Archer Avenue Bridge.

MAYOR'S ANNUAL MESSAGE

AND THE

Thirty-First Annual Report

OF THE

DEPARTMENT OF

PUBLIC WORKS

TO THE

City Council of the City of Chicago

FOR THE

Fiscal Year Ending December 31

1906

ARCHER AVENUE BRIDGE.

ARCHER AVENUE BRIDGE.

ANNUAL REPORT

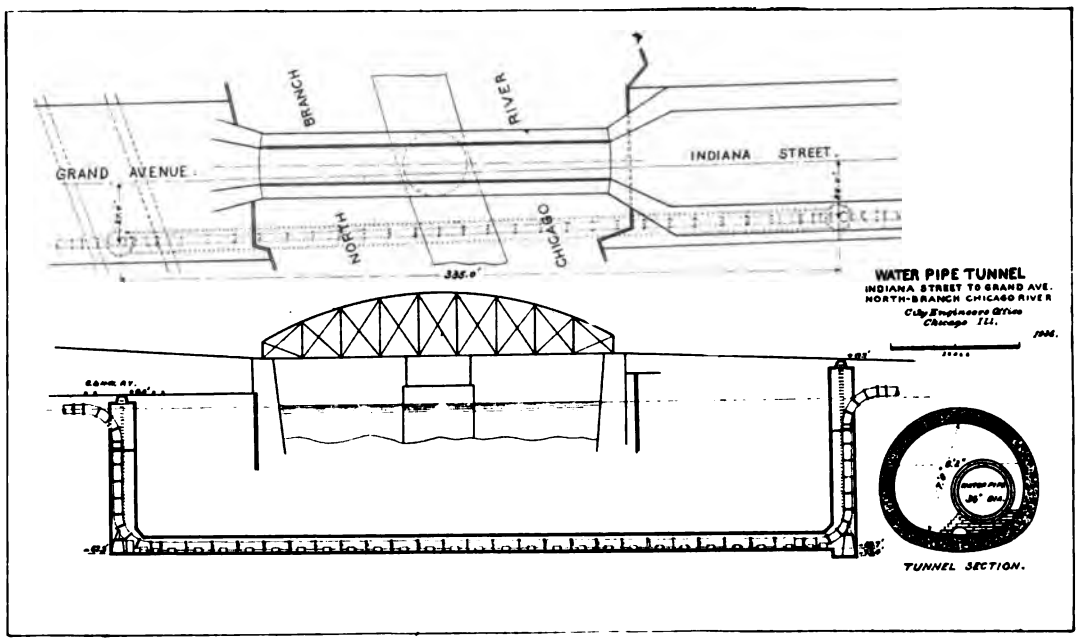
Bureau of Engineering

CITY OF CHICAGO

1906

W. A. SHAW,
Engineer in Charge.

JOHN ERICSON,
City Engineer.



ANNUAL REPORT

Division of Bridges, Harbor and Architecture

THOS. G. PIHLFELDT, City Bridge Engineer.

DIVISION OF BRIDGES, HARBOR AND ARCHITECTURE.

January 1, 1907.

HON. WILLIAM L. O'CONNELL,
Commissioner of Public Works.

DEAR SIR:—I beg to submit herewith the annual report of the Division of Bridges, Harbor and Architecture for the year ending December 31st, 1906. During the year the organization of the Division was perfected, and wherever possible improvements were made with a view of facilitating the transaction of the business of the various Subdivisions to the best advantage to the public.

The "Beck" system for filing of plans and other documents was adopted in all divisions, and the plans are now arranged and indexed in such a manner as to make it possible to find any particular drawing desired in the shortest time possible. By this arrangement a vast amount of time is saved for the engineers and draftsmen and the drawings can be properly taken care of and kept in order. Furthermore, the vault space can be utilized to much better advantage and additional room can be made available for other records of the Division. Considering the fact that the Division of Bridges alone owns over six thousand plans, which under the old system were folded or rolled up and filed in wooden cases, the superiority of the "Beck" system will be readily seen.

The system of keeping the accounts of the Bureau was simplified by the introduction of a set of new improved books, so that the standing of the various funds can be ascertained at any time without reference to the books of the Commissioner of Public Works or the Comptroller.

While the results of the work of the Division during the year have been satisfactory, viewed as a whole, there is room for improvements which, I think, would benefit the service. A large proportion of the property of the Bridge Division is scattered along the river and is

stored in sheds and shanties wholly inadequate and unsuitable for the purpose. This applies particularly to the bridge patterns and the electrical apparatus and supplies. The value of this property exceeds $100,000.00, and as it would be difficult if not impossible to replace some of it if destroyed, the necessity for proper storage can be easily understood. Every new bridge built makes this aggravating condition more serious and more difficult to contend with. I most earnestly recommend the erection of a fireproof building so located as to be accessible from the river as well as from land for the storage of the above mentioned property and necessary space for shops for the various crafts employed.

The question of protecting the street ends abutting on Lake Michigan and the Chicago and Calumet Rivers and the repairs to the pile constructions of the bridges is entitled to careful consideration. All work of this nature has hitherto been done under contract and has been attended with considerable expense, as well as delay. I am of the opinion that a substantial saving could be effected if the City were enabled to secure a pile driving plant and scows of its own for doing this work, and I would also recommend the purchase of a tug for the necessary towing.

A complete and reliable survey of the Chicago Harbor is a matter which should receive immediate attention. Only part of this work has been done and the greater portion remains unfinished. If the City Council can be prevailed upon to appropriate the necessary funds, I would recommend that this work be pushed to an early completion.

BRIDGE DESIGNING.

MR. ALEXANDER VON BABO, Structural Designer.

During the year 1906 plans for a trunnion bascule bridge of a new form over the North Branch of the Chicago River at Erie Street were prepared. The elevation of Erie Street at this point is 25 feet above city datum, or about six feet higher than the usual street elevation of other bridges. It is therefore a location where a deck span showing the outline of an arch bridge can be easily placed. The bridge will be a two truss bridge with its entire cross bracing beneath the roadway; it will have a clear passageway for vessels in the line of river, of 140 feet, and in general it will show graceful outlines.

The plans for a new bascule bridge over the North Branch Canal at North Halsted street, which were prepared for the usual street level of

19 feet last year, had to be changed to conform to the level of 16 feet, lately established and adopted for this location. By doing so the problem of the approaches in reference to conflicting property rights was satisfactorily solved, and a saving of at least Fifty Thousand Dollars, which otherwise would have to be spent to raise and bring the affected factory plant and coal yard up to grade, was obtained. A new set of substructure plans, and specifications for the superstructure as well as the substructure, were prepared.

A good deal of time was further spent in preparing plans and specifications for numerous changes and improvements of existing bridges. Such changes and improvements are:

Electrical Equipment for Madison Street Bridge.

Electrical Equipment for the South Halsted Street lift bridge over the South Branch.

New center lock for Harrison Street Bridge.

Pier protection for the new South Western Avenue Bridge over the West Fork of the South Branch of the Chicago River.

Renewal of the timber bridge over the North Branch of the Chicago River at Foster Avenue.

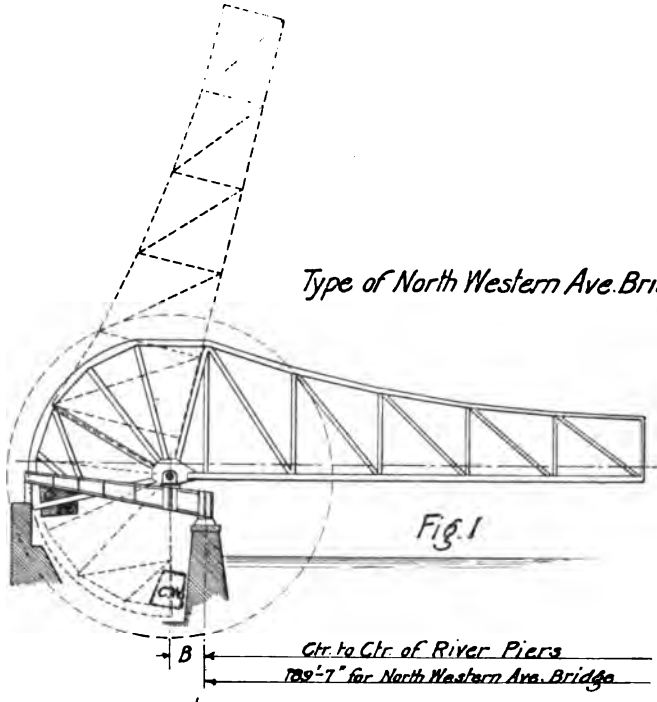
Heavy bridge gate for the east abutment of the new Archer Avenue Bridge.

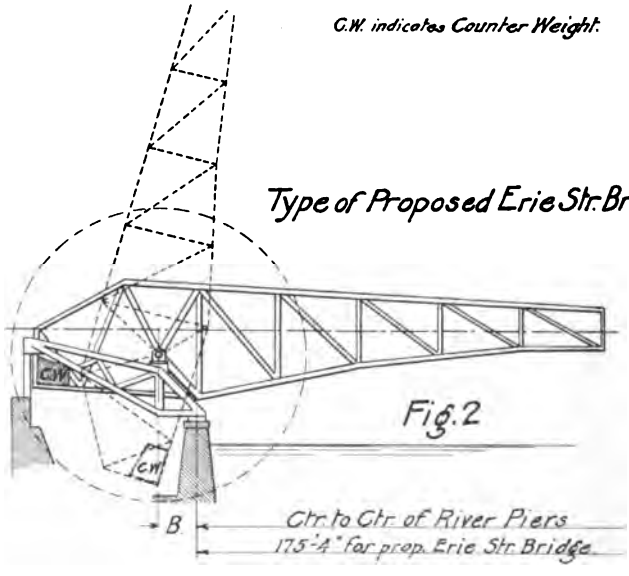
Partial renewal of approach spans of Van Buren Street Bridge, etc.

Furthermore, preliminary studies and plans, in reference to a new bridge at Kinzie Street over the North Branch, and a new bridge and viaduct connecting Franklin Street on the South Side with Orleans Street on the North Side across the main river were made and prepared.

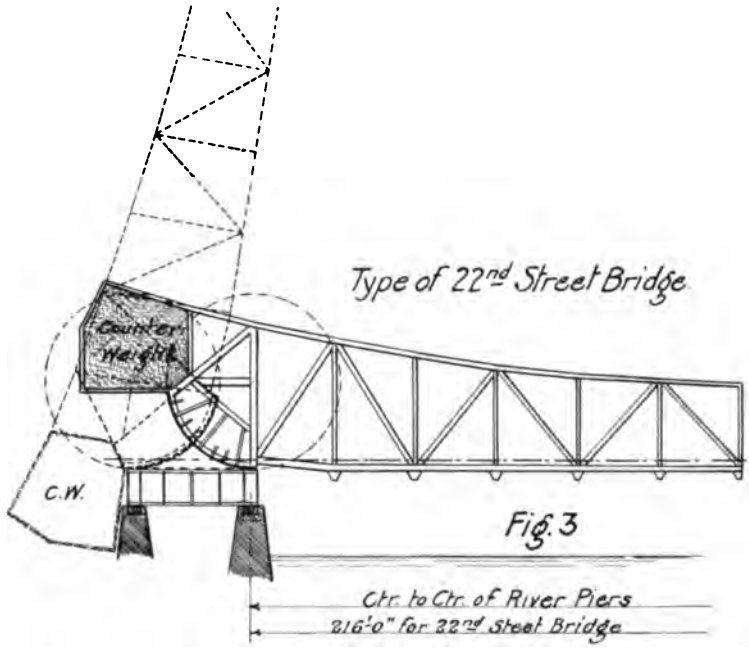
Considerable time was also consumed in examining and checking all working drawings for the now finished Archer Avenue Bridge, and the North Avenue Bridge still under construction, also for inspecting in field these and other structures, where work was going on.

