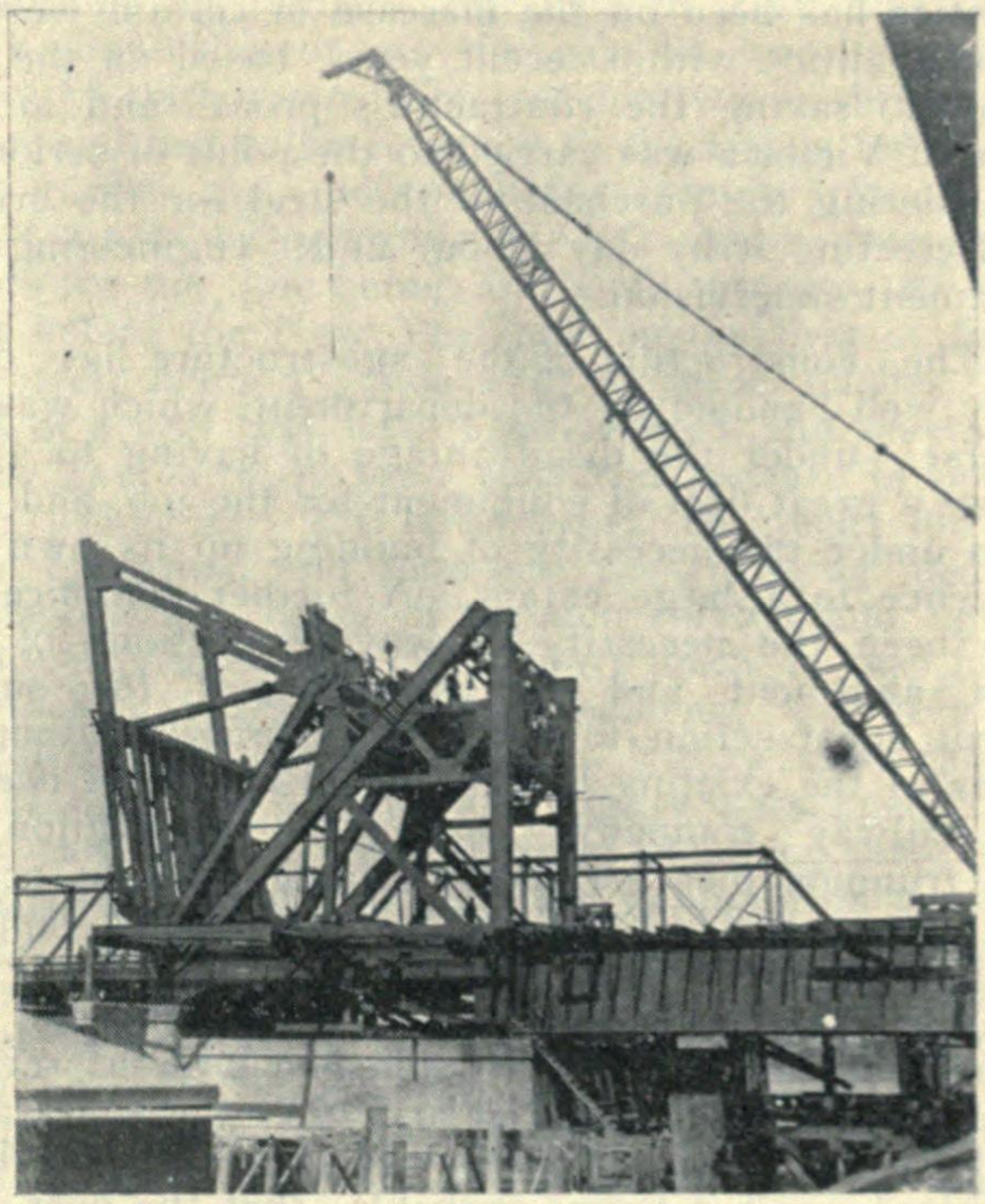
A revision of the estimated cost of the Johnson St. bridge project in Victoria, B. C., has just been made public by the city council and the engineering department which has created a feeling of consternation since it shows an increase of over 15% above the original estimates making up the total. As originally estimated, the project was to cost $720,000 of which the provincial government contributed $200,000 and the Canadian Pacific Railway $100,000, leaving $420,000 to be provided by the city, which was arranged for by the passage of a by-law authorizing the floating of bonds to the required amount. Statements of an optimistic nature have been issued from time to time by the engineering department to the effect that the work in hand was in all cases costing less than the estimates and one or two small increases in minor items were satisfactorily explained, so that the public were taken by surprise when the announcement was made that the bridge could not be completed for the amount subscribed by the various parties to the construction and would cost at least $110,000 more. Efforts have been made without success to obtain increases in the contributions of the provincial government and the Canadian Pacific Railway Co., and an application to the provincial government for an order-in-council authorizing the increase of the issue under the original by-law to the extent required was also refused, so that the only alternative remaining is to place a supplementary by-law before the people, which will be done this month.

The original and the present estimate of costs as detailed by the engineering department are as follows :—

	First Estimates	New Estimate	Increase	Decrease
Substructure	$170,950	$239,086	40%	
Superstructure	425,120	481,000	40%	
Approaches	36,040	34,000		5%
Engineering & Legal	30,000	40,656	36%	
Land	40,000	25,000		37%
Contingencies	17,890	10,258		42%
Totals	$720,000	$830,000	15%	

Of the items marked for decrease that of "approaches" has not yet been put in hand and is entirely a matter of judgment, while the item for "contingencies" has the note appended that the amount of $10,258 has already been expended with the project still far from completion, so that it is quite probable that the original estimate of this item is probably nearer the correct figure.

