

ROCK ISLAND CENTENNIAL BRIDGE

**FINAL REPORT
ON
CONSTRUCTION
OF THE
MISSISSIPPI RIVER BRIDGE
BETWEEN
ROCK ISLAND, ILLINOIS AND DAVENPORT, IOWA**

**HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
KANSAS CITY, MO. — NEW YORK, N. Y.**

FEBRUARY, 1945

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March 23, 1945

Honorable Robert P. Galbraith
Mayor, City of Rock Island
Rock Island, Illinois

Dear Mayor Galbraith:

We submit herewith our final engineering report on the construction of the Rock Island Centennial Bridge across the Mississippi River between Rock Island, Illinois, and Davenport, Iowa. We have endeavored to include in this report all principal data concerning the structure and the history of its construction.

In addition to this report, we have prepared and submitted during the period of development and construction of the project, special reports dealing with financing, planning, construction and operation of the project.

Copies of all reports, detailed construction records, the design calculations for the structure, the original design drawings revised to show final construction, inspection and test reports of materials incorporated in the work, and all similar data are preserved in our permanent files. The original tracings of shop and working drawings prepared by all contractors and a complete set of prints made from our design drawings have been stored in the vault of the administration building.

Respectfully submitted,

HOWARD, NEEDLES, TAMMEN & BERGENDOFF

R. N. Bergendoff
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CITY OF
ROCK ISLAND, ILLINOIS

Hon. Robert P. Galbraith, Mayor.

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FINAL REPORT
ON CONSTRUCTION OF THE
MISSISSIPPI RIVER BRIDGE

BETWEEN
ROCK ISLAND, ILLINOIS AND DAVENPORT, IOWA

PART I
REVIEW AND HISTORY

The Rock Island Centennial Bridge spanning the Mississippi River between Rock Island, Illinois and Davenport, Iowa was opened to traffic on July 12, 1940. It is a thoroughly modern, four-lane highway bridge, adequate in every respect for present day high speed passenger and transport traffic. The structure is ideally situated to provide rapid transit between the business districts of Rock Island and Davenport and serves not only the local or shuttle traffic in the Tri-City Area, but also heavy through motor travel on U. S. Highways 67 and 150.

The Centennial Bridge is notable in several respects. The main spans are box girder rib tied arches, a type rather unusual in America and permitting simplicity in design with pleasing appearance. The Centennial Bridge is the only bridge across the Mississippi providing for four lanes of traffic with separation of traffic in each direction. It is a toll bridge operating alongside a free bridge and has the lowest rates of toll of any toll bridge on the Mississippi River. It was financed entirely by the City of Rock Island with no obligation on the taxpayers; there was no federal or state participation in the financing. But perhaps the most

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outstanding feature of the new bridge is its great need. A few remarks on the communities served by the new structure, the services rendered, and some statistics on cross-river traffic in the Tri-City Area will emphasize the reasons for constructing the Centennial Bridge.

The three cities, Rock Island, Illinois, Moline, Illinois, and Davenport, Iowa, with populations respectively 38,400, 34,599 and 65,963 in the 1940 census, are so immediately situated that they are identified as the "Tri-Cities". Davenport, Iowa lies on the west bank of the Mississippi River, or rather on the north bank since the course of the river here is from east to west, and Rock Island and Moline merge together on the Illinois side which is south of the river. With adjacent suburban communities, the population of the Tri-Cities has been estimated at about 160,000. The river divides this population into two almost equal parts; the factories and principal industries of the communities are closely inter-related and there is considerable interchange of local business and commuting of employees to and from work on opposite sides of the river. The principal retail districts of Rock Island and Davenport lie almost exactly opposite on either side of the river and each is built within a block of the water's edge. The river at this point is about 2,230 feet wide and the total distance between the principal retail business streets of the two cities, which are approximately parallel to the river, is about three-quarters of a mile. All these conditions bring about a large volume of local cross-river traffic, and in addition there is considerable through motor travel on the various federal highways passing through the area.

Prior to 1935 all cross-river highway traffic in the Tri-City Area was served by the so-called Government Free Bridge. This structure

provided only two lanes for highway traffic and congestion was acute. The Centennial Bridge was built primarily to relieve this severe traffic congestion.

The Government Bridge was built by the United States Government under an emergency order primarily to give access to Arsenal Island, the site of the famous Rock Island Arsenal. The island extending from about one-half mile to three miles upstream from the centers of the business districts of Rock Island and Davenport is separated from Davenport by the Mississippi River and from Rock Island and Moline by a narrow waterway known as Sylvan Slough. The island has been extensively developed by the U. S. Government.

The Government Bridge spans the river from Davenport to the downstream end of Arsenal Island. It is a double-decked combined railroad and highway structure built in 1896. The upper deck carries a double track railroad and the lower deck a roadway accommodating two lanes of traffic with these two lanes also occupied by a double track street railway, and sidewalks. Vertical clearance is limited to 11 ft. 6 ins. and consequently large trucks cannot use the bridge. It is a low level structure, and for passage of river traffic has a swing span which is opened an average of $2\frac{1}{2}$ times each week day during the nine months navigation season. To reach the Illinois shore traffic must traverse Arsenal Island and cross Sylvan Slough by either a bridge at 24th Street in Rock Island or at 15th Street in Moline. The former is near the downstream end of the island and the latter near the upstream end. For reasons of military security public traffic is not normally permitted to traverse the length of the island and use the upper bridge at Moline.

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The Government Bridge was intended to provide access to the Arsenal. Its purpose is primarily military; public traffic is permitted to use the bridge through sufferance and could and has on occasion been ruled off or subjected to rigid, individual inspection. However, during the first world war and during the years of peace following, the public was given free use of the bridge. Traffic increased from 552,000 vehicles per year in 1912 to almost 9,000,000 vehicles in 1939. Traffic congestion became increasingly more acute, and traffic jams delaying traffic for from ten minutes to an hour were daily occurrences. Operation of the swing span for passage of river craft necessitated temporary total suspension of traffic. Traffic accidents were numerous, there being as many as 200 accidents on the bridge per year which were reported to police; undoubtedly there were many more of which the police were never notified.

The inadequacy of this two-lane structure is evident when compared with other structures. In 1938 the Government Bridge carried more vehicles than either the George Washington Bridge in New York or the San Francisco Bay Bridge in California, two of perhaps the best known and most expensive bridge structures in the world. Further, at St. Louis there are 5 bridges with 14 lanes of traffic to carry a total volume only 33 per cent more than that carried by two lanes of traffic on the Government free bridge.

In 1935 a high level bridge was constructed between the suburb, Bettendorf, Iowa and Moline, Illinois, just upstream from Arsenal Island. This structure was financed by P.W.A. to operate as a toll bridge until amortization. The bridge is located about $3\frac{1}{2}$ miles upstream from the retail business districts of Rock Island and Davenport and is a limited two-lane highway structure. While accommodating some local traffic, the bridge

functions largely as a by-pass for through traffic. However, the experience of the five years of its operation prior to the opening of the Centennial Bridge showed that it had almost no effect in reducing traffic congestion on the Government free bridge. The 8 mile drive to cross 3/4 mile of river did not appeal to or suitably accommodate local shuttle traffic between Rock Island and Davenport.

The traffic situation at Rock Island and Davenport demanded relief. The City officials of Rock Island and other civic-minded men of the community under the leadership of Mayor Robert P. Galbraith studied means of remedying the situation and proceeded to lay the ground work toward the financing and construction of a new and adequate river crossing. It was to be a toll structure and would become free to the public after costs of construction and maintenance had been amortized.

The City retained Ash-Howard-Needles & Tammen, Consulting Engineers, (predecessors of the present firm of Howard, Needles, Tammen & Bergendoff) to study the feasibility of constructing either a bridge or a tunnel. Preliminary surveys, traffic analyses, preliminary designs and estimates of cost were made, and it became evident early in the study that a bridge would be preferable to a tunnel both from the standpoint of original cost and cost of maintenance and operation through the years. A high level bridge having four lanes of traffic and two sidewalks would be much cheaper to construct and more economical to operate and maintain than a two-lane tunnel without sidewalks and in addition would have more than twice the traffic capacity. A report to this effect together with traffic studies and estimates of probable earnings of the proposed structure was submitted by the engineers under date of February, 1938.

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Once it had been established that a bridge was the preferable type of crossing, the City Officials proceeded to secure the necessary federal legislation to permit construction of a bridge across a navigable waterway. On November 23, 1937, Congressman Chester Thompson of Illinois introduced H.R. 8466, a bill "Authorizing the City of Rock Island, Illinois, or its assigns, to construct, maintain, and operate a toll bridge across the Mississippi River, at or near Rock Island, Illinois, and to a place at or near the City of Davenport, Iowa." After passage by the House and Senate the enabling act (Public - No. 446 - 75th Congress) received presidential approval on March 18, 1938. The City of Rock Island had the necessary authority under State-Law to construct and operate a toll bridge by virtue of the Enabling Act of 1935.

The enabling legislation authorized the City to fix and charge tolls for transit over the bridge to pay the cost of its operation and maintenance and to provide a sinking fund for amortization of the original cost, with the provision that the structure was to become toll free on amortization of the debt. To provide funds for the construction of the bridge the City was authorized under the State Enabling Act to issue bonds secured solely by net revenues from tolls.

Efforts were made to secure federal financial participation through the Public Works Administration but without success. Traffic analyses made by the engineers were sufficiently favorable from a revenue producing standpoint that the City decided to proceed with a private financing program. The engineers report of February 1938 incorporating the accumulated data showing the great need for an additional crossing

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was sufficient to impress private investment bankers as to the soundness of a toll bridge project operating alongside a free bridge. An independent survey and analysis was made for the bankers by Sverdrup and Parcel, Consulting Engineers of St. Louis. Their report of May, 1938 further substantiated the findings expressed in the earlier report. Revenue bonds issued in the name of the City of Rock Island, placing no obligation on the tax payers, were sold to Stifel-Nicolaus & Co., Inc. of Chicago. The issue was for \$2,500,000 with bonds bearing 4% interest, written for a 25-year term and dated February 1, 1939.