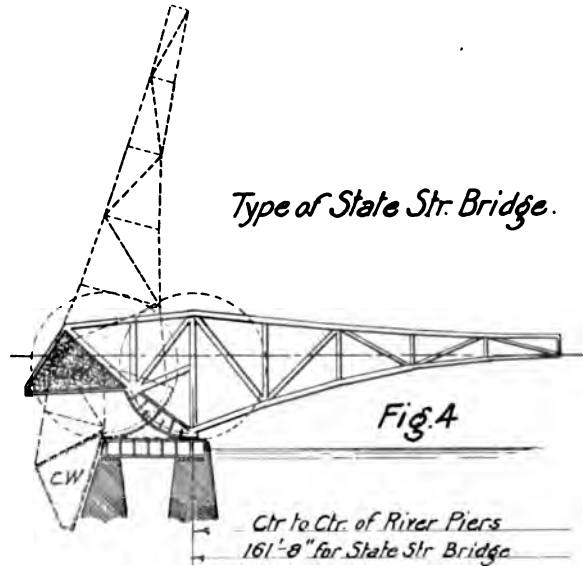
In relation to the plans prepared for the North Halsted Street trunnion bascule bridge and the bids received on December 21, 1906, for the construction of its substructure and superstructure, it may be mentioned in this connection that both the plans and the bids for this bridge were attacked by the owner of the patents for the rolling lift bridge type. Those who are not familiar with the bridge types in question may read with interest the following short description of said bridge types, and also a few remarks explaining the objections of the City Engineers to the further adoption of the rolling lift bridge design.





Figs 1 and 2 Trunnion Bascule Bridges.





Figs 3 and 4 Rolling Lift Bridges.

The characteristic difference between a trunnion bascule bridge, as designed in the City's bridge office and the rolling lift bridge may be described and defined in the following manner:

The leaves or leaf of a trunnion bascule bridge swings on an axle which is formed by the trunnions, in the same manner as a large fly-wheel rotates on an axle which passes through its hub. Figs. 1 and 2 trunnion bascule bridges.

The leaves or leaf of a rolling lift bridge, on the other hand, rolls with circular girders; or, to be more correct, with quarter segments of circular girders, on a level path, just like the rim of a large wheel would roll on a track. Figs. 3 and 4 rolling lift bridges.

In other words, a trunnion bascule bridge makes use of the hub of an assumed imaginary wheel; whereas a rolling lift bridge utilizes a part of the rim of such an assumed wheel.

It is then easily understood that the main support of a trunnion bridge does not change its position, but always remains stationary on the trunnions or axles and in the journal blocks, in which these axles rotate. If the weight of the bridge leaf is known, it is an easy matter to construct journal blocks of proper dimensions. For instance, if the dead weight per truss is 400,000 pounds and the live load and anchor reactions amount also to 400,000 pounds, each of the two journal blocks supporting one truss must support

$$\frac{400{,}000}{2} = 200{,}000 \text{ dead load}$$

and

$$\frac{400{,}000}{2} = 200{,}000 \text{ live load,}$$

or in total 400,000 lbs. for dead and live load.

If the diameter of the axle or trunnions is assumed to be 16 inches and the length of each journal bearing is 25 inches, the unit pressure per square inch in the journal block will amount to

$$\frac{200{,}000}{16 \times 25} = \frac{200{,}000}{400} = 500 \text{ lbs. for dead load alone,}$$

$$\frac{200{,}000}{16 \times 25} = \frac{200{,}000}{400} = 500 \text{ lbs. for live load alone,}$$

or 1,000 lbs. for dead and live loads combined.

These figures, which are close to actual conditions of Chicago bridges, give very conservative unit pressures in journal blocks, especially if it is considered that the leaves are never raised, when both the dead and live loads act simultaneously, and consequently that the unit pressure for the leaf in motion will scarcely exceed 500 to 700 lbs. per square inch, and finally that the rotary motion, whenever it takes place, is an exceedingly slow one. For a comparison it may also be stated that unit pressure in journal blocks of engines often exceed 1,500 lbs. per square inch, even under rotary speeds which are ever so much greater than for the trunnions of a bascule bridge in motion.

Furthermore, it must be noted that the surfaces of the trunnions and journal blocks which are in contact under pressure are machine finished, well lubricated and thoroughly protected against dust or any other injurious effects. In other words, we have here as favorable conditions as in any other large, slow moving machinery.

Let us now investigate the usual conditions during the operation of a rolling lift bridge, where we have a part of a circular girder resting and rolling on a level track girder.

If we assume for a moment that the leaf is without weight, the circular girder would touch the track girder only in one line in the same manner as a cylindric body without weight would touch a level surface in a single line parallel to its axis. If we now consider the actual conditions in the bridge, that is, that the entire weight of the leaf is transferred through this contact between the circular girder and the track to the track girders below, it will be easily understood that the contact can not take place in a single line, but over a certain rectangular surface of which the length is equal to the width of the track and the breadth depends on the elastic quality of material of the two girders in contact. Calculations, as well as actual observations on Chicago bridges, show that this breadth of the contact surface can scarcely be more than six inches. This means, in other words, that the dead load coming on a truss has to be sustained by a very limited surface which is not confined to a single especially prepared location or construction, as for instance in a journal box, but is to be found anywhere on the entire length of the segment and track-girders, as during the operation and rolling motion of the leaf all the points along the segment and track girders come in temporary contact with each other. The problem is then to spread the immense dead load of the leaf, wherever it may act during the rolling motion, over a sufficient length of the girder in contact so that no damage to details of construction is done. A satisfactory solution of this problem is by no means easy,

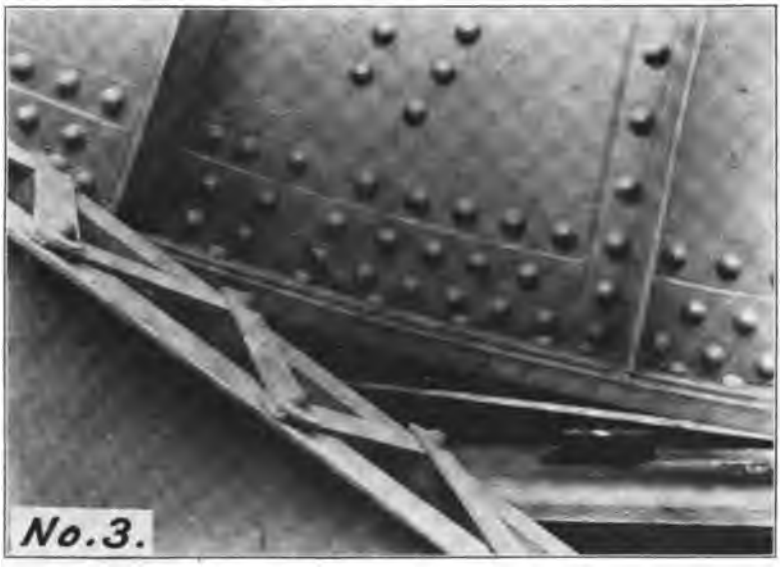
especially if the cost for such construction shall not be high. As far as Chicago bridges having a rolling contact are concerned, it is far from being solved, which is proved by the fact that the segment and track-girders of these bridges deteriorate amazingly fast. The reproductions of photographs taken on Taylor Street Bridge and also of the Chicago Terminal Transfer Co.'s Railway Bridge, which are attached to these notes, show plainly that the above remarks are not theoretical quibbles, but are based on actual facts.

Photographs Nos. 1 and 2 were taken of the northwestern segment girders of Taylor Street Bridge, and show what happened to it on June 8th, 1905. Taylor Street Bridge was opened for traffic in December, 1900, and consequently it was only about four and one-half years old when such a remarkable disintegration took place. That this deterioration is not confined to above segment girder is demonstrated on photograph No. 3, taken in January, 1907, which shows a part of the northeastern segment girder of the same bridge. On this picture we observe a crack along the corner of the flange angle; the pocket knife seen a little to the right, with its blade in the crack, makes it still plainer.

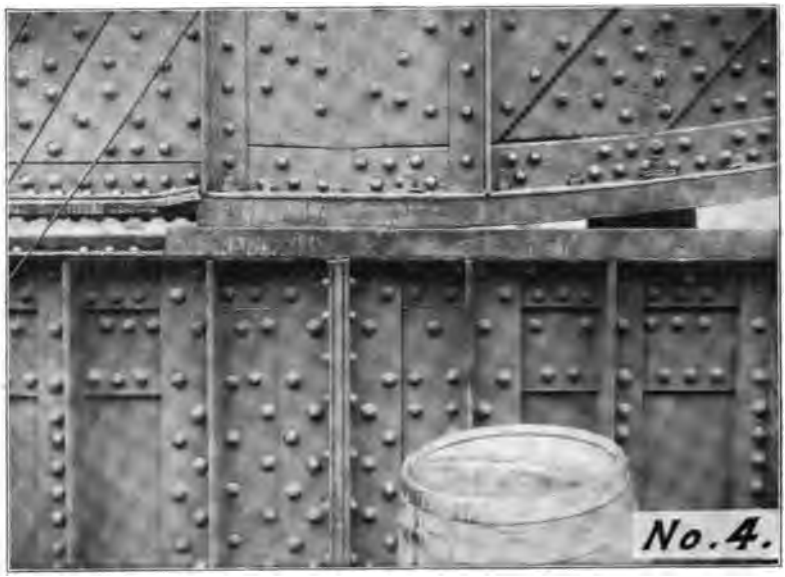
Photographs Nos. 4 and 5 were taken in February, 1907, of the segment and track girders at the north end of the Chicago Terminal Transfer Company's Railroad Bridge, which is located about one block south of the Taylor Street Bridge. This bridge was opened for traffic in 1901, so it is only a little over five years in use. Both photographs show how the immense loads of the leaf during its rolling motion have acted on the segment and track-girders. They show that some of the stiffeners of the track girder almost cut through the upper flange angles of this girder, that between two neighboring stiffeners the angle flange is bent down in the track girder and bent up in the segment girder. The latter fact may be seen by some of the bolt nuts (see photograph 5), which are partly hidden by the upward bent flange of the angle. All this proves that the heavy track plates are by far not heavy or strong enough to spread the great local loads during the rolling motion over a sufficient length of the girders. The photographs show further that said track plates have a creeping motion, whereby the bolts or rivets which hold the plates to the angle flanges are bent and occasionally broken. Some of the longer, ill-fitting bolts, to be seen on both photographs, are bolts put in place of broken ones. Another result of the creeping track plate may be seen in photograph No. 4, where the end of an angle which originally butted against the end of the upper track plate, is now pushed and bent in an upward direction.

TAYLOR STREET BRIDGE, June 8, 1905.
Bridge Completed December, 1900.