This whole matter is of more than local interest owing to the commentary it offers on the practices followed by the city council in awarding the different portions of the work. In the first place it was decided that the employment of an experienced consulting engineer for the design and supervision of the project was an unnecessary expense and the responsibility of the whole work was placed on the shoulders of the city engineer. Gratuitous engineering service was accepted from the Strauss Bascule Bridge Company for making up the preliminary estimate of the weight of steel in the bridge, and this estimate was subsequently found to be far below the actual requirements. This fact, it is stated, with certain additional requirements of the bridge

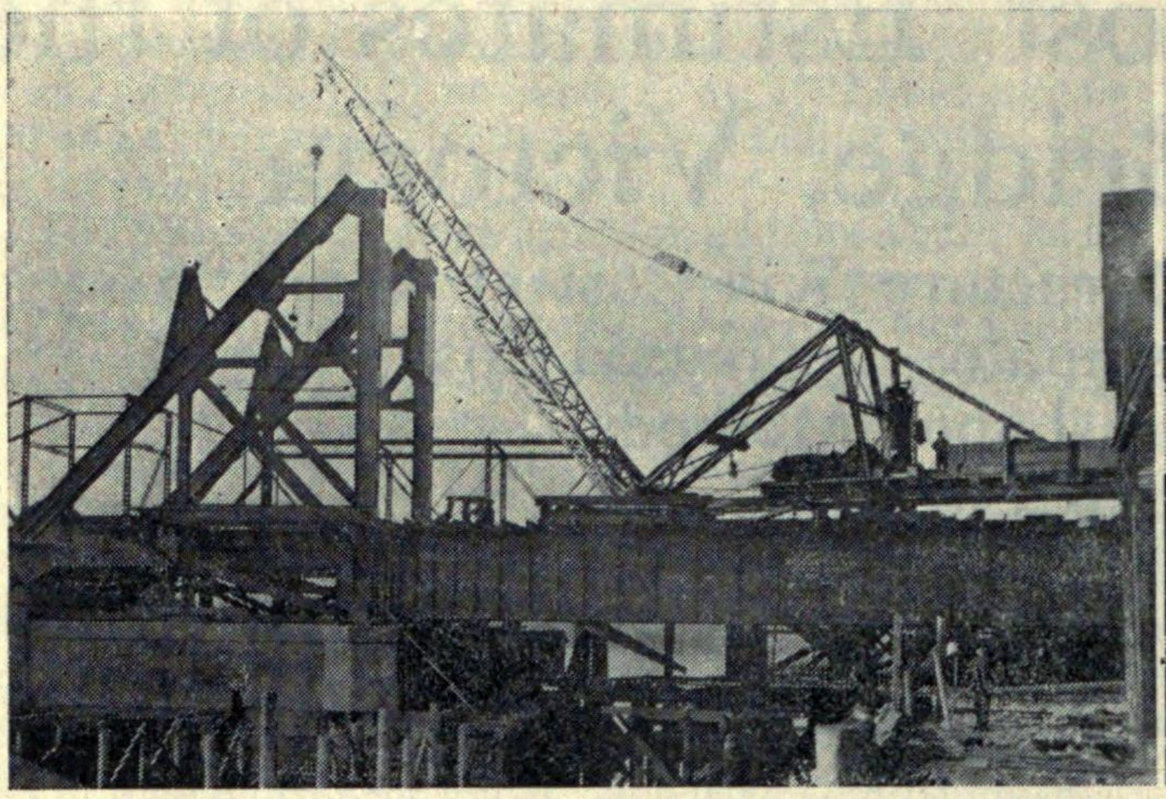


Canadian Bridge Co's derrick on the Johnson St., bridge Victoria, showing the 180 ft. boom assembling the main truss of the bascule span in the inclined position

engineers of the Canadian Pacific Railway Company, accounted for the increased cost of the superstructure which amounts to $55,880, deducted from the contract and tender figures of the Canadian Bridge Company, contractor for the highway portion of the bridge and successful tenderer for the second or railway portion.

Disadvantages of Handling Work by Day Labor

The substructure it is estimated will cost $68,136 more than the figure originally estimated by the engineering department in competition with the contractors tendering for the work. This estimate a-



Derrick with 90 ft. boom assembling steel

Setting main journals for bascule span

mounted to $170,950 and the lowest figure submitted by a contractor was in the neighborhood of $210,000. Instead, however, of regarding the department's figure merely as an estimate, the city council treated it as a tender and at once awarded the work to its own department to be done by day labour. This practice has been on the increase in certain western municipalities within recent years, based on the fallacy of "saving the contractor's profit" and in the case of Victoria was carried to the point of seriously considering the purchase of the steel for the bridge and erecting it by day labour under engineering department supervision.

The construction of the substructure has been very well handled by the department, which was, of course, under the disadvantage of having to purchase a great deal of equipment for the job, and was also under the necessity of building up its own experience to a large extent. A further complication has been the necessity of leaving portions of the east abutment and the trunnion pier for subsequent construction to avoid weakening the foundations of the existing bridge, which is still in use by the railway company. During the excavation for the trunnion pier a rather alarming accident occurred due to the crib sinking through a hard capping of indurated clay into a stratum of mud. This was caused by over-ballasting to a certain extent, and was corrected without much trouble and without serious injury to the crib, which at first gave the appearance of being wrecked. No other incidents of this kind occurred, and it seems probable that the over expenditure was due to a low estimate of unit costs of excavation and concreting, etc., rather than to any of the well-known chances of this type of construction.

Engineering Allowances Were Low

The item allowed for engineering and legal costs in the original estimate was $30,000 amounting to 4.2% of the total. This was certainly low, as the engineering alone of a project of this kind will rarely be less than 5%. This has been increased in the new estimate to $40,656 which is still only 4.9% of the new total and is expected to cover legal expenses as well, which have been rather heavy on this work, due to certain disputes over the land required for the approaches.

Of the original contingency fund of $17,890 it is stated that $10,258 has already been spent, and this latter amount has been included in the new estimate as the total contingency fund required. The contingency allowance was originally only 2½% of the then estimated total cost, and as this has already been expended to the extent of 60%, it would seem to be the part of prudence to include in the new estimate a sum which could be drawn upon for unforeseen expenditures. As the matter stands, however, it is assumed that all such contingencies have already been met, an assumption which is, to say the least, optimistic in view of the fact that a certain amount of sub-aqueous work remains to be done.

Expert Supervision Desirable

The conclusions to be drawn from the situation that has arisen are, of course, the same as have been so often emphasized, viz., the advisability; which amounts to a necessity, of having all such projects under the supervision of a consulting engineer who is thoroughly familiar with the particular class of work proposed. It need hardly be reiterated that this involves no discredit upon the official holding the appointment of city engineer, whose duties are so multifarious and varied that he can rarely take the position of having what is specifically called "expert" knowledge of special works of major magnitude. And the other conclusion is that it is a practical impossibility to beat the contractor at his own game. The contractor's profit is his fee for expert services, and includes, from the clients' standpoint, the rental of equipment and the use of his organization, which has been gathered with the express purpose of handling work in an economical manner. It is only in the rarest instances that it can be shown that this "profit" about which such a cry is made, is actually saved by departmental handling of work.