The selection of a site for the structure was confined to fairly narrow limits. Physical conditions and the necessity for locating the termini in or immediately adjacent to the retail districts of the two cities indicated that the Rock Island entrance should be in the vicinity of 2nd Avenue and 15th Street and the Davenport entrance near 2nd Street and Western Avenue. Sites considered in Rock Island ranged from 13th Street to 17th Street with 15th and 16th Streets receiving major consideration. Fifteenth street was adopted as the final location since an entrance plaza was not feasible at 16th Street, adequate connection could be made to existing traffic routes, and right-of-way costs and damage to adjacent property were not excessive. In Davenport the sites considered ranged from Brown Street to Scott Street with Western Avenue and Gaines Street receiving major consideration. Although the Western Avenue site was perhaps somewhat preferable from a traffic routing standpoint it necessitated locating the approach viaduct between the municipal stadium and the band shell in Leclaire Park. Refusal of the Davenport Park Board to grant easement over the Park and objections of property owners per-

mitted no alternative but the adopted location at Gaines Street.

Structures of several types were considered for the crossing; all had deck girder approach spans and were high level crossings providing for uninterrupted movement of traffic. For the main river spans consideration was given to suspension spans, continuous half-through arch trusses, and tied arches. The lengths of the channel spans and the location of the main piers were dictated by the Government to meet the needs of navigation by permitting the safe passing of tows between Lock No. 15 and the Crescent railroad bridge swing span downstream as well as avoiding undue interference with the boat landings at Rock Island and Davenport. These span lengths and pier locations were determined after public hearings before engineers of the War Department, at which navigation interests were represented. The design adopted was chosen to meet these conditions economically, and to provide a structure having a graceful and pleasing appearance. The final design utilizes just two types of spans - the tied arch spans over the river and the continuous girder spans of the approach viaducts. The result of this limitation in type has been a harmonious, logical, economical and aesthetically satisfying layout. The box girder tied arches are more pleasing to the eye than any system of truss construction and afford the traveler a virtually unobstructed scenic view up and down the river.

The public hearing before engineers of the War Department was held at Rock Island on April 15, 1938 and on August 16, 1938 the permit for construction of the new bridge was granted. A similar permit was subsequently granted by the Division of Waterways, Department of Public Works and Buildings, State of Illinois.

In the meantime, the engineers had in June 1938 made the necessary survey of the site as finally adopted and were proceeding with the preparation of final designs, detailed plans, and specifications. Foundation investigations were made by the Interstate Engineering Company of Rock Island. The railroads and other interests whose properties were affected by the new construction gave their fullest cooperation, resulting in prompt completion of final plans.

On December 8, 1938 the plans and specifications for seven concrete bents of the Illinois approach were submitted to and approved by the City Council. Bids on this portion of the work were taken on December 23, 1938 and a contract awarded on December 29, 1938 to the Central Engineering Company of Davenport for \$27,295. This contract was later assigned to the Priester Construction Company of Davenport. On January 23, 1939 the remaining plans and specifications were submitted to and approved by the Council. Bids on the main portion of the work were opened February 17, 1939 and a contract for the superstructure was let to the lowest bidder, the American Bridge Company, on their bid of \$1,135,964, while the McCarthy Improvement Company of Rock Island received the contract for the substructure and plazas on their low bid of \$426,997.80. Bids for construction of the administration building were received July 8, 1940 and a contract for \$16,993 was awarded to Sam Weisman on July 12, 1940. In every instance the contract was awarded to the low bidder.

The contract for construction of the seven Rock Island approach bents was separated from the main substructure work to permit an earlier start of construction and so increase the likelihood of approval of the PWA application then pending. On December 30, 1938 a nominal start on

construction of the Rock Island approach bents was made. The attempts to accomplish this method of financing were unsuccessful largely because PWA allotments of funds to projects in Illinois were already in excess of the quota assigned to that state. It was then determined to proceed under a private financing program and construction was started in earnest on March 6, 1939.

With all parts of the proposed construction except the administration building under contract the work progressed rapidly; construction of the administration building was deferred until after the opening of the bridge.

The bridge was opened to traffic on July 12, 1940. To celebrate the opening of the bridge, the completion of the City's new sewage treatment plant, and the 100th year of the City's existence, an elaborate celebration had been planned. Addresses by prominent speakers, a transportation parade, circus acts, fireworks and the like were included in the 3-day celebration.

By resolution of the City Council the bridge had been named the Galbraith Bridge in honor of Mayor Robert P. Galbraith. The Mayor, in declining this honor, suggested at the opening of Rock Island's centennial year, May 3, 1940, that the bridge be known as the Rock Island Centennial Bridge since it was being completed in 1940, the centennial birthday of the City. This suggestion was acted upon unanimously by the City Council.

PART II

DESCRIPTION OF THE PROJECT

The Rock Island Centennial Bridge, built at a total cost of \$2,448,776.07, spans the valley of the Mississippi River from the intersection of 15th Street and 2nd Avenue in Rock Island, Illinois to near the intersection of Gaines and 2nd Streets in Davenport, Iowa. Including the additional approach street pavement between 2nd and 3rd Avenues in Rock Island the total length of the project is .88 miles of which approximately .73 miles (3,848 feet) is open bridge structure, the remaining .14 miles being street and embankment approaches. The bridge and approaches provide two 5-foot sidewalks and four lanes for vehicular traffic, that is, two 2-lane roadways each 22 feet wide separated by a 2-foot 6-inch raised center island or median strip. Sodium vapor lighting is used to light the roadways. Plazas are lighted by both sodium vapor and incandescent lamps. Toll collection facilities are located near the center of the bridge at Pier 3, and the administration building is located at the Rock Island entrance plaza.

The Mississippi River at the bridge site is about 2,230 feet wide at pool level and at that stage has a maximum depth of about 14 feet under span 10. Extreme high water is some 16.6 feet above pool level.

The geologic formation varies considerably along the line of the structure. The underlying load-bearing material is principally limestone with an overburden of sands, gravels and clays varying greatly in depth. This bed rock forms the river bed near the Illinois shore but near the center of the river the rock has been eroded to great depths and replaced

with heavy clays, shales, sands and gravels. Under the viaduct approaches the bed rock is about 15 feet below the surface on the Rock Island side and about 20 feet on the Davenport side. Thus the type of foundation construction varies, soil bearing, rock bearing, and pile supported footings being used. Few sites on the Mississippi River have foundation conditions as good as those found at Rock Island. The shallow overburden above sound shales and rock permit very economical foundation construction.

The bridge structure is comprised of five steel box girder rib tied arch spans, 2,261 feet long overall, and 1,587 feet of deck, steel beam and girder viaduct approaches. The two main 538-foot channel spans provide clear openings for navigation 524 feet 10 inches wide having a vertical clearance of 66 feet at pool level and 49 feet 5 inches at extreme high water. All supporting piers and the two abutments are of reinforced concrete.

The Rock Island approach viaduct consists of 8 deck, steel girder and beam spans totalling 511 feet long. It overpasses an alley, First Avenue and the tracks of the Chicago, Burlington & Quincy Railroad; Chicago, Rock Island & Pacific Railway; Chicago, Milwaukee, St. Paul & Pacific Railroad, and the Davenport, Rock Island & Northwestern Railway - 19 tracks in all. The five beam spans, spans 1 to 5, are one continuous unit. Spans 6 to 8 are comprised of 3-span cantilever plate girders with a suspended center span. Spans vary in length from 52 feet to 123 feet, and the height of the supporting bents, from 12 feet to 32 feet above ground level. The viaduct is, for about half its length, on a 3000 foot radius horizontal curve and has a maximum grade of 5.85 percent.

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The Davenport approach viaduct is composed of 15 deck, steel beam spans and one girder span, and has a total length of 1,075 feet. The beam spans are generally of the cantilever type with alternating spans suspended. Span lengths vary from 47 feet to 94 feet, and the height of supporting bents, from 7 feet to 46 feet above ground level. The viaduct overpasses an alley, First Street and the tracks of the Chicago, Rock Island & Pacific Railway and Davenport, Rock Island & Northwestern Railway - 16 tracks in all. For about three-fourths of its length the viaduct lies on a 1,980 foot radius curve. Maximum grade is 6.03 percent.

The deck on each approach is carried on six lines of beams or girders. Cross diaphragms span between girders at intervals of about 18 feet. These are extended by cantilever brackets to support the overhang of the roadway, the curbs, sidewalks and handrails. All structural metal of the approach viaducts is carbon steel.

The roadway deck is an $8\frac{1}{2}$ inch concrete slab, reinforced transversely with steel bar trusses. A steel center island or median strip, 2 feet 6 inches wide and 7 inches high, separates the two 22-foot clear roadways. Steel safety curbs, 19 inches high separate the roadways from the 5 foot sidewalks on each side of the bridge. Handrails are of steel, with steel posts, and are 3 ft. 6 in. high above the sidewalks. To provide full drainage and to facilitate cleaning the roadway and removal of snow the curbs and the center island are made open. On the approach viaducts the drainage through the curbs and center island is carried away through a system of gutters and downspouts so as to protect tracks and streets below. On the river spans the gutter and downspout system was omitted.

At the bents, girders and beams are supported on cast steel shoes. In units of continuous beams and girders, shoes at one bent are simple pedestals; at other bents of the unit, rockers are provided to permit expansion movement. At the joining of continuous units, loads are transferred by simple pin connections or by link hangers. The link hangers are used where necessary to permit expansion and contraction due to temperature change, and at these points, fingered expansion plates are used in the roadway.