TAYLOR STREET BRIDGE—NORTHWESTERN SEGMENT GIRDER.



TAYLOR STREET BRIDGE.—PART OF NORTHWESTERN SEGMENT GIRDER.



CHICAGO TERMINAL TRANSFER CO.'S RAILROAD BRIDGE.—SEGMENT AND TRACK GIRDER, NORTH END OF BRIDGE.

CHICAGO TERMINAL TRANSFER CO.'S RAILROAD BRIDGE—SEGMENT AND TRACK GIRDER, NORTH END OF BRIDGE.

JACKSON ST. BRIDGE DANGER SIGNAL.

Instead of photographs Nos. 4 and 5 of the Chicago Terminal Transfer Railway Company railway bridge, photographs of other Chicago highway bridges could have been produced, but owing to the fact that the designer of these rolling lift bridges claims that deteriorations of the nature described were due to carelessness and neglect and could only happen in bridges operated and maintained by the City of Chicago, it was thought expedient and more convincing to show the conditions of a bridge which by its designer is always cited as a most perfect structure and as a carefully maintained bridge.

What the claims in reference to superiority and durability of rolling lift bridges amount to, anyone who read the foregoing remarks and inspected the attached reproductions of photographs may judge by his own conclusions. As to the repeated claims of cheapness of the rolling lift bridges the following may suffice: The overhanging river arms can be constructed a little shorter and consequently a little cheaper than those for trunnion bascule bridges, because the latter type requires, as a rule, a little longer free spans between supports. To the distance center to center of river piers must be added twice the distance from the trunnion center to the center of river pier, marked B in the accompanying diagram. The increase of cost is confined, however, to the trusses and counterweight only, the cost for the floor remaining practically the same, and would be easily counterbalanced if the rolling lift bridges were to be constructed with segment-girders and track-girders which would last, as the initial costs of such girders would be considerably increased.

All other savings made and claimed for rolling lift bridge designs have nothing to do with the system or type of bridges, but are the result of the efforts on the part of the owners of the patents to keep the original cost down to a minimum. Just as any other public improvement, for instance a schoolhouse, may be constructed in a more or less substantial and lasting manner, so it is with bridges. If one structure costs less to build than another, it does not necessarily follow that it is also the cheaper and better of the two in the long run for the taxpayers.

That the North Western Avenue Bridge, for instance, costs decidedly more than the State Street Bridge has its very good reasons. In the first place, the North Western Avenue Bridge has a longer movable span than State Street Bridge, because North Western Avenue crosses the river on a skew. For the same reason an additional very substantial fixed span, 75 feet long, had to be added. Furthermore, long substantial approaches had to be built. The bridge proper was calculated and constructed to satisfy heavier specifications than applied

to State Street Bridge, and the requirements of the specifications were enforced to the letter. This structure most favorably compares with State Street Bridge, as any one who will take the trouble to examine both bridges thoroughly and carefully must admit.

Concluding these remarks, it may be repeated that they were not prepared to represent a complete and exhaustive comparison between rolling lift and trunnion bascule bridges, but that they are intended to demonstrate the reasons against the further adoption of rolling lift bridges, as designed by the owner of the patent, and to refute some statements made in the daily papers from time to time.

NEW BRIDGE CONSTRUCTION.

MR. CLARENCE S. ROWE, Assistant Engineer.

North Avenue Trunnion Bascule Bridge.

The temporary bridge at North Avenue was opened for traffic January 9th, 1906. The old bridge was removed and work on the substructure of the new bridge was carried on during the year.

The foundations are of reinforced Portland cement concrete resting on piles. The piles were driven to about -52.0. The substructure is practically complete, with the exception of a portion of the east approach. The maintenance of uninterrupted street traffic requires that the temporary bridge be in use until the new bridge is complete. The interference of the roadway and street car tracks leading to the temporary bridge precludes the completion of the east approach.

Work on the superstructure was commenced December 11th, 1906, and about 60 tons of steel erected.

Jackson & Corbett Co. is the contractor for the substructure.

Roemheld & Gallery Co. is the contractor for the superstructure.

Mr. John C. Penn, Assistant Engineer, is in local charge.

Archer Avenue Trunnion Bascule Bridge.

This bridge, including approaches, was completed December 15th, 1906.

The work of removing the old bridge was commenced June 15th, 1905, and work on the substructure of the new bridge commenced August 21st, 1905. The substructure was completed, with the exception

of a portion of the east approach, necessarily left incomplete in order to maintain traffic over the temporary bridge, June 12th, 1906. Erection of superstructure was commenced May 8th, 1906. Street car traffic over new bridge, November 24th, 1906, and temporary bridge abandoned. Work was resumed on the completion of the east approach November 26th, and bridge was opened to team traffic December 15th, 1906. This is a trunnion bascule bridge, of one leaf 136 feet in length, operated from the west side of the river. Two roadways 18 feet in width and two sidewalks 8 feet in width, the total width being 60 feet. Total length, including approaches, 565.0 feet. There is a clear channel for the passage of vessels 107 feet in width.

The foundations are of Portland cement concrete, reinforced with corrugated steel bars, and resting on hard clay. No foundation piles being used, except in abutments on each approach.

Cost of substructure	$ 68,213.01
Cost of superstructure	87,322.96
Cost of bridge complete	$155,535.97

The FitzSimons & Connell Co. was the contractor for the substructure.

The Roemheld & Gallery Co. was the contractor for the superstructure.

Mr. Frank B. Umstot was in local charge.

South Western Avenue Bridge.

Work was commenced on the substructure of this bridge September 25th, 1905, and completed, with the exception of approaches, March 9th, 1906. Cost of substructure $25,720.43.

The superstructure of the old Eighteenth Street Bridge was transported from its temporary support in Slip "A," near Twenty-second Street and Ashland Avenue to South Western Avenue July 6th, 1906, placed upon center pier, cleaned, painted and decked. This bridge was opened to traffic August 11th, 1906. The truss span is 176 feet 8 inches in length and 36 feet 6 inches in width. One roadway 19 feet in width and two sidewalks 6 feet in width. Clear channel for the passage of vessels—56 feet.

The substructure consists of a center pier, two abutments with wing walls, all of reinforced concrete, resting on solid rock.

The center pier protection is of timber crib construction sunk in place and loaded with rip-rap, and is about 50% complete.

Thos. P. McDonough was the contractor for the substructure.

The Great Lakes Dredge & Dock Co. is the contractor for the superstructure.

Mr. Albert Wain is in local charge.

Washington Street Bridge.

Owing to the work of lowering the Washington Street tunnel and in accordance with an order passed by the City Council June 11th, 1906, preparations were made to remove the superstructure of the bridge. A temporary support was built in Slip "A" near Twenty-second Street and Ashland Avenue for the purpose of storing the superstructure.

Contractors—Great Lakes Dredge & Dock Co.

Surveys.

During the year 1906 surveys were made at the following locations in contemplation of new construction:

Erie Street, Kinzie Street and Chicago Avenue across the North Branch, Chicago River, North Halsted Street across the North Branch Canal. Ninety-second Street and One Hundred and Sixth Street across the Calumet River, South Ashland Avenue across the west arm, of the South Fork, of the South Branch, Chicago River. Orleans Street to Franklin Street across the Chicago River (Main). Also surveys made of the fixed spans at Foster Avenue (2), North Fortieth Avenue and Lawrence Avenue across the North Branch.

During the year 1906 the Sanitary District of Chicago completed the Twenty-second Street Bridge.

The Dearborn Street Bridge is now under construction by the Sanitary District.

BRIDGE AND VIADUCT REPAIRS AND MAINTENANCE.

MR. JOHN A. LENNARTSON, Assistant Engineer.

This Division has under its supervision sixty-four bridges and thirty-five systems of viaducts. Forty-nine of the bridges are movable and fifteen are fixed spans. Of the movable bridges eleven are bascule bridges of the Scherzer type, six are trunnion bascule bridges (City's design), one is a Page bascule bridge, one is a vertical lift bridge and the balance swing bridges. Twenty-seven of the movable bridges are operated by electricity, three by steam and the remainder by hand power.

The work of this Division being necessarily governed by the funds available for the purpose during the year, consisted to a great extent of emergency repairs. In endeavoring to keep the various bridges and viaducts in the city open to public travel, so as to impede the constantly increasing traffic as little as possible, the Division has been fairly successful, and at the same time quite a few repairs of permanent nature have been made. The change from steam to electric power for the operation of the Madison Street Bridge is partially accomplished, and the bridge will be operated electrically in the early part of 1907. The only two remaining bridges operated by steam under the jurisdiction of the City of Chicago are the Twelfth Street and the South Halsted Street Bridges, and the introduction of electricity, as soon as possible, for motive power for these bridges cannot be too strongly urged. The South Halsted Street Lift Bridge in particular is exceedingly expensive to operate with steam, and if an electrical equipment is installed the cost of operation could be reduced to one-third of the expense of the year of 1906. It is to be hoped that the City Council may be enabled to see its way clear to grant a sufficient appropriation to make the suggested change.

The heel-locks and the solenoids operating the same on the bridges built by the Sanitary District of Chicago, which are now under the supervision of the City, have been a constant source of trouble and expense, and the same applies to the center locks. Owing to the peculiar constructions of the center locks, it is very difficult for the bridge tenders to close the bridges without a severe jar to the leaves, which in turn will be transmitted to the adjoining buildings. Numerous complaints of this state of affairs have been received, and unless means are provided for remedying these defects the City may become involved in suits for damages which may reach considerable proportions.

Only five painters were employed during the year and, while this small force did as much work as could be reasonably expected, a number of the bridges and viaducts is rapidly going to ruin on account of lack of paint. It is a well known fact that the life of the structures will be prolonged considerably if they are properly painted. This is especially important in regard to the new bascule bridges, which should receive a coat of paint at least every third year. The employment of an adequate force of painters would undoubtedly prove economical, and if the necessary funds can be provided the present force should be at least doubled.

The lack of proper storage for patterns, electrical apparatus and supplies and other material has been more severely felt during this

year than the previous ones. The patterns for two new bridges were added during the year, and these were stored with the other bridge patterns in a frame building at the Water Works Repair Shops at Twenty-second Street and Ashland Avenue. In case of a fire these patterns, amounting in value to at least $75,000.00, would be in danger of being completely destroyed. If possible, a fireproof building should be constructed, containing sufficient space for the storage of the patterns as well as adequate quarters for the Shops.

The following is a brief synopsis of the principal repairs to bridges and viaducts made during the year of 1906:

BRIDGES.

Adams Street Bridge. The paving was patched and the wheel-guard angles and danger signals were repaired. The trolley wires on the turntable were housed in, boxes were built to inclose portions of the electrical machinery and new feeders were installed.

Ashland Avenue (West Fork) Bridge. When this bridge was erected the journal boxes in which the movable approach spans are hinged were babbitted. On account of the great weight of the structure the babbitt was gradually squeezed out and considerable friction developed in spite of the best lubricants used. The situation was growing rather serious, and in order to remedy the defects phosphor bronze bushings were put in the journal boxes at the four corners of the bridge, which necessitated the closing of the bridge to traffic for nearly a month. If the City had had the opportunity to check the plans and supervise the erection of this bridge, it is safe to say that this defect would have been eliminated and the expense caused by these repairs could have been avoidd.