The Lightning Rod Act

The provisions of "The Lightning Rod Act", which became effective in Ontario on January 2, 1922, have been issued in booklet form by the Ontario Government. This act regulates the sale and installation of lightning rods and insists on their arrangement according to certain rules and regulations, which are also included in the booklet.

Cost of the Johnson St. Bridge, Victoria

F. M. Preston, City Engineer of Victoria, Gives Some Figures Explaining the Increase in Cost Over the Original Estimate —Vindicates Day Labor

In our issue of May 10 there was an article entitled "Revision of the Cost Estimates of the Johnson St. Bridge, Victoria". The city engineer of Victoria, Mr. F. M. Preston, writes us regarding certain statements which he claims are in error. We have pleasure in giving Mr. Preston's explanations the same prominence as was given to the original article. Mr. Preston's statement follows:—

"In your issue of May 10th, there appears an article by J. B. Holdcroft, entitled, "Revision of the Cost Estimates of the Johnson Street Bridge, Victoria," to portions of which I take great exception, especially to the part of it concerned with the day labor methods used.

"I take no exception at all to that part of the article concerned with the 15% increase in costs over the original estimate, since this original estimate was made in 1919 upon only a general sketch plan and nothing was known as to the type of bascule, number of spans, or of the form which the substructure would take.

"After this estimate was prepared a railway loading was added to the city's side of the bridge, and therefore the Strauss Bascule Bridge Company's preliminary estimates were naturally affected; they were not asked for fresh estimates and therefore an unnecessary slur is cast upon the Strauss Bascule Bridge Company which should also be adequately corrected.

"The by-law for the additional $110,000 required has just been passed by the ratepayers by a very large majority, and this will give you some idea as to the 'feeling of consternation' which your correspondent says was produced. It was not known for certain until this year that the by-law amount would be exceeded.

"Referring to the part headed "Disadvantages of Handling Work by Day Labor," the following are the actual figures, and which can be verified without any difficulty.

"The original estimate for the whole of the substructure was $170,950, but when the final design was prepared, the cost was re-established at $212,500. For construction reasons the work had to be carried out in two portions, and the first portion, which has now been completed, consisted of the whole of the west abutment, the whole of the rest pier, two thirds of the main trunnion pier, about half of the east abutment and the whole of the counterweight trunnion pier. The cost of the first portion was estimated at $177,500 and the final portion at $35,000.

"Tenders were called in 1920 for the first portion of the work, and all tenders received, including an estimate made by the city engineer for carrying out the work by day labor, were based upon a schedule of quantities and prices; that is, the contractor was to be finally paid for the actual work done at the various prices submitted. No tenders on a lump sum basis were received. Taking the quantities given on this schedule, the city engineer's estimate for day labor worked out at $177,376, and that of the lowest contractor $212,714.

"After a final reckoning of quantities, the cost of the work, if it had been carried out by the contractor would have amounted to $239,766, and the actual day labor cost was $206,086, (this item of course, including all plant and equipment rental)—a direct saving of $33,680, by day labor, over the lowest contract tender.

"Taking each item of the work separately, the east abutment was constructed by day labor at a cost of $17,611 and the contractor's price would have been $19,783. The counterweight trunnion pier cost $68,-225 and the contractor's price would have been $70,-926. The main trunnion pier cost $43,616 and the contractor's price would have been $46,171. The rest pier cost $48,285 and the contractor's price would have been $63,763. The abutment cost $28,348 and the contractor's price would have been $39,123.

"Reverting to the question of the 15% excess cost of finished work over the original by-law estimate: I personally consider the original amount was a good guess—no one could call it an estimate—and I quote the following statement made to the city council on the subject: 'In order to give the city council some Idea of the difficulties entailed in estimating bridge work, even only a few weeks ahead, (and not as had to be done with the by-law,—some years in advance of the work) I should like to point out that there was a range in prices in contract No. 1 of $80,000 for work costing in the neighborhood of $206,000; in contract No. 2, $78,000, in work costing approximately $239,-000 and contract No. 3, in tenders refused a few weeks ago, approximately $41,000 upon work costing approximately $210,000. The above differences represent a percentage themselves of 30%, and assuming that the whole bridge will be completed for $840,000 the work will have been estimated originally within 16½%, which is a better guess for work to be done three years ahead than that made by the three largest bridge contractors in Canada, for work to be done a few months ahead.

"Referring to the paragraph "Expert Supervision Desirable," probably Mr. Holdcroft did not know that all the bridge plans had to be approved of by the C.P.R. bridge engineering department."

A catalog of Barford & Perkins, Ltd., of Peterborough, Eng., illustrating and describing their gasoline rollers, has been placed in our hands by E. O. Herbert, 81 Walnut St., Winnipeg, who is representing this firm in Canada. Two of the Barford & Perkins rollers have just been supplied to the Canadian National Parks. Mr. Herbert also handles in Canada the Ransome steam wagon, manufactured by Ransomes, Sims & Jefferies, Ltd., Ipswich, Eng.

About one hundred and ten union carpenters employed by the larger contractors in Toronto went on strike on May 29 owing to the employers having decided not to pay more than 80 cents per hour to the men. Officials of the union declare the prevailing rate is 90 cents per hour.