The 2,261 foot river span portion of the crossing is comprised of five box girder rib tied arch spans. The two main channel spans are each 538 feet long and the other three spans each 396 feet long. The tied arch consists essentially of the heavy steel arch rib, the horizontal tie connecting the haunches of the arch, and the vertical hangers suspended from the arch rib and supporting the roadway. The use of a heavy steel tie eliminates the need for massive pier construction to resist the thrust of the arch ribs. In resisting the thrust of the arch rib under full load the tie is subjected to a tensile stress of 1,200 tons which stretches the tie 4.2 inches. There is no structural continuity between successive arches; each span is an independent, integral structural unit.

The arch spans are entirely on tangent; the curves begin on the viaducts at each end of the arch span portion of the crossing. Transitions are provided at each end of the main spans to meet the superelevated sections of the viaduct approaches. At the Rock Island end the transition is 4 panels or 142 feet 4 inches in length and is superelevated 8 inches. At the Davenport end the transition is 6 panels or 213 ft. 6 in. long and is superelevated 12 inches. This superelevation is accomplished by the use

of variable height steel shims placed between the crossbeams and the stringers.

The arches are spaced at 51 ft. 6 in. centers, the two roadways being carried between the arches while the two sidewalks are cantilevered out on the outside of the arches. Arched portals at each end of each span provide to traffic approximately 16 foot vertical clearance at the outer edges of the roadways. Vertical clearance on the inside lanes is governed by the 18-foot clearance at the toll house canopy.

A description of the 538 foot arch spans will serve to illustrate the type of construction of the 396 foot spans as well, since they are similar in all respects. The arch ribs of the 538 foot spans rise about 89 feet above the roadway at midspan. The arch tie is 5 feet below the level of the roadway and has 1 foot of camber; thus, the total rise of the arch rib is 95 feet. The arch ribs are box girders of silicon steel made up as follows: two vertical webs 96 inches deep set 27 inches clear inside, top and bottom flanges made up of 4 angles each, and 37-inch wide cover plates top and bottom. The webs are stiffened vertically by angle frames spaced at 5-foot intervals, and horizontally at mid-depth by a single angle on each web. Horizontals and vertical stiffeners are on the inside of the box so that the girder webs present a smooth appearance except for rivet heads. There is ample room for a man to walk erect on the inside of the rib, and manholes for access to the interior of the rib are provided. The hangers are made of carbon steel 14-inch 87 pound H sections and are spaced at 35 ft. 7 in. centers. At hanger points a 27-inch beam section is used as a diaphragm in the rib and the hanger is connected thereto by car channels. The arch tie is an extremely heavy silicon steel H section

weighing 398 pounds per foot, being $18\frac{1}{4}$ inches deep and $16\text{-}5/8$ inches wide and having flanges nearly 3 inches thick. At splice points the total metal thickness is increased over 100 percent by splice plates so that the maximum grips for the two hundred $1\frac{1}{4}$ -inch diameter rivets required at each splice are in the neighborhood of $6\frac{1}{4}$ inches. Roller type expansion shoes are provided at one end of each span to care for lengthening and shortening of the arches with changes in temperature and loading. Both the fixed and roller shoes are steel castings. The rollers proper are of chrome nickel alloy steel.

The concrete roadway slab is $7\frac{1}{4}$ inches thick, reinforced with longitudinal bar trusses and is supported on 10-inch I-beam crossbeams at 4.45 foot centers. The crossbeams rest on three lines of stringers in each roadway made of rolled beam sections 27, 30 and 33 inches in depth. The stringers frame into built-up floorbeams 60 inches deep and spaced 35 ft. 7 in. apart. Contraction joints are provided at every third panel point to reduce participation stresses in the floor. At these joints the stringers are suspended from the floorbeams by link hangers. At the end floor beams a horizontal beam is used in the plane of the bottom flange of the floor beam and of the bottom laterals to distribute the lateral stresses effectively at the ends of the span.

The reinforced concrete sidewalk slab is $3\frac{1}{2}$ inches thick and is supported by a bulb angle fastened to the curb support on one side and by a fascia channel on the other side. The fascia channel frames into brackets cantilevered from the floor beam at each panel point. The steel safety curbs, the center median strip and the handrails are the same as those on the approach viaduct.

All superstructure metalwork was given three coats of paint, one in the fabricating shop and two after erection. All paints were manufactured by the E. I. DuPont de Nemours & Company. The shop coat was red lead, the first field coat Dulux brown and the final field coat ready-to-mix aluminum.

All substructure units, including the river piers, the viaduct bents, the abutments, and the retaining walls at the two plazas are of reinforced concrete. River piers 1 and 2 are founded on rock, piers 3, 4 and 5 are founded on shale. River pier 6 and all viaduct bents are supported on steel piling; the abutments and plaza walls are supported on creosoted timber piling.

The shafts of all piers and bents are each two, tapered, rectangular columns joined at their top with a massive cross beam. On river piers 1 to 5 a tie beam or diaphragm also connects the two columns immediately above the base. The columns of all bents adjacent to railroad tracks are joined by collision struts at track level. The two columns of river piers 1 to 5 inclusive have a common rectangular base; columns of pier 6 and all bents are carried on individual bases. The shafts of river piers 1 to 5 are fitted with cadmium plated steel nose plates at their upstream ends to protect them from ice flows and drift. At the upstream and downstream ends of pier 3 graduated, navigation clearance markers are provided to indicate the vertical clearance between the water surface and the low steel above.

The deck of the bridge proper is lighted by 27 sodium vapor lighting units of 10,000 lumen capacity. These are spaced at about 150-foot centers alternating from one side of the roadway to the other. Units light-

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ing the approach viaducts are carried on standards in the line of the handrail and overhang the roadway. Units on the arch spans are carried on brackets attached to the hangers. Incandescent street lighting units are suspended beneath the structure over the alley and tracks in Rock Island and over First Street, the tracks, and parking area on the Davenport side.

Navigation lights, conforming to the requirements of the Lighthouse Service of the U.S. Department of Commerce, are provided on piers 2, 3, 4 and 5 and at the center of span 11. Provision has been made for channel lights at the center of span 10 in the event that channel conditions may require their installation at a future date.

Electric power at 4600 volts is obtained from the Peoples Power Company of Moline through a transformer station located just west of the Rock Island abutment. From there the power supply circuit is carried to the main distribution transformer and switchboard in the locker house at pier 3 where all electrical controls are located. On the bridge all circuits are carried in open metallic conduits under the sidewalks, and at the plazas the conduits are buried. The roadway lights are in a 6.6 ampere series circuit and may be controlled either manually or by the automatic astronomical dial time switches. The navigation lights are in a 115/230 volt multiple circuit and may be controlled by manual switches or by a time clock. General service circuits for lights, signs and toll collection appliances in and around the locker and toll houses are either 115 or 230 volts.

At pier 3, near the center of the bridge are located the toll houses and locker house. The locker house is constructed on the concrete pier below the roadway. It is a flat-roofed, one-story building of all

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steel construction and houses the field office, locker and accounting rooms, and electrical controls and transformers for the various lighting circuits. The building is heated by a forced-air, oil heater and has toilet and washroom facilities. Access to the building is through an enclosed stairway entered through the center toll house at roadway level above.

Three toll houses are provided - the main toll house located along the center island and two smaller subsidiary toll houses located at the curbs, in line with the arch ribs. These buildings are also flat roofed, one story, and of all steel construction. They provide space for four collectors. An elevated canopy spans the roadways between the arches and extends out to cover the sidewalks. Vertical clearance under the canopy is 18 feet.

Modern equipment is provided for registering and recording all tolls. Individual registers are provided for each collector, and on these, each toll is recorded as to kind and amount. The registers are connected electrically with view indicators, placed where they can be seen readily by individuals paying tolls, which show on illuminated panels the amount of the toll registered by the collector. Automatic treadle-type traffic counters recording the passage of each axle are located in the roadways. Nickel-in-the-slot turnstiles are provided for pedestrian traffic.

The Rock Island terminal plaza is located just north of the intersection of 15th Street and 2nd Avenue. The plaza area rises from street level on the south to the abutment where the approach viaduct begins. The entire plaza is constructed on a sand gravel fill retained on three sides by concrete retaining walls. Portions of the area not occupied by

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roadways, sidewalks, and fountains are sodded and landscaped.

Massive, cut-stone pylons mark the entrance to the bridge structure proper. Beginning at these pylons and following the line of the retaining walls are cut stone handrails or balustrades. The plaza is lighted by incandescent parapet lights recessed in the pylons and balustrades and by multiple lights on ornamental standards mounted on the terminal posts at the south ends of the balustrades. In addition, two sodium vapor luminaires are used adjacent to the roadway. Buried conduits for possible future installation of traffic light circuits at 2nd Avenue and 15th Street are provided.

On the Rock Island plaza are constructed two electric fountains, one on each side of the roadway. Each fountain is comprised of an upper circular pool, a series of cascades, and a lower pool. The upper pool contains a series of jets and spray nozzles which project the water into the air. The pools are lighted with underwater projectors set vertically in the upper pool to light the falling spray and horizontally at the weirs and in the lower pool. The water system of each fountain is self-contained; water is taken from the lower pool through a motor-driven pump and discharged through the jets and nozzles into the upper pool. Pump motors and lights are operated by remote control from the administration building across the street. The fountains are constructed of reinforced concrete with the floors and inside of the walls lined with terra-cotta and the tops and outside of the walls faced with cut stone.

At the southeast corner of the intersection of 15th Street and 2nd Avenue in Rock Island is the administration building. It is a one-story, flat-roofed, masonry structure with cut stone facing on three sides

backed up with concrete blocks, with concrete block partitions and concrete floor slabs. Casement windows are set in steel sash. The building houses the general and private offices, the vault, garage and maintenance shop.