Belmont Avenue Bridge. The entire west approach, including the bridge seat, and the Rockwell Street approach leading up to the west approach were rebuilt throughout. The turntable was overhauled and several new steel rack segments and new steel pinions were put in.

Canal Street Bridge. The decking and sidewalks were renewed and two G. E. 58 motors were installed in the south machinery room to replace the Westinghouse motors which were burned out. The column supporting the bearing blocks at the southeast corner of the bridge, which had become fractured, was reinforced by means of heavy plates and the shafts were lined up and adjusted.

Chicago Avenue Bridge. All the main braces and counters and all the truss rods and top laterals were renewed and painted. The decking, chord cover and sidewalks were also renewed and the center step was adjusted and a new center screw was put in.

Clark Street Bridge. The south approach was paved with A. F. Shuman's "Slip-not" pavement between the wheelguard and the outer street car rail. All the old piles in the east half of the protection were pulled and new ones were substituted. Several new turn-table wheels were put in and the old brick parapet wall on the north abutment, which was crumbling away, was removed and replaced with concrete. Repairs were also made on the pavement and the locks.

Clybourn Place Bridge. New maple sidewalks were built and the planking on the roadway was patched. The center locks were overhauled and put in working order, and a new shaft 8 inches in diameter was erected in place in the east machinery room.

Diversey Street Bridge. The old pavement and decking was removed and new subplanking, consisting of 4″x6″ yellow pine, laid 12 inch centers, was substituted, and the entire roadway was paved with A. F. Shuman's W and A pavement. The wheelguard, chordcover and sidwalks were also renewed and all the iron work received two coats of paint.

Erie Street Bridge. New web members were put in and the trusses were lined up and painted. The bridge house was practically rebuilt and the sidewalks and roadway were patched extensively.

Fuller Street Bridge. The west approach was rebuilt and substantial pile clumps were driven in place to protect it. The planking on the roadway and sidewalk was renewed. as was also the chordcover.

Foster Avenue Bridge (West). This bridge was practically rebuilt, only a few bents in the old bridge being used. The bridge is now in a good condition and with a few incidental repairs will be serviceable for the next ten years.

N. Halsted Street (Canal) Bridge. Every possible effort was made to keep this bridge in service to the end of the year. It was found, however, that the dilapidation of the structure was so extensive that

it was necessary to close the bridge to team and street car traffic on June 27th. Since that date the bridge has been open to pedestrians only.

N. Halsted Street (River) Bridge. Two new tail pit tanks, made of boiler plate, were put in, and a number of the bolts holding the sole plates to the segmental girders were substituted for the old ones, which had sheared off.

S. Halsted Street Bridge. Platforms were built to intercept ashes and cinders from the boilers, idlers were put in place to prevent the operating cables from slipping off the sheaves and the buffers were overhauled and put in working order.

Harrison Street Bridge. Considerable difficulty was experienced in keeping the large eye-bars in the tailpits in working order. Several of them were so badly bent as to necessitate their temporary removal for repairs, and the defects in their design and construction were only partly overcome.

Jackson Street Bridge. The subplanking, wheelguard and chord-cover were renewed and the bridge was paved with Shuman's W and A pavement. This work was done under contract by the Roemheld & Gallery Co. The City Repair Force laid new sidewalks and put in new electric feeders and commenced the installation of a danger signal system similar to the one in use at the Rush Street Bridge. (See photo 6.)

Lake Street Bridge. A new pinion shaft was erected in place and the bearings were babbitted. The center pedestal was fastened securely to the center pier by means of steel straps and the shattered brick parapet wall on the west abutment was removed and replaced with concrete.

Laurel Street Bridge. Timber bents were erected to support the north approach, the floor system and the bottom chords were painted and the bridge was paved with A. F. Shuman's W and A pavement.

Madison Street Bridge. The roadway between the wheelguard and the outer street car rail was paved with W and A pavement, and the installation of the electrical equipment for motive power was so far advanced that the bridge will be operated electrically in the early part of 1907.

Main Street Bridge. Additional counterweights were put in to counterbalance the trolley supports erected by the street car company and the upper portion of the iron work received one coat of paint.

Ninety-Fifth Street Bridge. New brake-bands were put in and a considerable portion of the iron work was cleaned and painted.

Ninety-Second Street Bridge. Several timber bents were erected to support the approaches and the roadway and sidewalks were patched.

One Hundred and Sixth Street Bridge. A complete new set of steel turntable wheels was installed, the drum and spider rods were adjusted and the west approach was reinforced.

Randolph Street Bridge. Both roadways between the wheelguards and the outer street car rails were paved with composite wood and asphalt pavement, pump houses were built and the stringers on the west approach were leveled up and anchored.

Riverdale Bridge. New bents were erected to support the north approach and the roadway on this approach was patched extensively.

Rush Street Bridge. A number of sidewalk brackets, bent in collisions with passing vessels, were straightened and reinforced and eighty-two piles were driven to protect the foundation piers.

State Street Bridge. An examination of the soleplates and their connections to the segmental girders displayed the fact that a large percentage of the rivets had sheared off. In order to prevent a repetition of the occurrence at the Taylor Street Bridge in 1905, when one of the soleplates broke loose entirely from the curved girder and fell down on the track, all the defective rivets were taken out and new rivets substituted. The center locks were repaired repeatedly, as were also the heel locks and heel lock solenoids, and the pitpump motors were housed in.

Taylor Street Bridge. New brake-bands were put in and all the iron work received one coat of paint. Cast iron brackets to support the car tracks at the break in the bridge were also put in and the planking on the roadway was patched.

Torrence Avenue Pontoon Bridge. A scow-basin was built so as to give a sufficient opening for passing vessels in the north draw. This work was done under contract by the Great Lakes Dredge & Dock Company.

Twelfth Street Bridge. Thirteen 45 ft. piles were driven at the southeast corner of the center pier protection and all the iron work on the bridge received one coat of paint.

Van Buren Street Bridge. A number of sole plate bolts were renewed and the west approach was replanked.

Webster Avenue Bridge. Forty-six 40 ft. piles were driven in the center pier protection, nearly all the web members were renewed and painted and the roadway, chord cover and sidewalks were patched.

Wells Street Bridge. Fenders on the outer edge of the sidewalks were put in place and eighteen 45 ft. piles were driven in the center pier protection. Damages done to the pier protections were also repaired.

The dismantling of the temporary bridges at Archer Avenue and Twenty-Second Street was commenced and the temporary bridge at S. Western Avenue was removed.

In addition to the above repairs, nearly all the bridge houses were painted inside and necessary repairs to the operating machinery, due to wear and tear, were made.

Where the bridges were damaged in collisions with vessels, street cars, teams, etc., the cases numbering 148 during the year, the repairs were made by this Division and the cost was charged to the parties responsible.

VIADUCTS.

N. Halsted Street and Kinzie Street Viaduct. The subplanking, wheelguard and chordcover was renewed over the right of way of the Chicago & North-Western Railway Company and this portion of the structure was paved with 6″ yellow pine paving blocks. The cost of this work was borne by the Chicago & North-Western Railway Company and the Chicago Union Traction Company.

Desplaines Street Kinzie Street Viaduct. The subplanking, wheelguard, chordcover, sidewalks and gas pipe sidewalk railing over the tracks of the Chicago & North-Western Railway Company were renewed

and the roadway paved with A. F. Shuman's W and A pavement. The roadway over the tracks of the Chicago, Milwaukee & St. Paul Railway Company was also paved with A. F. Shuman's W and A pavement. The cost of this work was charged to the respective railroad companies. Other repairs to the various viaducts were made by the railroad companies interested, at their own expense.

During the year, the Thirty-Fifth Street and the Blue Island Avenue Viaducts were removed on account of track elevation.

The following table shows in detail the expenditures on the various bridges and viaducts during the year:

STATEMENT OF EXPENDITURES OF REPAIRS AND OPERATION FOR PERIOD ENDING DECEMBER 31st, 1906.

BRIDGE.	Labor.	Material.	Coal.	Supplies.	Power.	Piles.	Office Salaries.	Office. Supplies.	Teams.	Total.
Adams street	$4,043.70	$1,239.86	$34.70	$17.97	$600.00					$5,936.23
Archer avenue	3,587.75	642.29	51.70	67.65						4,339.39
Ashland avenue (S. Fork)	49.60	14.26								63.86
Ashland avenue (W. Fork)	3,850.27	867.34	71.55	43.23	600.00					5,432.39
Belmont avenue	4,682.42	4,979.52	41.40	12.13						9,715.47
Blackhawk street	932.99	719.86	41.40	12.29						1,706.54
Canal street	3,295.68	1,638.12	93.69	11.60	600.00					5,639.09
Chicago avenue	4,048.71	1,780.80	56.40	12.89		147.60				6,046.40
Chittenden	794.60	236.71	34.38							1,065.74
Clark street	2,284.45	1,304.19	71.10	15.55	600.00	6,420.58				11,295.87
Clybourn place	2,433.11	1,150.74	64.20	27.27	600.00					4,275.32
Dearborn street	292.38	324.55								616.93
Diversey street	2,529.27	481.66	49.20	20.97		152.00				3,233.10
E. Division street	1,368.81	546.76	93.90	13.57	600.00					2,623.04
W. Division street	1,000.59	438.93	78.90	17.88	600.00					2,136.30
Eighteenth street	1,704.07	329.69	64.20	27.08	600.00					2,725.04
Erie street	4,496.79	1,833.78	71.40	24.65		411.26				6,837.88
Fuller street	1,648.14	981.85	35.00	10.88		1,401.23				4,077.10
Fullerton avenue	1,834.98	994.85	56.25	12.25	600.00					3,498.33
N. Halsted street (canal)	1,036.17	189.51	64.15	25.02						1,314.85
N. Halsted street (river)	1,977.49	2,102.70	63.70	20.77	600.00					4,764.66
S. Halsted street	3,085.33	1,098.55	2,194.68	49.11						6,427.67
Harrison street	2,591.38	1,244.82	122.30	10.25	600.00					4,368.75
Indiana street	139.30	65.85	49.40	22.76						277.31
Jackson street	3,114.25	2,404.46	78.90	14.56	600.00					6,212.17
Culvert at O. C. P. Station	769.75	735.98								1,505.73
Kinzie street	1,008.23	352.24	42.20	35.78		647.48				2,085.93
Lake street	3,681.05	2,471.29	86.25	16.85						6,255.44
Laurel street	2,266.79	1,730.15	37.80	6.59						4,041.33
Loomis street	1,782.27	255.75	123.30	32.11	600.00					2,793.43
Madison street	2,419.89	2,606.83	870.55	30.75						5,928.02
Main street	1,209.31	308.28	86.00	28.81	600.00					2,232.40
Ninety-second street	2,364.80	520.01	49.90	7.37						2,942.08
Ninety-fifth street	2,048.84	924.94	79.40							3,053.18