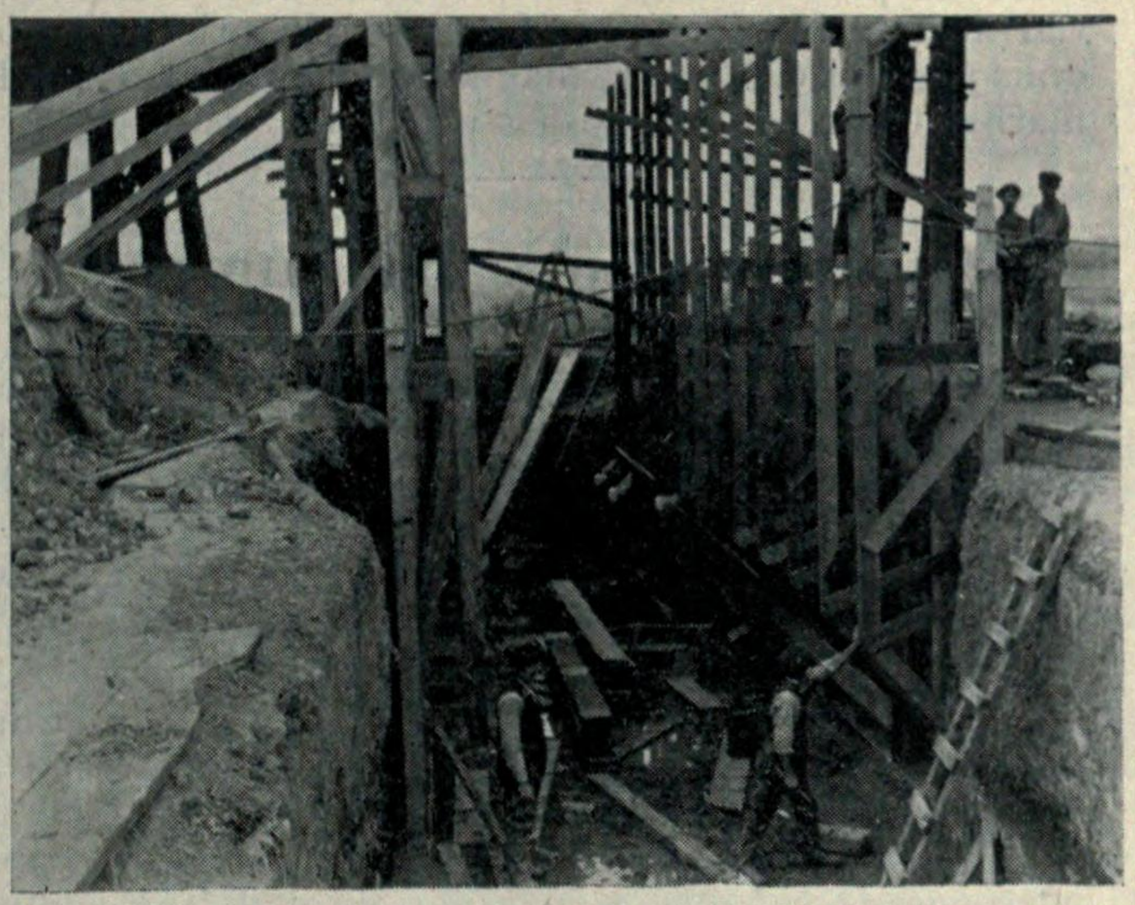
Progress on Johnson St. Bridge, Victoria

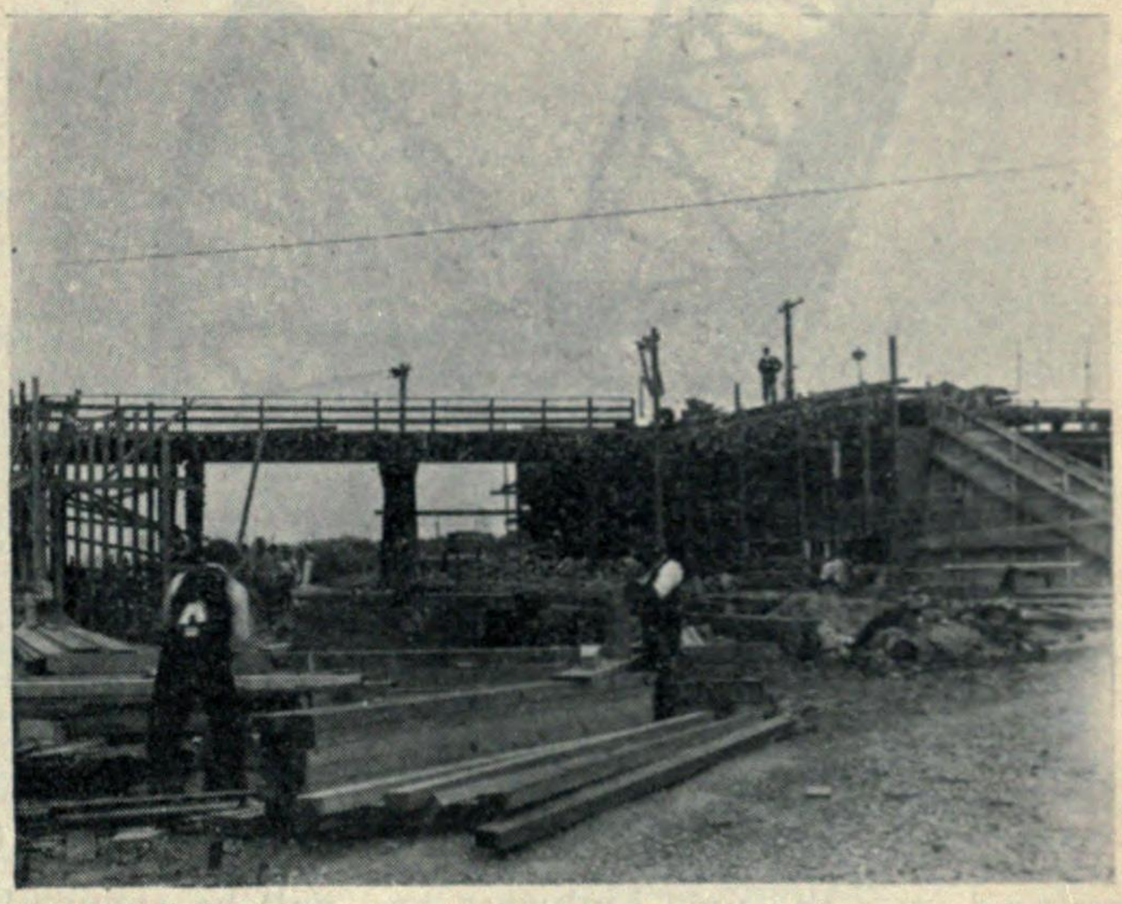
Highway Span Successfully Placed — Removal of Swing Span Commenced — Economical Handling of Material for Subway Structure