The Davenport plaza is located at the southwest corner of the intersection of Second and Gaines Streets and fronts on Second Street. The plaza area rises on sand gravel fill from street level on the north and east to the abutment at the southwest corner of the plaza. The fill is retained on the south and west by reinforced concrete retaining walls capped with cut stone. Cut stone terminal posts at the abutment mark the entrance to the bridge proper. The plaza is lighted by incandescent lights recessed in these terminal posts and by a 3-lamp cluster on an ornamental standard located at the safety island at the center of the plaza pavement.

Roadways on both plazas are paved with concrete, 8 inches thick except near the abutments, where the slab is made 12 inches thick and heavily reinforced. To care for drainage on the viaducts, the plazas and adjacent areas a storm water drainage system was constructed in both Rock Island and Davenport with outfalls into the river.

PART III

DESIGN LOADS AND SPECIFICATIONS

The bridge is designed in accordance with the 1935 Specifications of the American Association of State Highway Officials, modified in certain respects as discussed hereafter. The floor system, hangers, and similar members were designed to carry a 20-ton truck per lane with trucks placed symmetrically in each lane. The arches, girders, substructure units and all other parts of the structure were designed to carry H-15 highway loading which is the loading of a continuous train of trucks on each traffic lane, each train consisting of one 15-ton, 2-axle truck, followed and preceded by $11\frac{1}{4}$ -ton trucks at intervals of 30-feet between vehicles; however, in those members where this loading does not produce as great a stress as does the single 20-ton truck per lane, the latter was used in the design. In the design of all parts of the structure the trucks were assumed to occupy the full 11-foot width of roadway, and thus fractional lane widths were not considered. In view of the improbability of coincident maximum loading on all lanes, loads were decreased 25 percent when four loaded lanes were considered, 15 percent when three loaded lanes were considered, and no reduction when only one or two lanes were considered loaded. Sidewalk live loads were assumed to be 100 pounds per square foot in design of the floor system; in the design of the arches and girders the assumed live load varied with the span length as stipulated in the above mentioned specifications.

The bridge design provides at 25 percent increase in normal stresses and with the structure fully loaded, for wind loads considered to be equivalent to those imposed by wind having a velocity of 61 miles per

hour, and at the same increase in normal stresses for wind loads on the unloaded structure considered to be equivalent to those from wind having a velocity of 86 miles per hour.

The concrete roadway slabs were designed by the U.S. Bureau of Public Roads method as published in the October 1937 issue of Public Roads magazine using 11-foot traffic lanes. An allowance was added for $\frac{1}{2}$ inch wear from the surface of the slab.

Design stresses for structural carbon steel, reinforcing steel, and concrete were those permitted by the 1935 Specifications of the American Association of State Highway Officials, except that an allowable tensile stress of 18,000 pounds per square inch was permitted in reinforcing steel. Design stresses for silicon steel were as permitted by the 1935 specifications of the American Railway Engineering Association. Principal design stresses, in pounds per square inch for these materials were the following:

Structural Carbon Steel

Tension	18,000
Compression, members with riveted ends	$15,000 - \frac{1}{4} \left(\frac{L}{r}\right)^2$
Bending, compression on extreme fiber	$18,000 - 5 \left(\frac{L}{b}\right)^2$
Shear, on girder webs	11,000

Structural Silicon Steel

Tension	24,000
Compression, members with riveted ends	$20,000 - .46 \left(\frac{L}{r}\right)^2$
Bending, compression on extreme fiber	$24,000 - 6.67 \left(\frac{L}{b}\right)^2$

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Rivet Steel

Shear on field driven rivets	11,000
Bearing on field driven rivets	22,500

Reinforcing Steel

Tension	18,000
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Concrete

Compressive stress due to bending	900
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Carbon steel used in the construction is open hearth, mild carbon steel, conforming to the Standard Specification, Designation A7-36 of the American Society for Testing Materials. The steel has a minimum tensile strength between 60,000 and 72,000 pounds per square inch and a yield point between 33,000 and 36,000 pounds per square inch. Structural silicon steel, used principally in the arch ribs and ties, conforms to ASTM Standard Specification, Designation A94-36 and has a minimum tensile strength between 80,000 and 95,000 pounds per square inch and a minimum yield point of 45,000 pounds per square inch. Special chrome nickel alloy steel was used for the rocker bars of the arch span shoes and for the expansion links and pins in the girder spans. This metal has a minimum yield point of 75,000 psi, a minimum ultimate strength of 125,000 psi, and a minimum Brinnell hardness of 300. Reinforcing bars were rolled from new billets of open hearth steel meeting requirements of ASTM specification A15-35 for Billet-steel Concrete Reinforcement. All bars were of intermediate grade except those in the welded bar trusses where structural grade steel was used.

Two types of cement were used - a modified Portland cement having a moderate heat of hardening (Federal Specification SS-C-206) and standard

Portland cement (ASTM Designation C9-38). Concrete mixes were designed to contain minimum quantities of cement, and to have minimum compressive strengths at the end of 28 days as follows:

Class 35, used in roadway and sidewalk slabs on the bridge structure - cement content $7\frac{1}{2}$ bags per cubic yard; strength after 28 days, 3500 pounds per square inch.

Class 30, used in piers, bents, abutments, plaza walks and roadways, and miscellaneous construction - cement content $6\frac{1}{2}$ bags per cubic yard; strength after 28 days, 3000 pounds per square inch.

It seems desirable to discuss the stress analysis and design of the tied arch spans in some detail. The analysis of the arch was first carried through assuming no rib shortening and tie stretch. The moments due to rib shortening and tie stretch due to full dead load and live load on the span were then computed separately. The angle changes due to these moments were then determined and provision made in the shop detailing to introduce angle changes of the opposite sign at the rib splices thereby theoretically eliminating these secondary moments. However, in order to care for possible inaccuracy in shop work and erection, these secondary moments were added to both the maximum positive and negative primary moments in determining the final rib sections at the various panel points. Thus, the rib if properly fabricated has considerable strength in excess of that indicated in the design. For instance, at the crown of the 538-foot span the maximum unit stress in the rib, neglecting the secondary moments, is 15,780 pounds per square inch against an allowable stress of 19,465 psi and at point 2 the maximum unit stress is 18,500 psi against an allowable stress of 19,280 psi.

The vertical deflections at the panel points, the lengthening of the tie and the horizontal movements at the roadway expansion joints were computed for (1) the steelwork swung free from the falsework and (2) the weight of the concrete slab. Field measurements were in substantial agreement with the calculated values, affording a check on the reliability of the design theory.

PART IV

CONSTRUCTION PROCEDURE

Excavation for the construction of all piers and bents was done in the open. For all river piers except Pier 1 excavations were made by enclosing the area of each pier base within a watertight wall of interlocking steel sheet piling. These cofferdams were used only on five river piers, other excavations being shored only as necessary to prevent caving. All substructure concrete was poured in the dry with the exception of the seal courses in the bases of piers 5 and 6 which were placed under water.

Pier 1, located near the Illinois shore, is founded in limestone rock at elevation 534, being keyed into the rock about 6 feet. Excavation of the earth and rock was done by drilling and blasting in the open pit without a cofferdam. Before pouring the concrete base, test holes were drilled at three locations over the base area to depths of 10 feet below bottom of base to determine that the supporting rock stratum was of ample thickness. All concrete was placed in the dry.

Construction at Pier 2 was similar to that at Pier 1, except a single-wall steel sheet pile cofferdam was used. The cofferdam was unwatered to permit subsequent construction operations in the dry. As at Pier 1, three 10-foot holes were drilled into the rock to establish the adequacy of the supporting stratum. Pier 2 is also founded in limestone rock.

The original design of Pier 3 contemplated the use of piling under the pier. A single wall steel sheet pile cofferdam was driven, and after the excavation for the pier base had been made, test piles were driven into the supporting stratum. The test piles were driven to refusal with a

penetration of only 2.5 feet. Consequently, bearing piles were abandoned and the concrete base was increased in size to 30 by 76.5 feet. This pier is founded in shale at elevation 515,30 feet below pool level.

For pier 4 a single wall cofferdam was driven, the bottom of the piling being approximately 16 feet below river bed. Driving was difficult and it was necessary to blast on the inside and excavate on the outside of the cofferdam in order to get sufficient penetration. Core borings made at the center and both ends of the pier to about elevation 515 disclosed hard shale. Test piling were driven to refusal after a penetration of only 2.5 feet. A spread footing enlarged to 25 by 76.5 feet was substituted for the pile supported design originally contemplated and founded in the shale at elevation 522.

A double wall steel sheet pile cofferdam was used in the construction of pier 5, the outside dimensions being 69 by 130 feet and the inside dimensions 39 by 100 feet. Twenty-five foot piling were used in the outer wall and 20-foot piling in the inner wall. The space between the walls was filled with sand and gravel from the river. After excavation had reached elevation 525, three test holes were drilled with a jack hammer to depths varying from 10 to 14 feet. Two steel test piles were then driven, but refusal was obtained with only 3 feet of penetration. Core borings were then made to elevation 500 and disclosed hard shale. The pile footing design was again abandoned in favor of the spread footing. As these investigations proceeded portions of the inner wall of the cofferdam slipped in due to lack of adequate bracing. With the cofferdam no longer watertight it was necessary to pour the lower or seal course of the concrete base under water, using a submarine bucket. The seal covered the entire

area within the cofferdam, about 39 by 100 feet, from elevation 525 to 532. After the seal course had set it was possible to unwater the cofferdam and place the remaining concrete in the dry. Above elevation 532 the pier was constructed to dimensions shown on the plans. The pier is founded in shale at elevation 525.