North avenue	3,627.38	631.34	35.00	25.72		224.80				4,544.69
106th street	1,314.27	346.27	44.40							1,704.94
Polk street	602.79	84.34	49.20	14.22						750.55
Randolph street	4,195.12	862.09	93.90	17.69	600.00					5,768.30
Riverdale	550.40	511.00		2.59						1,063.99
Rush street	3,790.86	1,695.77	78.60	59.03	600.00					6,224.26
State street	4,636.49	974.88	116.10	45.74	600.00					6,373.21
Taylor street	3,069.71	1,138.62	78.90	18.57	600.00					4,905.80
Torrence avenue	947.20	211.60								1,158.80
Twelfth street	2,739.61	1,022.72	944.55	30.16		854.22				5,591.26
Twenty-second street	2,302.09	394.92	64.29	32.83	50.00					2,794.13
Thirty-fifth street	924.52	232.41	34.20	16.35						1,207.48
Van Buren street	2,601.95	1,847.91	49.00	12.22	600.00					5,111.08
Washington street	688.02	112.90	63.90	18.41	600.00					1,483.23
Webster avenue	4,707.76	3,065.47	34.20	37.45		908.20				8,753.08
Weed street	1,316.79	50.42	27.00	42.45						1,436.66
Wells street	965.87	1,280.92		2.25						2,249.04
N. Western avenue	353.18	69.44	78.60	4.86	600.00					1,106.08
S. Western avenue	1,384.51	374.85	34.20	7.17		394.92				2,175.65
Steamer Hopkins		349.75	383.55	4.28						737.58
Eighteenth street shops		363.04	27.25							390.29
Lake street shops		110.54								110.54
Center ave. & 16th st. viaduct	59.40	49.63								109.03
Halsted & 16th street viaduct	6.75	4.37								11.12
Desplaines street viaduct	134.17	19.74		.63						154.54
18th street (west) viaduct	49.62	30.00								79.62
Sangamon street viaduct	17.60	15.45								33.05
Wells street viaduct	23.00									23.00
Blue Island ave. viaduct	3.32	8.16								11.48
Clark street viaduct	147.40	7.63								155.03
Milwaukee avenue viaduct	68.20									68.20
Argyle street bridge	68.76									68.76
California avenue bridge	6.65	8.97								15.62
E. Foster avenue bridge	604.55	292.64		1.98						899.17
Lawndale avenue bridge	24.55	33.95								58.50
Montrose Boulevard bridge	542.01	152.55								694.56
Ogden avenue viaduct	17.70	20.91								38.61
General account	20,676.13	9,653.82		4,294.20			8,832.16		2,656.12	46,112.45
Totals	$138,141.49	$63,546.14	$7,184.74	$5,337.39	$12,650.00	$11,562.29	$8,832.16		$2,656.12	$249,910.33

CHICAGO

No.	BRIDGES.	SUPERSTRUCTURE.						
		Length, ft.	Width ft.	Operation.	Material.	Date.	Contractors.	Cost.
1	Rush Street	211	.....	Hand	Iron	1856	Harper & Tweedale	$54 000.00
1a	" " rebuilt	211	.....	"	Wood	1864	Fox & Howard	8,900.00
1b	" " "	211	33	"	Iron	1872	Detroit Bridge Co.	15,600.00
1c	" " "	240	59	Electric Power	"	1884	Rust & Coolidge	49,370.00
2	State Street	184	35	Hand	Wood	1864	Fox & Howard	32,000.00
2a	" " rebuilt	184	36	"	Iron	1872	Keystone Bridge Co.	22,500.00
2b	" " "	184	39	Steam	Steel	1887	A. Gottlieb & Co.	24,400.00
2c	" " "	247.6	63	Electric power	Steel	1903	American Bridge Co.	88,340.19
3	Dearborn Street	60	.....	Hand	Wood	1834	.....	.....
3a	" "	190	35.5	Steam	Iron	1872	Fox & Howard	22,820.00
3b	" "	.....	.....	.....	.....	.....	.....	.....
4	Clark Street	.....	.....	.....	Wood	1840	.....	3,000.00
4a	" "	.....	.....	Hand	"	1857	Chapin & Co.	.....
4b	" " rebuilt	180	32	"	Combination	1866	Thos. Mackin	14,200.00
4c	" " "	180	37.5	"	"	1872	Fox & Howard	32,000.00
4d	" " "	215	59	Electric Power	Steel	1889	Variety Iron Works	69,875.00
5	Wells Street	.....	.....	.....	Wood	1840	.....	3,000.00
5a	" " rebuilt	190	.....	Hand	"	1856	Harper	.....
5b	" " "	190	35	"	"	1862	Fox & Howard	5 290.00
5c	" " "	190	35.25	"	Iron	1872	Fox & Howard	22,820.00
5d	" " "	220	59	Electric Power	Steel	1888	Keystone Bridge Co.	86 750.00
6	Lake Street	.....	.....	.....	Wood	1849	.....	.....
6a	" " rebuilt	185	.....	Hand	"	1859	N. Chapin	.....
6b	" " "	185	33	"	Combination	1868	Fox & Howard	11,450.00
6c	" " "	220	59	Electric Power	Iron	1885	Detroit Bridge Co.	57,533.00
7	Randolph Street	.....	.....	.....	Wood	1849	.....	.....
7a	" " rebuilt	153	32.5	Hand	"	1864	L. B. Boomer	5,000.00
7b	Randolph Street rebuilt	157	34	Steam	Iron	1874	Keystone Bridge Co.	10 850.00

BRIDGES, 1906.

SUBSTRUCTURE.			APPROACHES.	REMARKS.
Material.	Contractors.	Cost.	Type.	
Stone on piles	Harper & Tweedale	Included in super. contract	Curb and filling	
" "	Old work repaired	.....	" "	Burned in fire of 1871.
" "	Detroit Bridge Co.	$8,874.00	" "	Destroyed by collision with Schooner "Granger" November 22, 1883.
Concrete and masonry on piles.	Fitzsimons & Connell Co.	70,674.00	" "	
Piles.	Fox & Howard	Included in super. contract	" "	Burned in fire of 1871.
Masonry on piles	Keystone Bridge Co.	27,000.00	" "	New turn-table built in 1880 by the Keystone Bridge Co.; cost, $2,500.
" "	Old work repaired	.....	Viaduct	
Concrete on piles	Lydon & Drews Co.	89,490.06	Curb and filling (S.) and viaduct (N)	$18,000 added for design and plans making total cost of bridge $195,830.25
Piles.	.....	.....	.....	This was the first draw bridge built over the Chicago River.
Masonry on grillage	Fitzsimons & Connell Co., 1888.	30,000.00	Viaduct	Superstructure erected at Wells Street moved in 1888.
.....	.....	.....	.....	Under construction.
Piles.	.....	.....	.....	Swept away by flood of 1849.
"	Chapin & Co.	.....	Curb and filling	Substructure repaired in 1871 by Earnshow & Goble; cost, $4,000.
"	Old work repaired	.....	" "	Burned in fire of 1871.
"	Fox & Howard	Included in super. contract	" "	Superstructure moved to Webster Ave. in 1889.
Concrete and masonry on piles	Fitzsimons & Connell Co.	62,500.00	" "	North Chicago Street Railway Co. paid all.
Piles	.....	.....	.....	
"	Harper	.....	Curb and filling	
"	Old work repaired	.....	" "	Burned in fire of 1871.
Masonry on piles	Fox & Howard	26,182.00	" "	Superstructure moved to Deaborn Street in 1888.
Concrete and masonry on piles	Fitzsimons & Connell Co.	59,000.00	" "	N. C. St. Ry. Co. paid all. Double-decked and reinforced by Northwestern Elevated R. R. in 1896.
Piles	.....	.....	.....	
Center pier piles; abutments stone	N. Chapin	.....	Girder	The first means for crossing the Chicago River was a ferry, located at the site of the present Lake Street bridge, first established in 1829.
" "	Old work repaired	.....	"	
Concrete and masonry on piles	Fitzsimons & Connell Co.	69,726.00	"	Double-decked and reinforced by Lake Street Elevated R. R. in 1893.
Piles	.....	.....	.....	
"	L. B. Boomer	Included in super. contract	Curb and filling	A crossing was constructed of rough logs near the site of the present Randolph Street bridge in 1833, which was used until 1840.
"	Old work repaired	.....	" "	

CHICAGO

No.	BRIDGES.	SUPERSTRUCTURE.						
		Length, ft.	Width, ft.	Operation	Material	Date.	Contractors.	Cost.
7c	Randolph Street Rebuilt.	265.6	72	Electric power	Steel	1903	American Bridge Co.	$118,728.18
8	Washington Street.....	157	31.5	Electric power	Iron	1875	American Bridge Co.	11,495.00
8a	" "	Owing to the lowering of Washington St. Tunnel the Superstructure was ordered removed by the						
9	Madison Street	.....	.....	.....	Wood	1849	.....	.....
9a	" " rebuilt	155	.....	Hand	Iron	1857	Gaylord	42,000.00
9b	" " "	157	31.5	Steam	"	1875	American Bridge Co.	11,495.00
9c	" " "	197	52	"	Steel	1891	Riter & Conley	52,500.00
10	Adams Street.....	160	31	Hand	Combination	1869	Fox & Howard	37,860.00
10a	" " rebuilt.....	160	32	"	Iron	1872	Keystone Bridge Co.	14,880.00
10b	" " "	259	59	Electric power	Steel	1889	King Bridge Co.	68,500.00
11	Jackson Street	280	59	"	"	1888	Detroit Bridge Co.	76,500.00
12	Van Buren Street.....	163	.....	Hand	Combination	1867	Fox & Howard	13,470.00
12a	" " rebuilt.	163	34	"	"	1872	E. Sweet, Jr., & Co.	13,200.00
12b	" " "	115	59	Electric power	Steel	1895	C. L. Strobel	87,175.00
13	Harrison Street.....	175	31	Hand	Iron	1877	American Bridge Co.	24,875.00
13a	" " rebuilt.....	247.4	52	Electric power	Steel	1905	Jackson & Corbett B. & S. Works.	154,947.92
14	Polk Street.....	154	31	Hand	Combination	1869	Fox & Howard	29,450.00
14a	" " rebuilt.....	154	31	"	Iron	1872	King Iron Bridge Co.	12,625.00
15	Taylor Street.....	161.4	32	"	"	1872	Keystone Bridge Co.	14,880.00
15a	" " rebuilt.....	255	32	Electric power	Steel	1901	Chicago Bridge & Iron Co.	55,561.92
16	Twelfth Street	202	32.75	Hand	Combination	1868	Fox & Howard	44,450.00
16a	" " rebuilt.....	220	59	Steam	Steel	1886	Chicago Forge & Bolt Co.	41,159.00

BRIDGES, 1906.