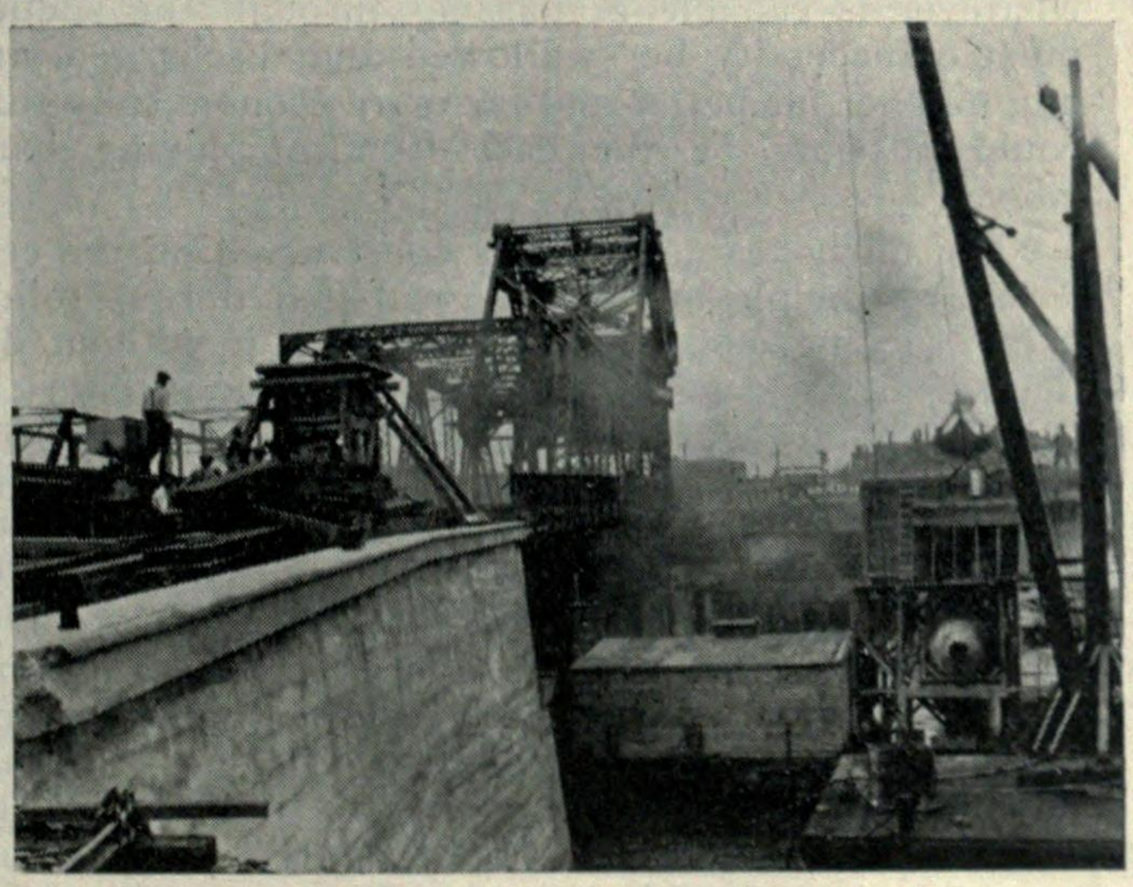
On the afternoon of the 14th of August the recently completed highway section of the Johnson Street Bridge scheme at Victoria, B. C. was lowered for the first time, moving into place exactly true to line and distance. This satisfactory conclusion to many months of anxious and careful work is looked upon as auguring equal satisfaction from the remaining units of the scheme, which will now be proceeded with.

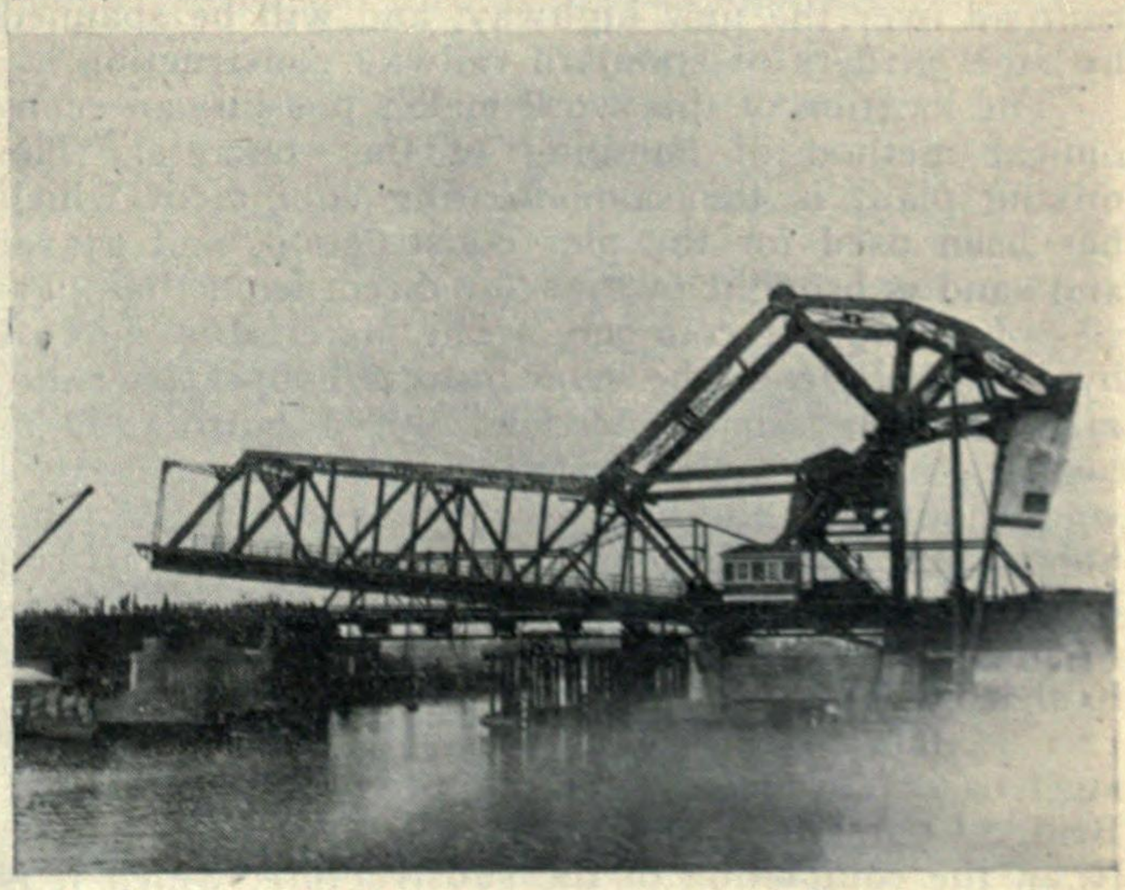
An interesting feature of this first trial was the extreme accuracy of the estimated weight required as a counterweight. The weight, which is of concrete, and which has only recently been completed by Messrs Parfitt Bros, the sub-contractors for this portion of the work, proved to be very slightly on the heavy side with the bridge in its present condition, considerable work in connection with the deck still being required, and when this work is completed it is probable that some additional weight may be required to obtain a balance. Under the existing conditions however, it was found that 160 amperes of current were required for lowering, and 150 amperes for raising, which was regarded as a very close result for a preliminary trial.