Pier 6, on the Iowa shore, is similar in construction to the bents of the Rock Island and Davenport approach viaducts; each of the two columns is supported on an individual footing. This pier is founded on steel piling (12"x12"x53#H) driven to provide a minimum bearing capacity of 100 tons per pile according to the Engineering News formula. The piling are driven into hard shale. Separate sheet pile cofferdams were used for the individual footings of the pier. Concrete for the seal was placed under water by a "tremie", a metal pipe having a hopper at its upper end to receive the concrete. The tremie was manipulated so that while concrete was being placed the lower end of the pipe was continuously buried in the concrete previously deposited, and water was prevented thereby from mixing with the concrete.

All viaduct bents are founded on steel H piling driven to a minimum safe bearing capacity of 50 tons. The individual footings under each column were constructed in open excavation without cofferdams.

Piling in the Davenport viaduct were driven with a Vulcan No. 1 single-acting, steam hammer, in leads mounted on a crawler crane. Before ordering piling the contractor drove test piles, generally one in each footing. Thus, with the proper length of piling determined in advance, splicing was reduced to a minimum. This procedure greatly expedited the work, the piles for the 15 bents of the Davenport viaduct being driven in

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the period from May 17 to June 28, 1939.

Piling in the Rock Island viaduct were driven with a drop hammer. The Engineering News formula modified to $\frac{2WH}{S+0.5}$ was used to determine safe bearing capacity. Test piling were not driven as on the Davenport approach, and as a result 105 splices were required in the 184 piles driven.

Creosoted southern pine timber piling were used to support the abutments and retaining walls at the entrance plazas. The areas enclosed by the retaining walls were filled with sand thoroughly compacted by rolling to reduce to a minimum any future settlement of the area. After the pavements, sidewalks, and fountains had been constructed the sand fill was covered with black top soil and sodded. Trees and shrubs native to the climate were selected and placed according to arrangement developed from clay model studies of the plazas.

Both gravel and crushed stone aggregates were used in the sub-structure concrete. Limestone was furnished by the Dewey Portland Cement Company of Davenport; sand and gravel were furnished by W.G. Block and Company of Davenport and the Rock Island Sand and Gravel Company. Cement for all contracts was furnished by the Dewey Portland Cement Company. Concrete was of good quality, with strengths ranging from 63 to 102 per cent above the specified minimum.

Seven bents of the Rock Island approach viaduct were constructed by the Priester Construction Company of Davenport with W.A. Priester in charge. The river piers, Davenport viaduct bents, abutments and plazas were constructed by the McCarthy Improvement Company of Rock Island with A.E. Foote as general superintendent.

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Erection of superstructure metalwork was begun at span 14, the south span of the Davenport viaduct, with erection progressing simultaneously in both directions. The material yard was on the Davenport side and a material track terminating under span 14 had been constructed.

For erection of the arch spans three derrick boats were equipped for pile driving and steel erection, and a 65-ton traveler crane was mounted on the previously erected steel work of span 14. The two derrick boats equipped for pile driving drove the steel pile falsework bents while the third derrick boat erected the floor system of the span. After the floor beams (to which were attached the lower ends of eight jacking posts), the stringers, cross beams, bottom laterals, and arch ties had been erected on the falsework the traveling crane proceeded out on this roadway and erected the overhead steel - arch ribs, end portals, top laterals, hangers and the upper sections of the eight jacking posts which were to be used in adjusting the arch ribs. Material was delivered to the traveler in cars running on a track at deck level. As erection neared the south pier of the span, shoes and end floor beams were set in place, the last section of the arch rib, tie, and floor beam were connected, and the span swung free of the falsework by means of the jacks. Temporary jacking posts were then removed and the regular hangers put in place. The derrick boats, equipped with Vulcan pile extractors, then pulled the falsework piles and redrove them under the next span. Because of the hard material encountered in driving the piling considerable difficulty was experienced when the piles were pulled.

While the steel for span 13, the first river span on the north side of the river, was being erected, two crawler cranes erected the steel

for the Davenport approach.

Erection of the arch spans proceeded progressively southward toward the Illinois shore. No difficulty was encountered in erecting spans 13, 12 and 11, but there was some delay at span 10 when cold weather hampered pile driving operations and floating equipment became frozen in the ice.

When steel erection reached span 11, the first long channel span, material and equipment were moved to the Illinois side. Steel for the Rock Island approach viaduct was placed while the remaining arch spans were being erected.

Steel erection was begun on July 21, 1939, by April 2, 1940 the river span steel and the Rock Island approach steel had been connected, and on June 5, 1940 main steel erection had been completed.

Three coats of paint were applied to the metalwork - the red lead primer shop coat during the summer and fall of 1939, the brown field coat during the winter and spring of 1940, and the final aluminum field coat during the spring and summer of 1940. Metal was cleaned in the shop by scraping, chipping and wire-brushing.

The placing of the reinforced concrete deck slab was started on the Davenport viaduct in October 1939. A concrete mixer and pumcrete machine were located at ground level about midway along the approach. Concrete was pumped through a 6-inch pipe to the two finishing machines at roadway level above, concrete being placed simultaneously on both roadways. During the paving of this approach the entire slab was enclosed and was heated by stoves from underneath provided with blowers. After the roadway concrete had hardened sufficiently trucks hauled ready-mix concrete for the

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sidewalk slabs.

Concreting was resumed the following spring with the placing of the deck slab on the river spans and Rock Island viaduct. For the Rock Island viaduct ready-mix concrete was hauled to a pumpcrete machine below the viaduct. For the river spans ready-mix concrete was hauled to a pumpcrete machine at span 14 from where it was pumped to the various spans. After the roadways were completed sidewalk concrete was poured in place from ready-mix trucks.

Sand and gravel aggregates and Dewey Portland cement were used in the deck concrete. Concrete was of good quality with compressive strengths ranging from 59 to 77 percent above the specified minimum of 3 500 pounds per square inch.

Structural carbon and silicon steels were manufactured at various plants of the Carnegie-Illinois Steel Corporation and fabricated at the Gary, Indiana plant of the American Bridge Company. It was erected by forces of the American Bridge Company under the direction of Edw. Nimmergood, General Superintendent. Painting of metalwork was done by the Beckman Painting Corporation of Chicago under subcontract. Concrete roadway and sidewalk slabs were placed by Couse and Saunders of Detroit also under subcontract.

All work conducted at the site was supervised and inspected by engineers under the direction of Mr. William Schmidt, Resident Engineer for the Consulting Engineers. All foundation borings, mill and shop inspection and materials testing were done by the W.J. Reese Testing Laboratories of Rock Island.

PART V

LISTING OF PREVIOUS REPORTS AND SUPPLEMENTS

Report on Proposed Mississippi River Bridge, Rock Island, Illinois to Davenport, Iowa, January 8, 1938.

Report on Proposed Mississippi River Bridge, Rock Island, Illinois to Davenport, Iowa, February 10, 1938.

Supplementary Report on Proposed Mississippi River Bridge, Rock Island, Illinois to Davenport, Iowa, February 24, 1938.

Recommendations as to number of employees, toll schedule and operating budget. June 15, 1940.

Recommendations for Bridge Operation. June 28, 1940.

Construction plans and specifications for Mississippi River Bridge between Rock Island, Illinois and Davenport, Iowa.

Compilation of Resident Engineer's Bi-weekly Summary Reports on Construction Progress.

Compilation of Monthly Estimates for Payments to Contractors.

Compilation of Inspection Reports on Driving of Foundation Piles.

Compilation of Materials Testing Reports by W.J. Reese Testing Laboratories.



Fromader
Davenport, Iowa
57435

PART VI

APPENDIX

- Exhibit 1 - Personnel
- Exhibit 2 - Principal General Dimensions
- Exhibit 3 - Principal Quantities
- Exhibit 4 - Chronology
- Exhibit 5 - Summary of Project Cost -
Tabulation of Bids
- Exhibit 6 - Contract No. 1 7 Concrete bents
- Exhibit 7 - Contracts No. 2, 3 and 4 Substructure & Plazas
- Exhibit 8 - Contracts No. 5, 6 and 7 Superstructure
- Exhibit 9 - Contract No. 8 Administration Building
Final Estimates
- Exhibit 10 - Contract No. 1 . . . Central Engineering Co.
- Exhibit 11 - Contract No. 4 . . . McCarthy Improvement Co.
- Exhibit 12 - Contract No. 7 . . . American Bridge Company
- Exhibit 13 - Contract No. 8 . . . Sam Weisman
Sample Material Inspection Reports
- Exhibit 14 - Creosoted Timber Piling
- Exhibit 15 - Concrete Aggregate - Sand
- Exhibit 16 - Concrete Aggregate - Limestone
- Exhibit 17 - Portland cement
- Exhibit 18 - Water
- Exhibit 19 - Reinforcing Steel
- Exhibit 20 - Structural Steel - Mill inspection
- Exhibit 21 - Structural Steel - Shop inspection
- Exhibit 22 - Paint
Sample Construction Inspection Reports
- Exhibit 23 - Pile Driving Record
- Exhibit 24 - Concrete Cylinder Compression Tests

Miscellaneous

- Exhibit 25 - Record of Bench Marks
- Exhibit 26 - Clear Opening at Roadway Joints
- Exhibit 27 - Setting of Expansion Shoes
- Exhibit 28 - Federal Act Authorizing Construction of Centennial Bridge
- Exhibit 29 - Federal Time Extension Act
- Exhibit 30 - State Enabling Act
- Exhibit 31 - War Department Permit
- Exhibit 32 - General Plan and Elevation of Bridge

PERSONNEL

CITY ADMINISTRATION

Hon. Robert P. Galbraith, Mayor

ALDERMEN

Herbert E. Cook		Harold H. Ritze
	1937 - 1939	
Charles E. Johnson		Albert F. Schersten
Edward C. Berry		Russell H. Mahin
Emiel Engels		E.W. Robinson
Vernon R. Hendren	1937 - 1941	Lawrence O. Swanson
Elmer F. Holmgrain		H.E. Wendel
John C. Kaiser, Jr.		C.C. Wilson
Carl A. Borst		Charles I. Knorr
	1939 - 1941	
Thomas J. Ellison		Elmer R. Wessel

Martin T. Rudgren, City Clerk
Carl J.L. Wessell, City Treasurer

ENGINEERS

HOWARD, NEEDLES, TAMMEN & BERGENDOFF

formerly

ASH, HOWARD, NEEDLES & TAMMEN

Partners

Ernest E. Howard	Henry C. Tammen
Enoch R. Needles	Ruben N. Bergendoff

Designing Engineers	Chief Draftsman
Ned L. Ashton	Carl S. Harper
Theodore Doll	Resident Engineer
Jacob Karol	William Schmidt
Architect, R.N. Wakefield	

COUNSEL

Thomas P. Sinnett	J. Hays Britton
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CONSTRUCTION CONTRACTORS

Contract No. 1 - Substructure - Rock Island Approach

Central Engineering Company assigned
to Priester Construction Company;
W.A. Priester, President.