SUBSTRUCTURE.			APPROACHES.	REMARKS.
Material.	Contractors.	Cost.	Type.	
Concrete on piles	Jackson & Corbett Co.	$117,669.28	Curb and filling (E.) and viaduct (W.)	$18,000 added for design and plans, making total cost of bridge $254,397.46.
Masonry and concrete	Fitzsimons & Connell Co.	46,099.00	Girder	Substructure paid for by West Chicago Street Ry. Co.; superstructure erected at Madison Street moved in 1891.
City Council and t	aken to slip A west of Ashland A	venue temporarily.		
Piles	.....	.....	.....	
Masonry on piles	Gaylord	Included in super. contract	Curb and filling	
Repaired	American Bridge Co.	3,505.00	" "	Superstructure moved to Washington Street in 1891.
Concrete and masonry on piles	Fitzsimons & Connell Co.	52,000.00	Girder, curb and filling	
Center pier piles; abutments stone	Fox & Howard	Included in super. contract	"	Burned in fire of 1871.
Masonry on piles	" "	31,264.00	"	Superstructure moved to Taylor Street in 1889.
Concrete and masonry on piles	Fitzsimons & Connell Co.	54,721.00	"	
"	"	49,807.00	Viaduct	
Center pier piles; abutments stone	Fox & Howard	4,800.00	Curb and filling	Burned in fire of 1871.
Masonry on piles	E. Sweet, Jr., & Co.	Included in super. contract	" "	
" "	Fitzsimons & Connell Co.	82,525.00	Old approaches slightly altered	First bridge of the Scherzer rolling type. The Metropolitan Elevated R. R. Co. contributed $45,000.
Piles	American Bridge Co.	Included in super. contract	Curb and filling	
Concrete on piles	Lydon & Drews Co.	82,683.50	" "	$34,974.96 added (including Hall plans $16,435.54) for design and plans, making total cost of bridge $272,606.38.
Piles	Fox & Howard	Included in super. contract	Viaduct and girders	
Masonry on piles	E. Sweet, Jr., & Co.	23,970.00	" "	East abutment rebuilt in 1882 by E. F Gobel & Co.; cost, $8,573.
Concrete and masonry on piles	Chicago D. & D. Co.	25,500.00	Viaduct	Substructure built at expense of West Chicago Street Ry. Co.; superstructure built at Adams Street moved in 1889.
Concrete on piles	Chicago Bridge & Iron Co.	39,094.87	"	$12,666.67 added for design and plans, making total cost of bridge $107,323.46.
Masonry on piles	Fox & Howard	Included in super. contract	Curb and filling	
Concrete and masonry on piles	Fitzsimons & Connell Co.	59,851.00	Viaduct	

CHICAGO

No.	BRIDGES.	SUPERSTRUCTURE.						
		Length, ft.	Width, ft.	Operation.	Material.	Date.	Contractors.	Cost.
17	Eighteenth Street.....	175	32	Hand	Combination	1868	Fox & Howard	$28.500.00
17a	" " rebuilt.....	176.5	35	"	Iron and steel	1888	King Bridge Co.	21,560.00
17b	" " "	247.6	58	Electric power	Steel	1905	Jackson & Corbett Co.	120,791.05
18	Canal Street..... ..	200	35	Hand	Howe truss	1891	A. Gottlieb & Co.	11,989.00
18a	" "	100	85	Steam	Steel	1893	Shailer & Schniglau	.....
18b	" "	283	41	Electric power	"	1903	American Bridge Co.	74,540.18
19	Twenty-second Street.....	210	32	Hand	Combination	1871	Fox & Howard	26,900.00
19a	" "	237	60	Electric power	Steel	1906	Jackson & Corbett B. & S. Works.	171,046.85
20	Archer Avenue (Ogden Slip)..	115	40	Hand	Combination	1871	Fox & Howard	15,000.00
21	South Halsted Street.....	150	31.25	"	Wood	1861	" "	8,500.00
21a	" " " rebuilt.	150	33	"	Iron	1872	King Iron Bridge Co.	15,900.00
21b	" " "	130	61.4	Steam	Steel	1894	Pittsburg Bridge Co.	.....
22	Main Street (Throop).....	152	29	Hand	Combination	1868	Fox & Howard	12,450.00
22a	" " "	247.6	58	Electric power	Steel	1903	American Bridge Co.	76,326.45
23	Loomis Street (Deering).....	200	30	Hand	Iron	1889	Shailer & Schniglau	17,080.00
23a	" " "	267.5	58	Electric power	Steel	1904	Jackson & Corbett Co.	127,725.04
24	Ashland Avenue (West Fork)..	160	20.5	Hand	Iron	1883	Detroit Bridge Co.	10,500.00
24a	" " " .	273.2	58.5	Electric power	Steel	1902	Chicago Bridge & Iron Co	99,685.15
25	South Western Avenue.....	125	21.3	Hand	Combination	1869	F. E. Canda	13,000.00
25a	" " "	176.5	35	"	Steel and iron	1888	King Bridge Co.	21,500.00
26	Fuller Street.....	125	19.5	"	Wood	1865	N. Chapin & Co.	7,500.00
26a	" " rebuilt.....	127	19.5	"	Combination	1877	G. W. James	4,210.00
27	Archer Avenue.....	152	28.75	"	"	1870	Fox & Howard	11,500.00

BRIDGES, 1906.

SUBSTRUCTURE.			APPROACHES.	REMARKS.
Material.	Contractors.	Cost.	Type.	
Piles	Fox & Howard	Included in super. contract	Viaduct, curb and filling	
Concrete and Masonry on piles	Chicago D. & D. Co.	$41.288.00	"	Superstructure moved to S. Western Avenue in 1906.
Concrete on piles	Lydon & Drews Co.	95,014.91	Viaduct	$18,000 added for design and plans, making total cost of bridge $233,805.96.
Piles	Chicago D. & D. Co.	7,141.00	Viaduct, curb and filling	Removed to Belmont Avenue in 1892 (condemned by U. S. Government as an obstruction to navigation.)
Masonry on piles	Shailer & Schniglau	.....	Timber trestles	Lift bridge, Harmon's patent; total cost $46,844.90.
Concrete on piles	Lydon & Drews Co.	87,109.29	Curb and filling	$20,500 added (including $2,500 for Schinke plans) for design and plans, making total cost of bridge, $182,-149.87.
Piles	Fox & Howard	Included in super. contract	" "	
Concrete on piles	Gt. Lakes D. & D. Co.	88,530.91	" "	$18,107.48 added for design and plans, making total cost of bridge $277,-682.24.
Piles	Fox & Howard	Included in super contract	Timber	Removed and slip filled by C. S. F. & C. R. R.
"	" "	"	Curb and filling	
"	Old substructure used	.....	Timber	Demolished by collision, Steamer Tioga, June 3), 1892.
Masonry to bed rock	Pittsburg Bridge Co.	.....	Old approaches slightly altered	First and only bridge of the Waddell lift type; total cost, $237,180.52 complete.
Piles	Fox & Howard	Included in super. contract	Timber	
Concrete	Lydon & Drews Co.	95,321.19	Curb and filling	$18,000 added for design and plans, making total cost of bridge $189,647.64.
Piles	Chicago D. & D. Co.	9,964.00	Timber	
Concrete	Lydon & Drews Co.	85,523.84	Curb and filling	$18,000 added for design and plans, making total cost of bridge $231,248.88.
Piles	Harry Fox & Co.	6,302.00	Timber	
Concrete	Page & Shnabel	45,420.57	Curb and filling	$15,000 added for design and plans, making total cost of bridge $160,105.72.
Piles	F. E. Canda	Included in super. contract	Timber	
Concrete	T. P. McDonough	25,720.43	Curb and filling	Superstructure moved from Eighteenth Street in 1906 by Gt. Lakes D. & D.Co.
Piles	N. Chapin & Co.	Included in super. contract	Timber	Blown down by storm of May 5, 1876.
"	Old abutments repaired		Curb, filling and timber	
"	Fox & Howard	Included in super. contract	Timber	

CHICAGO

No.	BRIDGES.	SUPERSTRUCTURE.						
		Length, ft.	Width, ft.	Operation.	Material.	Date.	Contractors.	Cost.
27a	Archer Avenue	212	60	Electric power	Steel	1906	Roemheld & Gallery	$87,322.96
28	Douglas Avenue	141.5	21.3	Hand	Combination	1874	Fox & Howard	9,900.00
28a	" rebuit (35th St.)	170	35	"	Howe truss	1891	Shailer & Schniglau	10,545.00
29	Ashland Avenue (South Fork)	152	18.5	"	Wood	1871	Fox & Howard	5,000.00
29a	" "	.....	.....	.....	.....	.....	.....	.....
29b	" " (canal)	.....	.....	Fixed	Iron	1886	Pittsburg Bridge Co.	3,622.00
30	Western Avenue (canal)	.....	.....	"	Wood	1870	C. Fitz Simons	1,840.00
30a	" " rebuilt	118	18	"	Iron	1882	Massillon Bridge Co.	5,900.00
31	Kedzie Avenue (canal)	108	.....	"	"	1879	" " "	2,879.00
31a	" " (West Fork)	109	16	"	"	1881	" " "	3,765.00
32	Crawford Avenue (South 40th)	.....	.....	"	Wood	.....	.....	.....
33	Laurel Street (Morgan Street)	154	33	Hand	Iron	1888	Chicago Forge & Bolt Co.	.....
34	Kinzie Street	170	31.5	"	Combination	1870	Fox & Howard	15,850.00
35	Indiana Street	163	32	"	"	1869	" "	48,800.00
36	Erie Street	200	32	"	"	1871	" "	30,000.00
37	Chicago Avenue	175	32	"	"	1867	" "	26,700.00
37a	" " rebuilt	175	32.5	"	"	1872	" "	20,850.00
38	North Halsted Street	140	20	"	Wood	1866	" "	7,000.00
38a	" " " rebuilt	140	.....	"	Combination	1877	W. B. Howard	4,190.00
38b	" " " "	127	50	Electric power	Steel	1897	King Bridge Co.	57,768.00
38c	" " " (canal)	228	32	Hand	Iron	1874	Fox & Howard	29,945.00
39	Division Street (River)	180	29	"	Combination	1869	" "	15,795.00
39a	" " "	260	60	Electric power	Steel	1904	Roemheld & Gallery	161,912.68
39b	" " (canal)	176	29	Hand	Combination	1870	Fox & Howard	17,700.00
39c	" " "	242	60	Electric power	Steel	1903	Roemheld & Gallery	76,924.24

BRIDGES, 1906.