Work will now be commenced on the removal of the present swing span, which is still in use by the railway, but which will be permanently out of commission as soon as a temporary trestle is completed which will divert the railway traffic for the time being over the highway section of the new bridge. It is anticipated that this work will take about two months in all. About another four months will then be required for the completion of the substructure. The work remaining to be done on the piers consists of the completion of the main or trunnion pier, a portion of which was necessarily left for construction







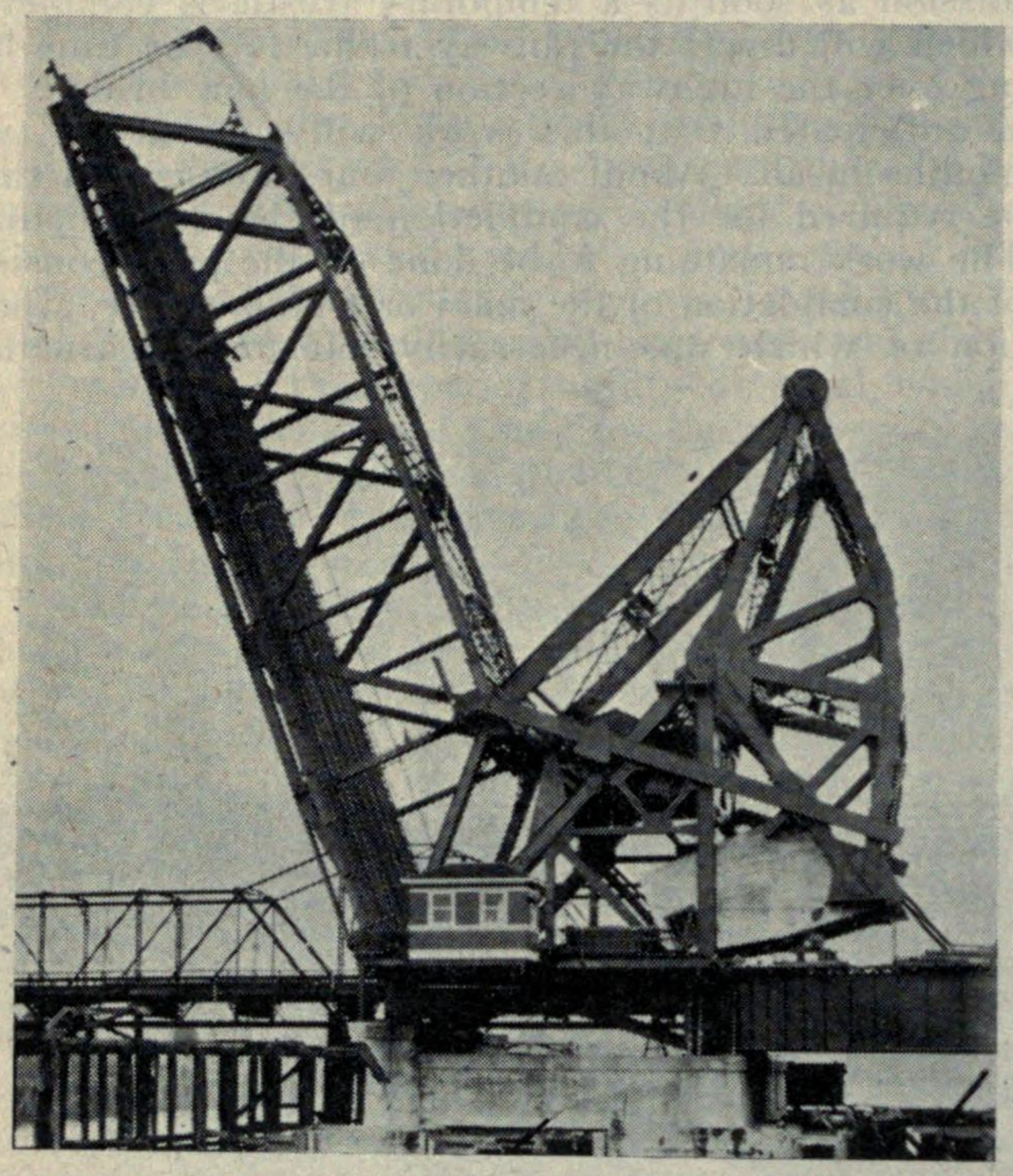


(Upper left) Placing form for subway abutment. (Upper right) General view; framing and placing forms for abutment of subway crossing, west approach. (Lower left) Concreting plant in use for supplying concrete to subway abutments, west approach. Main bridge in lowered position. (Lower right) Bridge bascule being lowered into place for first time.

until the cylinder piers of the old bridge are removed.

The northern half of the eastern abutment has also been left and will be proceeded with as soon as conditions permit. The rest pier and west abutment with its wingwalls are complete, and considerable progress has been made on the earth filling for both approaches, the material for the western end being obtained from the grading of the extension of Johnson Street to connect with the new bridge, which is being carried out simultaneously by a separate contract.

Work is at the present time proceeding on the construction of a subway in connection with the scheme, which will make the connection between the extension of Johnson Street which has been referred to and the west end of the bridge. This subway, which is being constructed with concrete abutments and wingwalls will furnish an elevated crossing for the



The completed highway section immediately previous to lowering

railroad over the new highway, and will be spanned by steel girders of standard railway construction.