Contract No. 4 - Substructure - River Piers and Davenport Approach

McCarthy Improvement Company
A.E. Foote, Superintendent

Contract No. 7 - Superstructure

American Bridge Company
C.J. Kennedy, Engineer
Edw. Nimmergood, Superintendent

Contract No. 8 - Administration Building

Sam Weisman

Materials Testing - W.J. Reese Testing Laboratories

Foundation Exploration - Interstate Engineering Co.
W.J. Reese, President

* * * * *

PRINCIPAL GENERAL DIMENSIONS

Width of Roadways	2 @ 22 feet
Width of Sidewalks	2 @ 5 feet
Width of Median Strip	2 ft. 6 in.
Width of Curbs	2 @ 11 in.
Width between Handrails	58 ft. 4 in.
Distance center to center of Arches	51 ft. 6 in.
Vertical Clearance over Roadway (at canopy)	18 ft.
Length of Project	4,643 ft.
Length of River Structure	2,262 ft.
Length of Rock Island Viaduct	511 ft.
Length of Davenport Viaduct	1,075 ft.
Length of Open Bridge Structure between Abutments	3,848 ft.
Length of Rock Island Plaza	184 ft.
Length of Davenport Plaza	183 ft.
Length of Approach Pavement	428 ft.
Length of Channel Spans	538 ft.
Length of Side Spans	396 ft.
Clear Horizontal Width of Channel Openings	524 ft. 10 in.
Vertical Clearance of Channel Spans above Pool Level	66 ft. (El. 545)
Vertical Clearance of Channel Spans above Extreme High water (El. 561.6)	49 ft. 5 in.
Height of Tallest Pier (#3) bottom of Concrete to top of Pier	90 ft. 4 in.
Size of Largest Pier Base (#5)	40 ft. x 100 ft.
Deepest Concrete below Pool Level (Pier #3)	30.1 ft.
Distance Top of Arch above Pool Level	170 ft.
Maximum Grade on Spans	5.15%
Maximum Curvature on Spans	2° 53' 36"
Maximum Grade on Plazas	6.03%

PRINCIPAL QUANTITIES

SUBSTRUCTURE

Concrete in bases of river piers	5,437 cubic yards
Concrete in river piers, above bases	5,645 cubic yards
Concrete in viaduct piers, walls and abuts.	4,163 cubic yards
Total concrete in foundations	15,245 cubic yards
Steel H Bearing piles in river Pier 6	24 tons
Steel H Bearing piles in viaduct piers	334 tons
Wood piling in walls and abutments	2,579 lineal feet
Reinforcing steel in river piers	89 tons
Reinforcing steel in viaduct piers, walls and abutments	163 tons
Reinforcing steel in plazas and street pavements	41 tons

SUPERSTRUCTURE

Silicon steel in river spans	3,200 tons
Carbon steel in river spans	3,523 tons
Carbon steel in Davenport Viaduct spans	1,148 tons
Carbon steel in Rock Island Viaduct spans	587 tons
Total weight of structural metal	8,458 tons
Concrete in roadway slabs on spans	4,141 cubic yards
Concrete in sidewalk on spans	520 cubic yards
Reinforcing steel in concrete	703 tons

PLAZAS

Embankment filling	14,872 cubic yards
Concrete in pavements and walks of Plazas and Streets	2,890 cubic yards
Cut Stone constructions - pylons, railings, fountains	4,900 cubic feet
Asphalt paving adjacent to Davenport Plaza	1,040 square yards

CHRONOLOGY

- Nov. 23, 1937 - Bill to authorize construction of bridge introduced in U.S. House of Representatives by Congressman Chester Thompson of Illinois.
- Jan. 29, 1938 - City Council of Rock Island employs Ash, Howard, Needles and Tammen as Consulting Engineers, and accepts bond offer of Stifel-Nicolaus & Company.
- Feb. 7, 1938 - House of Representatives passes bridge bill.
- Mar. 11, 1938 - Senate passes bridge bill.
- Mar. 18, 1938 - President Roosevelt signs bridge bill.
- Mar. 29, 1938 - Application submitted to War Department for permit to construct at 15th Street in Rock Island and Western Avenue in Davenport.
- Apr. 13, 1938 - Davenport City Council authorizes City of Rock Island to build Iowa approach to bridge.
- Apr. 15, 1938 - Public hearing on application for permit for construction held before engineers of the War Department at Rock Island.
- May 3, 1938 - Recommendations of Army Engineers forwarded to Washington, D.C.
- May 18, 1938 - Permission to construct on 15th Street and Western Avenue location granted by the Assistant Secretary of War.
- July 5, 1938 - Revised application for permit to construct at 15th Street and Gaines Street submitted to War Department.
- Aug. 18, 1938 - Permission to construct at 15th Street and Gaines Street granted by Acting Secretary of War.
- Dec. 8, 1938 - Plans and specifications for 7 bents of Rock Island viaduct approved by City Council.
- Dec. 23, 1938 - Bids received for construction of 7 bents of Rock Island viaduct.

- Dec. 29, 1938 - Contract awarded to Central Engineering Company for construction of 7 bents. (Later assigned to Priester Construction Company).
- Jan. 23, 1939 - Plans and specifications on remainder of work approved by City Council.
- Feb. 9, 1939 - Permit for construction of bridge granted by Division of Waterways, Department of Public Works State of Illinois.
- Feb. 17, 1939 - Congressman Anton J. Johnson introduces bill to extend times for commencing and completing construction one and three years respectively. Bids received for construction of superstructure and remainder of substructure.
- Feb. 28, 1939 - An ordinance authorizing and providing for the construction and operation of a bridge by the City of Rock Island, Illinois across the Mississippi River, and authorizing the issue of \$2,500,000 bridge revenue bonds adopted by City Council and approved by the Mayor.
- Mar. 6, 1939 - Ceremonies mark start of work on both sides of Mississippi River.
- Mar. 10, 1939 - Contract signed with Central Engineering Company for construction of 7 bents of Rock Island viaduct.
- Mar. 11, 1939 - Contract signed with American Bridge Company for construction of superstructure.
- Mar. 14, 1939 - Contract signed with McCarthy Improvement Company for construction of substructure and plazas.
- Mar. 17, 1939 - Completed sale of \$2,500,000 bonds to Stifel-Nicolaus & Company.
- Apr. 14, 1939 - Senate passes time extension bill.
- Apr. 26, 1939 - President Roosevelt approves time extension bill extending time for commencement of construction to April 26, 1940 and completion to April 26, 1942.

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- May 1, 1939 - First river pier started (#6).
 - July 7, 1939 - First river pier completed (#6).
 - July 25, 1939 - Steel erection started.
 - Sept. 9, 1939 - All viaduct bents completed.
 - Sept. 29, 1939 - All river piers completed.
 - May 20, 1940 - Plazas completed.
 - June 5, 1940 - Steel erection completed.
 - June 21, 1940 - Concrete deck slab on spans completed.
 - July 8, 1940 - Bids received for construction of Administration Building.
 - July 12, 1940 - Bridge dedicated and opened to traffic. Contract signed with Sam Weisman for construction of Administration Building.
 - July, 1940 - Administration Building started.
 - July, 1941 - Administration Building completed.
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SUMMARY OF PROJECT COST

Construction		
Substructure - Contract No. 1	\$ 30,746.93	
Substructure & Plazas - Contract No. 4	454,829.91	
Superstructure - Contract No. 7	1,124,680.97	
Administration Bldg. - Contract No. 8	24,483.40	
Incidental Construction	<u>10,850.32</u>	
		\$ 1,645,591.53
Engineering		
Special Traffic Survey	10,000.00	
Preliminary Borings	4,213.50	
Testing and Inspection	12,787.25	
Surveys, Design, Plans & Supervision	<u>140,000.00</u>	
		167,000.75
Attorneys Fees		77,922.52
Administrative Expense		
Expense, Salaries, Supplies, Adv.	17,718.01	
Trustee's Fees	<u>1,495.00</u>	
		19,213.01
Right-of-way		119,414.20
Taxes		1,615.54
Insurance and Bond		17,245.65
		<u> </u>
	Sub-total	\$ 2,048,003.20
Financing Costs		
Bond Discount	250,000.00	
Interest Accrual	- 12,777.75	
Bond Issue Expense	13,550.62	
Interest during Construction	<u>150,000.00</u>	
		400,772.87
		<u> </u>
	Total Construction Cost	\$ 2,448,776.07
	Surplus	<u>51,223.93</u>
	TOTAL BOND ISSUE	\$ 2,500,000.00