SUBSTRUCTURE.			APPROACHES.	REMARKS.
Material.	Contractors.	Cost.	Type.	
Concrete	Fitzsimons & Connell Co.	$68,213.01	Curb and filling	
Piles	Fox & Howard	Included in super. contract	Timber	
"	Kimbell & Cobb Stone Co.	10,227.00	"	
"	Fox & Howard	Included in super. contract	"	
.....	.....	.....	.....	
Piles	Pittsburg Bridge Co.	Included in super. contract	Timber	
"	C. Fitz Simons	"	Filling	
Stone	Massillon Bridge Co.	1,021.00	"	
"	" "	Included in super. contract	"	
Wood	" "	634.00	"	Old wooden bridge here destroyed by flood of 1881.
Piles	.....	.....	"	
"	.....	.....	Curb and filling	Built by Town of Lake before annexation in 1889.
"	Fox & Howard	Included in super. contract	Curb and filling, and timber	The first crossing over the North Branch was a float bridge constructed in 1832 near the site of the present Kinzie Street bridge and used for foot passengers only.
Masonry on piles	" "	"	Viaduct and girder	
Center pier piles; abutments stone	" "	"	Viaduct and curb, and filling	Wooden float bridge until 1871.
Piles	" "	"	Curb and filling	Burned in fire of 1871.
"	" "	"	"	
"	" "	"	Timber	
"	Old work repaired	.....	"	Substructure rebuilt in 1884 by Chicago Dredg. & Dock Co.; cost, $10,490. Bridge demolished to make room for new bridge in 1896.
Masonry on piles	Wilson & Jackson	46,572.12	Old approaches	Second rolling bascule bridge; double roadway, two trusses. Total cost about $114,000, of which the N. C. St. Ry. Co. pays 25 per cent.
Piles	Fox & Howard	Included in super. contract	Timber	
"	" "	"	"	
Concrete on piles	Fitzsimons & Connell Co.	94,407.84	Curb and filling	
Piles	Fox & Howard	Included in super. contract	Timber	
Concrete on piles	Roemheld & Gallery	117,226.20	Curb and filling	

CHICAGO

No.	BRIDGES.	SUPERSTRUCTURE.						
		Length, ft.	Width, ft.	Operation.	Material.	Date.	Contractors.	Cost.
40	Weed Street (canal)	150	33	Hand	Iron	1891	Shailer & Schniglau	$8,296.00
40a	" " "	80	12	"	Wood	1905	Jackson & Corbett	
41	North Avenue	145	19.5	"	"	1865	N. Chapin & Co.	3,700.00
41a	" " rebuilt	150	29	"	Combination	1877	Conro, Carkin & Co.	7,149.00
41b	" "							
42	Clybourn Place	140	32	Hand	Combination	1873	Fox & Howard	13,700.00
42a	" " rebuilt	217.5	60	Electric power	Steel	1902	American Bridge Co.	84,000.00
43	Webster Avenue	180	37.5	Hand	Combination	1872	Fox & Howard	32,000.00
44	Fullerton Avenue	225	20	Fixed	Wood	1874	" "	1,490.00
44a	" " rebuilt	125	20	Hand	Combination	1877	I. W. Lavin & Co.	2,978.00
44b	" "	164.6	35.4	Electric power	Steel	1895	Chicago Bridge & Iron Co.	11,956.12
45	Diversey Boulevard	184.2	35.4	Hand	"	1896	Lassig Bridge & Iron Co.	14,961.58
46	North Western Avenue	266	36	"	Howe truss	1891	Binder & Seifert	14,000.00
46a	" " "	360.8	60	Electric power	Steel	1904	C. L. Strobel	212,824.57
47	Belmont Avenue	77.67	19.10	Fixed	Iron	1875	King Bridge Co.	
47a	" "	200	35	Electric power	Wood	1893	City	7,773.37
48	Irving Park Boulevard	65.5	19.10	Fixed	Iron			
49	Montrose Boulevard	50	22	"	Combination	1906		
50	N. Fortieth Ave. (Rutledge)	62	17.7	"	"			
51	N. Forty-eighth Av. (Jefferson)	64	18	"	Wood			
52	Forest Glen Avenue	49	16	"	Wood and iron			
53	N. Fifty-sixth Av. (Carpenter)	46	16.2	"	"			
54	Ninety-second Street	200	34	Hand	Iron			
55	Ninety-fifth Street	200	35	"	Howe truss	1891	Chicago Forge & Bolt Co.	13,350.00
55a	" "	319.5	60	Electric power	Steel	1903	Roemheld & Gallery	82,990.44
56	106th Street	179	31	Hand	Iron			
57	Chittenden Road	80	18	"	Wood			
58	Riverdale	131.3	21.2	"	"			
59	Blackhawk Street	180	29	"	Combination	1902	Fox & Howard	

BRIDGES, 1906.

SUBSTRUCTURE.			APPROACHES.	REMARKS.
Material.	Contractors.	Cost.	Type.	
Piles	Shailer & Schniglau	Included in super. contract	Timber	Lift bridge built under Capt. Harmon's patents.
.....	.....	.....	"	Pontoon bridge.
Piles	N. Chapin & Co.	Included in super. contract	"	
"	Old substructure used	.....	"	
.....	.....	.....	.....	Under construction.
Piles	Fox & Howard	Included in super. contract	Timber	A wooden bridge was built here in 1862 by Fox & Howard; cost, $1,000.
Concrete on piles	Fitzsimons & Connell Co.	$68,910.74	Curb and filling	
Piles	Chicago D. & D. Co.	11,500.00	Timber	Superstructure built at Clark Street moved in 1889.
"	Fox & Howard	Included in super. contract	Timber	
"	I. W. Lavin & Co.	"	"	Town of Lake View paid $4,466; total cost, $7,444.
Masonry on Bed Rock	Fitzsimons & Connell Co.	$15,796.67	Timber trestles and paved filling	North Chicago Street Railway Co. contributed $18,000.
Masonry on piles	Lydon & Drews Co.	16,383.52	"	Connects the North and West Boulevard systems.
Piles	Chicago D. & D. Co.	18,706.00	Timber	
Concrete	Fitzsimons & Connell Co.	91,173.57	Curb and filling	
Stone	.....	.....	Filling	Demolished to make room for new bridge in 1893.
Piles and Timber	Chicago D. & D. Co.	19,259.19	Timber trestles	Superstructure of first Canal Street bridge. Necessary real estate cost $5,500 additional.
Stone	.....	.....	Filling	
Timber	.....	.....	Trestle	Trestle approaches 119 feet.
Stone	.....	.....	Filling	
"	.....	.....	"	
"	.....	.....	"	
"	.....	.....	"	
Pier, stone on piles; abutments, piles	.....	.....	Timber	
Piles	Kimbell & Cobb Stone Co.	12,259.00	"	
Concrete on piles	Roemheld & Gallery	149,463.77	Curb and filling	
.....	.....	.....	Trestle	
.....	.....	.....	.....	Pontoon bridge.
Piles	.....	.....	Trestle	
"	Fitzsimons & Connell Co	.....	Piles	Old W. Division Street superstructure removed to Blackhawk Street in 1902.

CHICAGO

No.	BRIDGES.	SUPERSTRUCTURE.						
		Length, ft.	Width, ft.	Operation.	Material.	Date.	Contractors.	Cost.
60	Torrence Avenue	188	26	Hand	Wood	1905	Jackson & Corbett	$23,530.15
61	Foster Avenue (East)	25	16	Fixed	Wood & iron			
62	" " (West)	86	15	"	Wood			
63	North Kedrie Avenue	57	21.3	"	Wood & iron			
64	Argyle Street	78.5	18	"	"	1888	Massillon Bridge Co.	
65	Lawndale Avenue	108	18	"	Wood	1894		3,658.73
66	Lawrence Avenue	80.5	34.67	"	Wood & iron			

BRIDGES, 1906.

SUBSTRUCTURE.			APPROACHES.	REMARKS.
Material.	Contractors.	Cost.	Type.	
.....	.....	.....	Timber	Pontoon bridge.
Steel piers	.....	.....	Filling	
Piles	.....	.....	Timber	
"	.....	.....	"	Superstructure removed in 1898 from 61st Street Viaduct.
Steel piers	.....	.....	Filling	
Piles	.....	Included in super. contract		
"	.....	.....	Not built	Superstructure removed in 1898 from 61st Street Viaduct.

CHICAGO

No.	LOCATION.	Character of Superstructure.	Length ft.	Width, ft.	CHARACTER OF SUBSTRUCTURE.	CONTRACTOR SUBSTRUCTURE.
1	State Street	Wrought iron	304	59	Masonry abutments, small piers with Phoenix columns	Unknown
2	Dearborn Avenue	Steel	379.5	40	Masonry abutments small piers with steel columns	M. C. and J. Duffy $13,191.43
3	Clark Street	Wrought iron	83	80	Masonry abutments	Unknown
3a	" "	Steel	83	73	Masonry abutments, old repaired	City $1,368.91
4	Wells Street	Wrought iron	83	80	Masonry abutments	Unknown
4a	" "	Steel	93	80	" "	"
5	Indiana Street	Wood	614	31.8	Masonry piers and abutments	Unknown $54,687.00
5a	" "	Iron	613.07	38	Old, repaired	City
6	Erie Street	Wood	467	34	Masonry piers and abutments	Unknown
6a	" "	Iron	463.37	38	Old, repaired	City
7	Chicago Avenue and Halsted Street	"	238 716	60 49	Masonry piers and abutments and iron columns	Duffy & Sons
8	Lake Street	Wrought and Cast iron	78.25	60	Masonry abutments	Unknown
8a	" "	Iron	106.2	60	Old, rebuilt	Fitzsimons & Connell $12,880.70
9	Randolph Street	Wrought and Cast iron	81	60	Masonry abutments	Unknown
9a	" "	Steel	80	70	" "	"
10	Washington Street	"	251	32	Masonry abutments, small piers, steel columns	J. J. Duffy $9,567.00
11	Madison Street	Wrought and Cast iron	98	60	Masonry abutments	Unknown
11a	" "	Steel	128	59	Concrete abutment, small pier east, steel columns	Fitzsimons & Connell
12	Adams Street	Iron	306	33.5	Masonry abutments, small piers, iron columns	Unknown
12a	" "	"	208.6	58	Masonry abutments, small piers, concrete filled steel columns	City
13	Jackson Street	Steel	359.3	58	Masonry piers and abutments	Sackley & Peterson
14	Van Buren Street	Iron	35 65	60 62	Masonry abutments	Unknown

VIADUCTS, 1906.

CONTRACTOR SUPERSTRUCTURE.	Date.	City Paid.	Railroads Paid	Totals.	APPROACHES.			
					Location.	Length, ft.	Gradient.	Character.
Keystone Bridge Co.	1872	.....	.....	$29,840.00	North South	270 Bridge	1:36 Level	C. W. with P. F. Bridge
M. Lassig $44,957.00	1889	$22,858.74	$40,000.00	62,858.74	North South	178 Bridge	1:20 Level	C. W. with P. F. Bridge
Keystone	1872	24,277.43	14,730.00	39,007.43	North South	278.5	1:37.5	C. W. with P.F. "
A. Gottlieb & Co. $9,981.60	1892	Nothing	All	11,444.87	North South	394.7 168	1:37.3for210.7 1:100for184.0 1:40	" "
Keystone	1872	12,570.65	Nothing	12,570.65	North South	230 176	1:27.5 1:54	" "
Unknown	1899	Nothing	All	Unknown	North South	.....	.....	Double-deck viaduct
F. E. Canda $23,010.00	1869	.....	.....	78,697.00	West East	228 Bridge	1:24 Level	C. W. with P. F. Bridge
Pittsburg Bridge Co.	1888	54,491.39	Nothing	54,491.39	West East	Same "	Same "	Same "
Fox & Howard	1871	23,056.25	"	23 056.25	West East	350 Bridge	1:26 Level	C. W. with P. F. Bridge
Edw. Hemberle $37,438.00	1885	45,000.00	"	45,000.00	West East	Same "	Same "	Same "
Pittsburg Bridge Co.	1884	149,637.50	135,696.91	285,334.41	West East North South	768 550 Bridge 758	1:40 1:30 Level 1:37	W. E. and S.C.W. with P. F. N. Bridge
Keystone	1872	.....	.....	13,505.00	West East	176 75	1:21.5	C. W. with P. F. Same to Bridge
Massillon Bridge Co. $26,127.14	1887	Nothing	39,007.84	39,007.84	West East	230.4 75.53	1:23 1:37	Same "
Keystone	1871	.....	12,206.00	12,206.00	West East	268 76.28	1:70 1:40	" Timber trestle.
C. L. Strobel	1901	Nothing	All	Unknown	West East	.....	.....	Bridge on the East. C. W. with P. F.
King Bridge Co. $16,685.00	1880	20,237.63	6,014.37	26,252.00	West East	146 Bridge	1:21 Level	C. W. with P. F. Bridge
Keystone	1866	15,675.00	.....	15,675.00	West East	221 66.5	1:31.7	C. W. with P. F. Same to Bridge.
Penn. Bridge Co.	1891	11,200.00	Nothing	11,200.00	West East	222.75 48.75 Girder	1:30.43 1:23.89	Same. Gird.span to bridge
Keystone	1869	25,883.87	19,000.00	44,833.87	West East	200 Bridge	1:18.40 Level	C. W. with P. F Bridge.
Keystone $27,993.00	1885	.....	All	33,462.40	West East	Same Bridge	Same 1:115	C. W. with P. F. Bridge.
Gottlieb $75,700.00	1888	137,600.00	74,600.00	212,200.00	West East Canal St. S Canal St. N	524.69 Bridge 306.66 355.00	1:35 Level 1:30.15 1:50.8	C. W. with P. F. Bridge. C. W. with P. F.
American Bridge Co.	1870 1880	3,275.00	4,440.56	7,715.56	West East	176 184	1:23 1:26.7	" "