The location of this work makes possible an economical method of handling of the concrete. The mixing plant is the same floating equipment which has been used for the pier construction, and gravel and sand is brought in by scow direct from the quarries of the supply company. The material is handled by clamshell from the scow into a hopper over the mixer, and a second derrick with a bottom dump bucket lifts the mixed concrete from the mixer to a small hopper at the head of an inclined track. This hopper discharges into small dump cars, which run by gravity down the incline, which is not so steep as to prevent their being easily returned by hand, the haul being only between two and three hundred feet.

The fabrication and erection of the remaining steel bascule unit has been awarded to the Canadian Bridge Company, and erection will follow immediately on the completion of the substructure, which it is expected will be in about six months time. The entire scheme should be completed well within twelve months.

Toronto Firm Secures Canadian Agency for Carrara Marbles

The Commercial Trading Corporation, Ltd., 9 Wellington St. E., Toronto, recently secured the Canadian agency for the internationally known line of Carrara white and colored marble, from the quarries owned by the famous art firm of Paolo Triscornia, of Carrara, Italy, who own and operate twenty marble quarries in that country and have executed some of the world's most famous works of art in marble, including the National monument of Queen Victoria in London, England, monument of King Edward VII at Liverpool, Eng., and others throughout the European continent and other foreign countries. "An erroneous impression held by many in Canada, in regard to Carrara marble, is that it will not withstand the vigorous Canadian winters without cracking," states our informant, Mr. Molini, sales manager of the Commercial Trading Corporation, Ltd. He points out that several monuments, statues, etc., constructed of this marble have been erected in Russia for centuries and have withstood the extremes of winter weather without a sign of deterioration. A particular instance of the weather resisting qualities of these marbles is the Troyan Tower, at Rome, Italy, which has been standing 983 years and is still in its original state of preservation. Mr. Molini also states that Carrara marbles compare favorably in price with ordinary granite. The Canadian company also handle marble terrazzo and mosaic products.

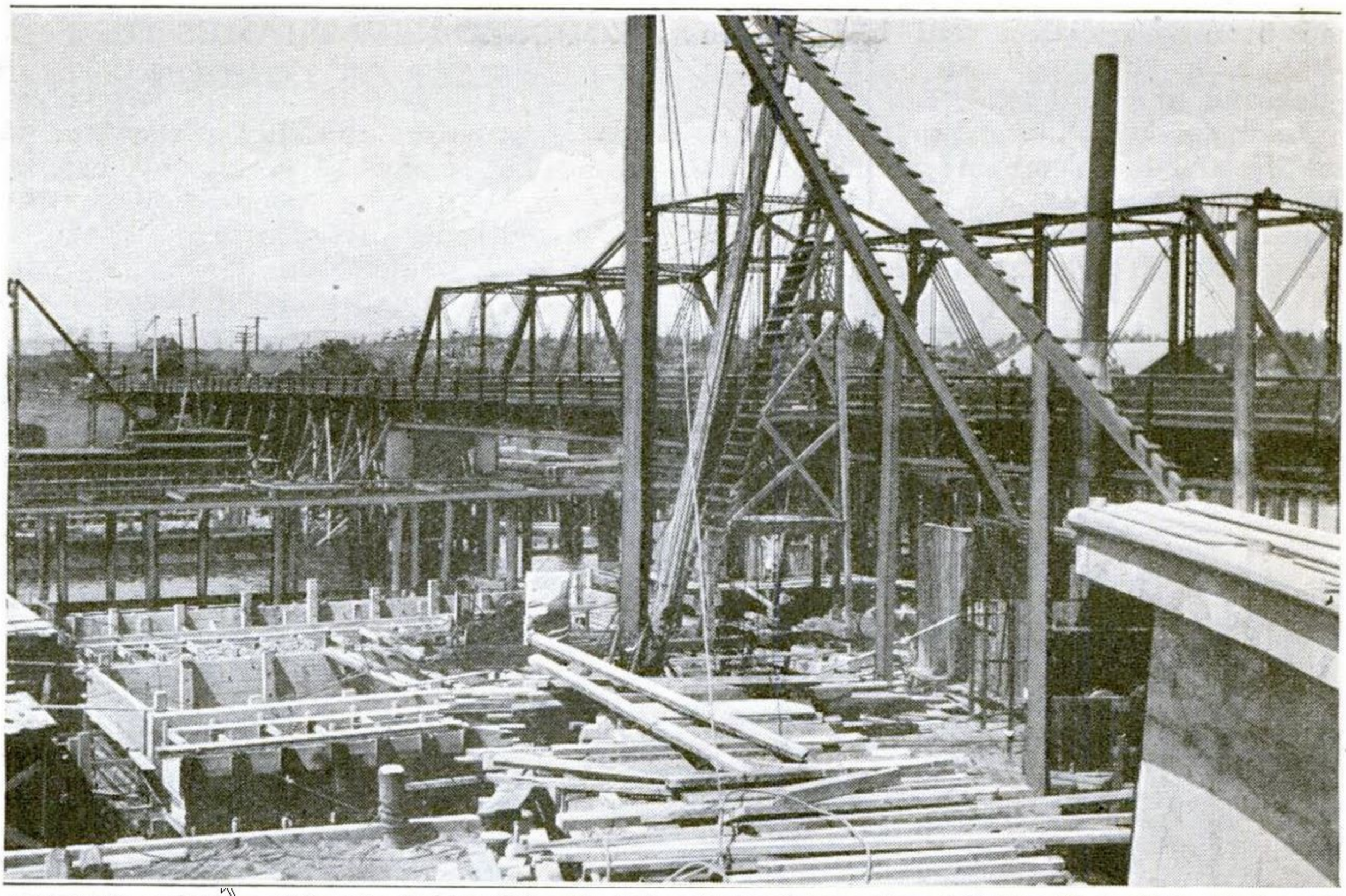
An Unchokeable Pump

The choking of pumps operating on semi-solids, is an unpleasant experience with which most engineers are familiar; and the consequent cost of removing the obstruction, the burning out of motors in electrically driven pumps, or the slipping and burning of belts in belt-operated installations are serious items which pump manufacturers have long been requested to eliminate.

The Unchokeable Pump, Limited, London, Eng., have made these problems their special study and as a result of experience have evolved a type of pump to deal with every possible contingency ensuring that whatever is capable of passing through the suction must of necessity be swallowed and discharged, and in a manner far better and far more economically than could possibly be the case from employing hand labor.