CITY OF ROCK ISLAND, ILLINOIS
MISSISSIPPI RIVER BRIDGE

Bids received by City of Rock Island, Illinois
CONTRACT NO. 1 - SEVEN CONCRETE BENTS

Bids Opened December 23, 1938

Central Eng. Co. Davenport Iowa	C.E. Carson Co. Chicago Illinois	Powers-Thompson Const. Co. Joliet Illinois	McCarthy Imp. Co. Davenport Iowa
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Item Description	Quantities	Central Eng. Co.		C.E. Carson Co.		Powers-Thompson		McCarthy Imp. Co.	
		Unit Bid	Amount	Unit Bid	Amount	Unit Bid	Amount	Unit Bid	Amount
#1 - Concrete in bases & Excavation	330 Cu.Yd.	21.90	7,227.00	20.00	6,600.00	20.25	6,682.50	30.00	9,900.00
#2 - Concrete above bases	420 Cu. Yd.	21.90	9,198.00	24.00	10,080.00	28.50	11,970.00	30.00	12,600.00
#3 - Rein. Steel & Misc. Metal	70,000 Lb.	.05	3,500.00	.05	3,500.00	.045	3,150.00	.05	3,500.00
#4 - Concrete piles	2,200 Ln.Ft.	3.85	8,470.00	5.15	11,330.00	4.40	9,680.00	4.50	9,900.00
Alternate A-Deduction Steel piles in place of concrete	2,200 Ln.Ft.	.50	-1,100.00	1.60	-3,520.00	1.45	-3,190.00	2.70	-5,940.00
Total Base Bid, Items 1,2,3 & 4			28,395.00		31,510.00		31,482.50		35,900.00
Deduction, Alternate A			1,100.00		3,520.00		3,190.00		5,940.00
Total with Alternate A Steel piles in place of concrete			27,295.00		27,990.00		28,292.50		29,960.00

CITY OF ROCK ISLAND, ILLINOIS
MISSISSIPPI RIVER BRIDGE

Bids Opened December 23, 1938

Bids Received by City of Rock Island, Illinois
CONTRACT NO. 1 - SEVEN CONCRETE BENTS

Item	Description	Quantities	Henry W. Herst Co. Rock Island Illinois		Conrad Schadt Silvis Illinois		Tunnicliff Const. Co. Davenport Iowa		Maxon Const. Co. Dayton Ohio	
			Unit Bid	Amount	Unit Bid	Amount	Unit Bid	Amount	Unit Bid	Amount
#1 -	Concrete in bases & Excavation	330 Cu.Yd.	25.00	8,250.00	29.60	9,768.00	18.50	6,105.00	40.00	13,200.00
#2 -	Concrete above bases	420 Cu.Yd.	32.00	13,440.00	33.00	13,860.00	39.00	16,380.00	39.00	16,380.00
#3 -	Rein. Steel & Misc. Metal	70,000 Lb.	.06	4,200.00	.055	3,850.00	.06	4,200.00	.05	3,500.00
#4 -	Concrete piles	2,200 Ln.Ft.	4.50	9,900.00	4.50	9,900.00	5.10	11,220.00	3.30	7,260.00
Alternate A - Deduction Steel piles in place of concrete		2,200 Ln.Ft.	2.00	-4,400.00		-1,400.00	.70	-1,540.00	.30	-660.00
Total Base Bid, Items 1,2,3 & 4				35,790.00		37,378.00		37,905.00		40,340.00
Deduction, Alternate A				4,400.00		1,400.00		1,540.00		660.00
Total with Alternate A Steel piles in place of concrete				31,390.00		35,978.00		36,365.00		39,680.00

MISSISSIPPI RIVER BRIDGE
 ROCK ISLAND, ILLINOIS, TO DAVENPORT, IOWA
 BIDS RECEIVED BY CITY OF ROCK ISLAND, FEBRUARY 17, 1939

CONTRACT NO. 2		Maxon Const. Co.		McCarthy Imp. Co.		C. E. Carson Co.		
Substructure: River Bridge		Dayton, Ohio		Davenport, Iowa		Chicago, Ill.		
Item	Description	Estimated Quantities	Unit Bid	Amount	Unit Bid	Amount	Unit Bid	Amount
1	Bases of Piers	5,230 cu.yd.	20.75	108,522.50	19.10	99,893.00	24.00	125,520.00
2	Concrete above Tops of Bases	5,630 cu.yd.	15.00	84,450.00	17.16	96,610.80	16.00	90,080.00
3	Reinf. & Misc. Metal	165,000 lb.	.05	8,250.00	.06	9,900.00	.06	9,900.00
4	Steel Foundation Piles	1,312,000 lb.	.04	52,480.00	.037	48,544.00	.044	57,728.00
Total - Contract 2				253,702.50		254,947.80		283,228.00
		K.C. Bridge Co.		Mo. Valley Br. & Iron		Minneapolis Br. Co.		
		Kansas City, Mo.		Leavenworth, Kans.		Minneapolis, Minn.		
1	Bases of Piers	5,230 cu.yd.	25.00	130,750.00	29.00	151,670.00	31.00	162,130.00
2	Concrete above Tops of Bases	5,630 cu.yd.	17.50	98,525.00	24.00	135,120.00	24.00	135,120.00
3	Reinf. & Misc. Metal	165,000 lb.	.05	8,250.00	.055	9,075.00	.04	6,600.00
4	Steel Foundation Piles	1,312,000 lb.	.05	65,600.00	.04	52,480.00	.035	45,920.00
Total - Contract 2				303,125.00		348,345.00		349,770.00
		Spencer & Ross		Powers-Thompson				
		Detroit, Mich.		Joliet, Ill.				
1	Bases of Piers	5,230 cu.yd.	31.25	163,437.50	27.25	142,517.50		
2	Concrete above Tops of Bases	5,630 cu.yd.	19.00	106,970.00	27.25	153,417.50		
3	Reinf. & Misc. Metal	165,000 lb.	.07	11,550.00	.045	7,425.00		
4	Steel Foundation Piles	1,312,000 lb.	.055	72,160.00	.039	51,168.00		
Total - Contract 2				354,117.50		354,528.00		

MISSISSIPPI RIVER BRIDGE
 ROCK ISLAND, ILLINOIS, TO DAVENPORT, IOWA
 BIDS RECEIVED BY CITY OF ROCK ISLAND, FEBRUARY 17, 1939

CONTRACT NO. 3 Substructure, Viaducts & Misc.			McCarthy Imp. Co. Davenport, Iowa		Powers-Thompson Joliet, Ill.	
Item	Description	Estimated Quantities	Unit Bid	Amount	Unit Bid	Amount
1	Concrete Bents 8 to 23, Abuts., Ret. Walls	3,600 cu.yd.	19.04	68,544.00	23.80	85,680.00
2	Concrete Pavements, etc.	2,650 cu.yd.	12.00	31,800.00	10.50	27,825.00
3	Reinf. & Misc. Metal	356,000 lb	.05	17,800.00	.045	16,020.00
4	Foundation Piles Bents 8 to 23	8,200 ln. ft.	2.50	20,500.00	2.20	18,040.00
5	Foundation Piles Abuts, Ret. Walls	2,300 ln. ft.	1.50	3,450.00	1.20	2,760.00
6	Sand Gravel Filling in Plazas	14,000 cu. yd.	.50	7,000.00	.90	12,600.00
7	Cut Stone for Plazas	Lump Sum		11,000.00		8,000.00
8	Drainage System Rock Island	Lump Sum		5,000.00		4,300.00
9	Drainage System Davenport	Lump Sum		9,200.00		5,400.00
10	Asphalt Paving Davenport	1,000 sq. yd.	1.50	1,500.00	3.00	3,000.00
Total - Contract 3				175,794.00	183,625.00	

			Priester Const. Co. Davenport, Iowa		C. E. Carson Co. Chicago, Ill.	
1	Concrete Bents 8 to 23, Abuts., Ret. Walls	3,600 cu.yd.	19.40	69,840.00	20.00	72,000.00
2	Concrete Pavements, etc.	2,650 cu.yd.	16.50	43,725.00	16.50	41,075.00
3	Reinf. & Misc. Metal	356,000 lb	.04	14,240.00	.0425	15,130.00
4	Foundation Piles Bents 8 to 23	8,200 ln. ft.	2.40	19,680.00	2.80	22,960.00
5	Foundation Piles Abuts, Ret. Walls	2,300 ln. ft.	1.30	2,990.00	1.40	3,220.00
6	Sand Gravel Filling in Plazas	14,000 cu.yd.	1.00	14,000.00	1.25	17,500.00
7	Cut Stone for Plazas	Lump Sum		14,400.00		16,250.00
8	Drainage System Rock Island	Lump Sum		6,500.00		4,000.00
9	Drainage System Davenport	Lump Sum		8,700.00		5,600.00
10	Asphalt Paving Davenport	1,000 sq. yd.	1.75	1,750.00	1.10	1,100.00
Total - Contract 3				195,825.00	198,835.00	

MISSISSIPPI RIVER BRIDGE
 ROCK ISLAND, ILLINOIS, TO DAVENPORT, IOWA
 BIDS RECEIVED BY CITY OF ROCK ISLAND, FEBRUARY 17, 1939