CHICAGO

No.	LOCATION	Character of Superstructure.	Length, ft.	Width, ft.	CHARACTER OF SUBSTRUCTURE.	CONTRACTOR SUBSTRUCTURE.
14a	Van Buren Street	Steel	67	58	Same, repaired	J. S. Patterson, subcontractor $1,238.00
15	Harrison Street	Iron	498.66	38	Masonry piers and abutments	J. J. Kearns
16	West Polk Street	"	346	33	Same	E. F. Gobel
17	Polk Street	Steel	375.5	40	"	Unknown
18	West Taylor Street	"	900	58	Masonry abutments, small piers, steel columns	Jas. Kincade $20,777.98
19	Taylor Street	"	976.63	36 and 40	Same	Unknown
20	Twelfth and Beech Streets	Iron	58	58	Masonry abutments	"
20a	" " " "	"	140	56	Same	Rebuilt by M. P. Garrity
21	Twelfth Street from bridge west and Lumber Street approach	"	363.5 365.0	58 40	Masonry piers and abutments Masonry abutments, small piers and columns	Jos. Downey $31,504.18 for Twelfth St. $7,750.00 for Lumber St.
22	Twelfth Street west of Clark, first section	"	495.35	58	Masonry piers and abutments, and small piers and columns	Kinsella, Daly & Co. $47,372.40
22a	Twelfth Street west of Clark, second section	"	374	58	Same	Jos. Downey
22b	Twelfth Street from Clark Street to Wabash Avenue	Steel	979.95	58	"	Sackley & Peterson $34,448.00
23	Fifth Avenue approach to Twelfth Street viaduct.	"	658.81	60	"	Jos. Downey
24	West Eighteenth Street	Iron	184	36	Masonry abutments	Jas. Clowry $15,215.16
25	Eighteenth Street	Steel	463.87	38 and 58	Masonry piers and abutments	Jos. Downey
26	Canal and Sixteenth Streets	Iron	300	64	Masonry abutments, small piers and columns	De Golyer & Hubbard $36,180.00
27	Halsted and Sixteenth Streets	"	176.5	60	Same	Unknown
27a	Same	"	176.51	60	"	Old, repaired and rebuilt by City
28	Center Avenue and Sixteenth Street	"	473	58	Masonry piers and abutments	M. P. Garrity $61,390.00
29	Extension to Halsted Street, Center Avenue and Canal Street viaducts by C. G. W. Ry.	Steel	52–36 30.5–35 40–40	65.67 55.67	Concrete abutments	C. G. W. Ry. Co.
30	Milwaukee Avenue and Desplaines Street	Iron	680 472	59 65	Masonry abutments, small piers and columns	$70,361.40 Jas. Kincade 1875

VIADUCTS, 1906.

CONTRACTOR SUPERSTRUCTURE.	Date.	City Paid	Railroads Paid.	Totals.	APPROACHES.			
					Location.	Length, ft.	Gradient.	Character.
Chicago Bridge & Iron Co. $6,790.78	1895	$6,494.00	$1,150.30	$7,644.30	West East	176 184	slightly raised "	C. W. with P. F. Bridge.
Rust & Coolidge	1881	19,851.75	76,567.55	96,419.30	West East	360 300	1:40 1:40	" "
Central Bridge Co.	1882	Nothing	115,009.49	115,009.49	West East	498.28 334.52	1:38.03 1:41.41	" "
Unknown	1888	Nothing	All	Unknown	West East Fifth Ave. N.	Bridge Dead end 280	Level 1:17.5	Bridge. Dead end C. W. with P. F.
American Bridge Works $62,250.00	1891	"	"	83,027.98	West East	305 Bridge	1:23 Level	" Bridge.
Binder & Seifert	1892	"	"	Unknown	West East Fifth Ave. N.	" Dead end 280	" 1:17.5	" Dead end C. W. with P. F.
American Bridge Co. $4,449.00	1873	7,549.62	25,668.25	33,217.87	West East	408 378.5	1:32 1:30	" "
Rust & Coolidge $18,440.00	1884	7,554.20	24,306.84	31,861.04	West East	331 Same	1:29.68 Same	" "
Gottlieb $48,100 for Twelfth St. $23,900 for Lumber St.	1887	.....	111,214.18	111,214.18	West East Lumber St. S	230 Bridge 150	1:40 Level 1:33.33	" Bridge. C. W. with P. F.
King Bridge Co. $70,800.00	1886	84,522.40	44,600.00	129,122.40	West East Clark St. N S.	Viaduct " 592 490	Level " 1:40 1:30	Viaduct " C. W. with P. F. "
M. Lassig	1888	20,000.00	Balance	Unknown	West East	Bridge Viaduct	Level "	Bridge. Viaduct.
Riter & Conley $175,208.00	1889	Nothing	209,736.00	209,736.00	West East	Viaduct 167.7	Level 1:22.28	" C. W. with P. F.
Chicago Forge & Bolt Co	1888	"	60,000.00	60,000.00	South North	Viaduct 200	Level 1:40	Viaduct. C. W. with P. F.
Keystone $11,194.00	1879	19,842.82	14,000.00	33,842.82	West East	330 130	1:28 1:40.5	" T'mb'r trestle to b'dg
Keystone	1888	Nothing	114,446.00	114,446.00	West East	Bridge 320	Level 1:26.4	Bridge. C. W. with P. F.
Fox & Howard $37,200.00	1873	30,000.00	96,401.29	126,401.29	North South	550 530	1:42.5 1:39.5	" "
Detroit Bridge Co.	1869	Nothing	24,725.00	24,725.00	North South	410 265	1:31 1:21	" "
Leighton Bridge Works.	1881	17,685.73	Nothing	17,685.73	North South	Same "	Same "	" "
Edw. Hemberle $77,737.33	1884	105,063.74	47,666.38	152,730.12	North South	722 722	1:40 1:40	" "
Gottlieb	1886	Nothing	85,987.57	85,987.57	.....	.....	.....	"
American, and Leighton Bridge Works $70,010.15	1876 1880	164,165.00	131,878.00	296,043.00	Northwest Southeast North South	670 540 510 435	1:50 1:40 1:40 1:40	" " " "

CHICAGO

No.	LOCATION.	Character of Superstructure.	Length, ft.	Width, ft.	CHARACTER OF SUBSTRUCTURE.	CONTRACTOR SUBSTRUCTURE.
31	Halsted—Kinzie	Iron	473	62	Masonry abutments, small piers and columns	Wm. Hildreth $23,792.00
31a	" "	Steel	545.26	60	New masonry piers and abutments	Sackley & Peterson $19 914.63
32	Sangamon—Kinzie	Iron	458	38	Masonry piers and abutments	M. C. & J. Duffy
33	Ogden Boulevard	Steel	440.41	120	Same	Jas. Kincade $84,500.00
34	Halsted and Fortieth Streets	"	372	60	"	John Ruddy $48,271.05

VIADUCTS, 1906.

CONTRACTOR SUPERSTRUCTURE.	Date.	City Paid.	Railroads Paid.	Totals.	APPROACHES.			
					Location.	Length, ft.	Gradient.	Character.
Soulerin, James & Co. $51,428.00	1874	$65,477.46	$65,357.81	$130,835.27	North South	524 472	1:38.5 1:39	Bridge C. W. with P. F.
Milwaukee Bridge & Iron Co. $54,570.43	1893	Nothing	All	76,891.25	North South	Same. slightly raised	Practically the same	Same, slightly raised and altered
Cunningham & Keepers $60,000.00	1881	50,129.24	48,847.79	98,977.03	North South Kinzie St. W E	495 440	1:30 1:30 1:17.5 both	C. W. with P. F. " "
American Bridge Works $118,220.00	1892	113,645.47	89,144.99	202,790.46	Southwest Northeast	450 450	1:25 1:25	" "
C. L. Strobel $31,834.20	1896	Nothing	83,594.12	83,594.12	North South	582.66 567.14	1:30 1:29	" "

HARBOR DIVISION.

RICARD O'SULLIVAN BURKE, Harbor Engineer.
CAPTAIN JOHN MCCARTHY . Harbor Master.
THOMAS J. ELDERKIN . . Vessel Despatcher.

This Division has supervision over the Harbor of the City of Chicago, which consists of the Chicago River, its branches, forks and slips, the Calumet River, its branches, forks and slips, and Lake Michigan from the north to the south boundary lines of the City and three miles out into the lake from the shore, and for a further distance of five miles beyond or east of the latter line sanitary jurisdiction of the City of Chicago extends.

During the year 1906 the following permit work was done, namely:

DOCK

NEW CONSTRUCTION.

	Permits.	Feet.	Fees.
Main Chicago River	...	.....	.....
South Branch Chicago River, including Sanitary District Canal, clumps, etc.	10	3,247	$471.50
North Branch Chicago River.	2	480	120.00
Calumet River.	7	1,065	266.25
Lake Michigan.	12	3,234	53.50
Total.	31	8,026	$911.25

REBUILDING.

	Permits.	Feet.	Fees.
Main Chicago River.	7	906	$ 226.50
South Branch Chicago River.	17	3,099.5	774.88
North Branch Chicago River.	9	2,736.0	684.00
Calumet River.	2	520.0	130.00
Lake Michigan.	.....	.....	.....
Total.	35	7,261.5	$1,815.38

REPAIRING.

	Permits.	Feet.	Fees.
Main Chicago River	3	507	$ 63.37
South Branch Chi ago River	8	705	88.13
North Branch Chicago River	1	580	72.50
Calumet River	5	990	124.00
Lake Michigan	1	35	4.37
Total	18	2,817	$352.37

SUMMARY OF DOCK WORK.

	Permits.	Feet.	Fees.
New Construction	31	8,026	$ 911.25
Rebuilding	35	7,261.5	1,815.38
Repairing	18	2,817.0	352.37
Total	84	18,104.5	$3,079.00

DREDGING 1906.

LOCATION OF WORK.	Permits.	Yards.	Fees.
Main Chicago River	5	3,000	$ 12.00
North Branch Chicago River	17	14,000	56.00
South Branch Chicago River	38	88,000	352.00
Calumet River	35	59,000	236.00
Lake Michigan	20	47,000	188.00
Lake Calumet	1	.....	....
Total	116	211,000	$844.00