The unchokeable pump is constructed on the centrifugal principle but so designed that fibrous solids, skins, sacking, etc., will pass through it without difficulty. It is specially constructed to withstand the hard grinding work inseparable from the constant pumping of all kinds of sludge, fibres, semi-solid and solid matter. In principle the pump operates upon ordinary centrifugal lines but in internal detail the pump differs from any other. No screens are necessary for large objects that pass through the suction will be ejected at the delivery. It is particularly designed to pass unscreened sewage, a most difficult material, rags, cotton waste and all kinds of pulp and trade effluent from textile work in general. It has been found impossible to make the pump choke with solids, or semi-solids no matter how quickly or in what quantity they may be drawn into the pump.

CANADIAN BASCULE BRIDGE BUILT AS TWO BRIDGES



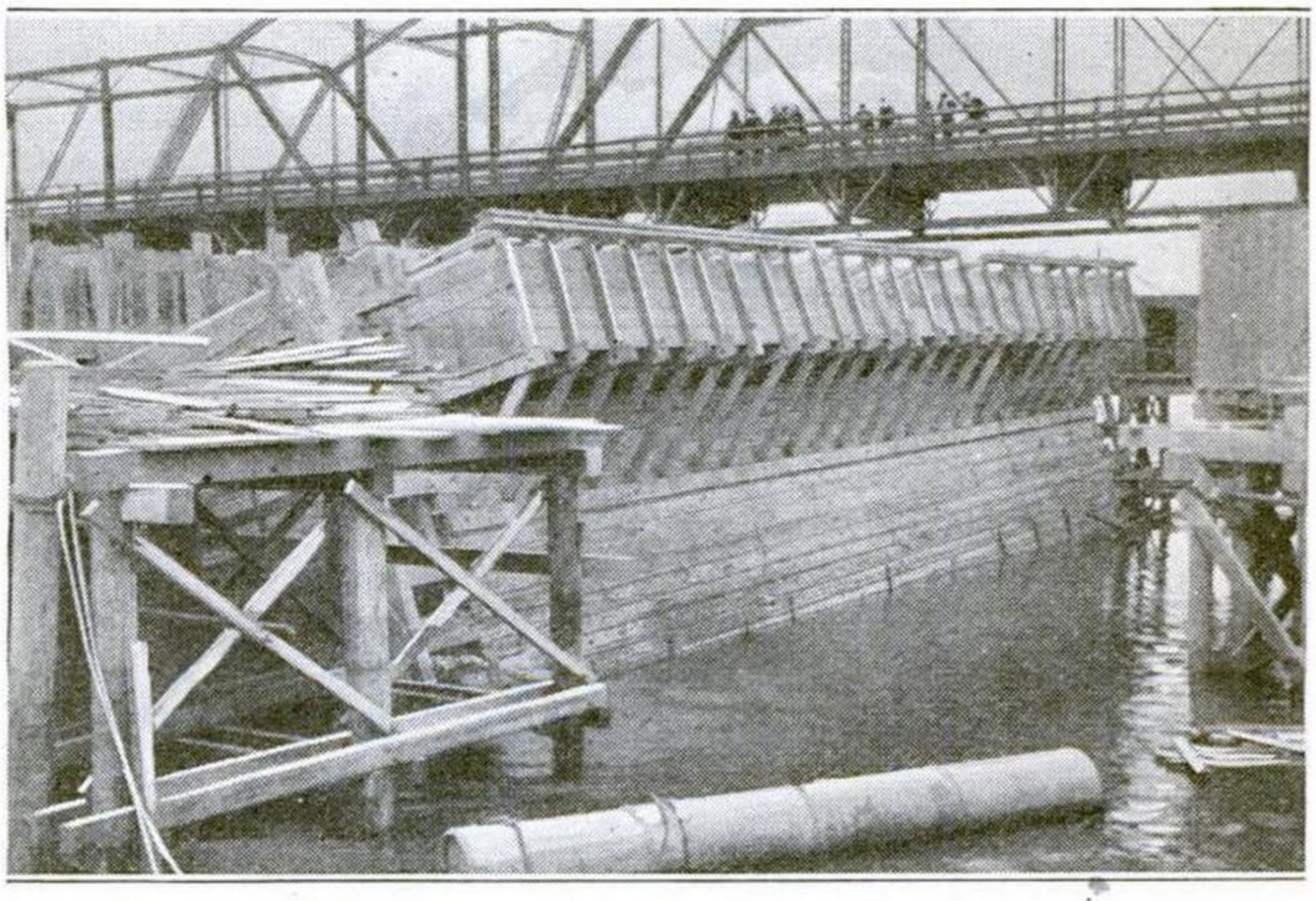
Old Railway Bridge at Victoria, British Columbia, being Replaced by a Bascule Bridge That will be Built as Two Bridges, So as Not to Interfere with Traffic during Construction: The First Bascule is Shown under Construction

A DIFFICULT problem was set for the engineers in charge of the design and construction of a new bridge to cross the neck of the harbor at Victoria, B. C., owing to the fact that it is necessary to locate the new structure on practically the same site as the old one without interrupting traffic.

The new bridge is to be of the trunnion-bascule type, and the difficulty has been surmounted by designing it as two separate bridges, the southern half, the piers for which are now under construction, being for ordinary street traffic, and the northern half, which will occupy the space now taken up by the old bridge, for railway traffic.

The highway section is to be completed first, and as street-car tracks are to be laid as part of the structure, it will be possible to use this section to accommodate the rail traffic until the north section is built. When the work is finally completed both bridges will be operated as one, from one operating house.

The piers are to be of concrete, carried well down into the harbor bed, and supported by piles driven closely together to bedrock, which is about 70 ft. below water level. A rather alarming accident occurred during the sinking of one of the open caissons, when this, suddenly and without warning, sank about 12 ft. at one edge, leaving the structure badly strained and considerably out of place. On investigation it turned out that the caisson had been overloaded, and had broken through a "capping" of hardpan into quicksand or liquid mud.



Accident to an Open Caisson during Construction of the First of the Bascule Bridges: The Caisson was Overloaded, and One End of It Sank 12 Feet, Which, But for Prompt Action, would have Caused Serious Damage

Quick work by the engineers in relieving the strain by removing the loading on the caisson, saved the situation, and about 48 hours after the accident the big box gently lifted and righted itself.

Source:
Popular Mechanics
Nov 1921