CONTRACT NO. 4 Substructure		Spencer & Ross Detroit, Mich.		Central Engineering Co. Davenport, Iowa		
Item	Description	Estimated Quantities	Unit Bid	Amount	Unit Bid	Amount
1	Bases of Piers	5,230 cu. yd.	31.25	163,437.50	28.15	147,224.50
2	Concrete above Tops of Bases	5,630 cu. yd.	19.00	106,970.00	24.15	135,964.50
3	Reinf. & Misc. Metal	165,000 lb.	.07	11,550.00	.055	9,075.00
4	Steel Foundation Piles	1,312,000 lb.	.055	72,160.00	.055	72,160.00
5	Concrete Bents 8 to 23, Abuts., Retaining Walls	3,600 cu. yd.	22.00	79,200.00	20.50	73,800.00
6	Concrete Pavements, etc.	2,650 cu. yd.	13.00	34,450.00	17.10	45,315.00
7	Reinf. & Misc. Metal in Concrete Items 5 & 6	356,000 lb.	.04	14,240.00	.055	19,580.00
8	Foundation Piles Bents 8 to 23	8,200 lin. ft.	2.30	18,860.00	2.75	22,550.00
9	Foundation Piles Abuts., Retaining Walls	2,300 lin. ft.	1.30	2,990.00	1.15	2,645.00
10	Sand-Gravel Filling Entrance Plazas	14,000 cu. yd.	1.00	14,000.00	1.35	18,900.00
11	Cut Stone Work Lump Sum			14,400.00		12,000.00
12	Storm Water Drainage Rock Island Lump Sum			6,500.00		3,750.00
13	Storm Water Drainage Davenport Lump Sum			7,000.00		6,150.00
14	Asphalt Paving Davenport	1,000 sq. yd	1.75	1,750.00	2.00	2,000.00
Total - Contract 4				547,507.50		571,114.00

MISSISSIPPI RIVER BRIDGE
 ROCK ISLAND, ILLINOIS, TO DAVENPORT, IOWA
 BIDS RECEIVED BY CITY OF ROCK ISLAND, FEBRUARY 17, 1939

CONTRACT NO. 4 Substructure		McCarthy Imp.Co. Davenport, Iowa		C.E.Carson Co. Chicago, Ill.		Powers-Thompson Joliet, Ill.		
Item	Description	Estimated Quantities	Unit Bid	Amount	Unit Bid	Amount	Unit Bid	Amount
1.	Bases of Piers	5,230 cu. yd.	19.10	99,893.00	23.50	122,995.00	27.00	141,210.00
2	Concrete above Tops of Bases	5,630 cu. yd.	17.16	96,610.80	15.50	87,265.00	27.00	152,010.00
3	Reinf. & Misc. Metal	165,000 lb	.06	9,900.00	.06	9,900.00	.045	7,425.00
4	Steel Foundation Piles	1,312,000 lb	.037	48,544.00	.044	57,728.00	.039	51,168.00
5	Concrete Bents 8 to 23, Abuts., Retaining Walls	3,600 cu.yd.	18.00	64,800.00	19.50	70,200.00	23.80	85,680.00
6	Concrete Pavements, etc.	2,650 cu.yd.	12.00	31,800.00	15.00	39,750.00	10.50	27,825.00
7	Reinf. & Misc. Metal in Concrete Items 5 & 6	356,000 lb	.05	17,800.00	.0425	15,130.00	.045	16,020.00
8	Foundation Piles Bents 8 to 23	8,200 ln. ft.	2.50	20,500.00	2.80	22,960.00	2.20	18,040.00
9	Foundation Piles Abuts., Retaining Walls	2,300 ln. ft.	1.50	3,450.00	1.40	3,220.00	1.20	2,760.00
10	Sand-Gravel Filling Entrance Plazas	14,000 cu.yd.	.50	7,000.00	1.25	17,500.00	.90	12,600.00
11	Cut Stone Work	Lump Sum		11,000.00		16,250.00		7,000.00
12	Storm Water Drainage Rock Island	Lump Sum		5,000.00		4,000.00		4,000.00
13	Storm Water Drainage Davenport	Lump Sum		9,200.00		5,600.00		5,000.00
14	Asphalt Paving Davenport	1,000 sq.yd.	1.50	1,500.00	1.10	1,100.00	3.00	3,000.00
Total - Contract 4				426,997.80		473,508.00		533,738.00

MISSISSIPPI RIVER BRIDGE
 ROCK ISLAND, ILLINOIS, TO DAVENPORT, ICWA
 BIDS RECEIVED BY CITY OF ROCK ISLAND, FEBRUARY 17, 1939

CONTRACT NO. 5

Superstructure: River
 Bridge

R. C. Mahon Co.
 Detroit, Mich.

Mt. Vernon Bridge Co.
 Mt. Vernon, Ohio

Item	Description	Estimated Quantities	R. C. Mahon Co.		Mt. Vernon Bridge Co.	
			Unit Bid	Amount	Unit Bid	Amount
1	All Metal Work	13,850,000 lb.	.074	1,024,900.00	.0755	1,045,675.00
2	Concrete, River Bridge Spans	2,600 cu.yd.	22.00	57,200.00	25.00	65,000.00
3	Reinf. Steel in Concrete of Item 2	835,000 lb.	.05	41,750.00	.0475	39,662.50
4	Toll House & Locker House	Lump Sum		7,500.00		10,000.00
5	Elec. System	Lump Sum		20,000.00		17,000.00
Total - Contract 5				1,151,350.00	1,177,337.50	

CONTRACT NO. 6

Superstructure: Viaducts

R. C. Mahon Co.
 Detroit, Mich.

Wisconsin Bridge
 Milwaukee, Wisc.

Clinton Bridge Co.
 Clinton, Iowa

Item	Description	Estimated Quantities	R. C. Mahon Co.		Wisconsin Bridge		Clinton Bridge Co.	
			Unit Bid	Amount	Unit Bid	Amount	Unit Bid	Amount
1	All Metal Work	3,450,000 lb.	.065	224,250.00	.068	234,600.00	.073	251,850.00
2	Concrete, Viaduct Spans	2,070 cu.yd.	20.00	41,400.00	24.85	51,439.50	30.00	62,100.00
3	Reinf. Steel in Concrete of Item 2	660,000 lb.	.05	33,000.00	.0495	32,670.00	.064	42,240.00
Total - Contract 6				298,650.00	318,709.50	356,190.00		

MISSISSIPPI RIVER BRIDGE
 ROCK ISLAND, ILLINOIS, TO DAVENPORT, IOWA
 BIDS RECEIVED BY CITY OF ROCK ISLAND, FEBRUARY 17, 1939

CONTRACT NO. 7 Superstructure		American Bridge Co. Chicago, Illinois		Bethlehem Steel Co. Bethlehem, Pa.		Mahon & Co. Detroit, Mich.		
Item	Description	Estimated Quantities	Unit Bid	Amount	Unit Bid	Amount	Unit Bid	Amount
1	All Metal Work	17,300,000 lb.	.056	968,800.00	.0682	1,179,860.00	.071	1,228,300.00
2	All Concrete River Bridge & Viaduct Spans	4,670 cu.yd.	16.00	74,720.00	20.00	93,400.00	20.00	93,400.00
3	Reinf. Steel in Concrete Item 2	1,495,000 lb.	.0444	66,378.00	.053	79,235.00	.05	74,750.00
4	Toll Houses & Locker House	Lump Sum		6,080.00		6,500.00		7,500.00
5	Complete Elec. System	Lump Sum		19,986.00		21,000.00		20,000.00
Total - Contract 7				1,135,964.00		1,379,995.00		1,423,950.00

		K.C. Bridge Co. K.C., Mo.		Mt. Vernon Bridge Co. Mt. Vernon, Ohio			
Item	Description	Unit	Bid	Amount	Unit	Bid	Amount
1	All Metal Work	17,300,000 lb.	.071	1,228,300.00	.074	1,280,200.00	
2	All Concrete River Bridge & Viaduct Spans	4,670 cu.yd.	25.70	120,019.00	25.00	116,750.00	
3	Reinf. Steel in Concrete Item 2	1,495,000 lb.	.05	74,750.00	.0475	71,012.50	
4	Toll Houses & Locker House	Lump Sum		11,000.00		10,000.00	
5	Complete Elec. System	Lump Sum		16,000.00		17,000.00	
Total - Contract 7				1,450,069.00		1,494,962.50	

CITY OF ROCK ISLAND, ILLINOIS
 MISSISSIPPI RIVER BRIDGE

BIDS RECEIVED BY CITY OF ROCK ISLAND, ILLINOIS,
 July 8, 1940
 CONTRACT NO. 8 ADMINISTRATION BUILDING

Item No.		Weisman	C.H. Langran	Ben Stillfield	O.M. Randall
		Constr. Co. Rock Island, Illinois	and Son Rock Island, Illinois	Constr. Co. Rock Island, Illinois	Constr. Co. Rock Island, Illinois
		Amount	Amount	Amount	Amount
1	Administration Bldg.	14,443.00	18,931.00	19,000.00	16,000.00
2	Equipment Allowance	2,500.00	2,500.00	2,500.00	2,500.00
	Total Bid	16,993.00	21,431.00	21,500.00	18,500.00

Estimate of Work on ROCK ISLAND BRIDGE PROJECT
 Done by CENTRAL ENGINEERING COMPANY
 For CITY OF ROCK ISLAND, ILLINOIS
 From 19 to 19 Contract No. 1 Estimate No. 5 - final
 HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY — NEW YORK

Item No.	Item No. Work Done and Materials Used	Quantities	Unit Price	Total Amounts
	1 Concrete in bases	334.19 C.Y.	21.90	7318.76
	2 Concrete above bases	422.34 C.Y.	21.90	9249.25
	3 Reinforcing Steel in place	68405 Lb.	0.05	3420.25
	4A Steel foundation piles in place	3179.08 L.F.	3.35	10649.92
	Unclassified Work Bills Previously Rendered Nos. _____			
	Unclassified Work Bills Accompanying this Estimate Nos. <u>1</u>			108.30
	Materials Remaining on Hand, Allowances, etc.			

We Certify that This Estimate is Correct

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
 CONSULTING ENGINEERS

By WILLIAM SCHMIDT
 Resident Engineer

Date Signed 12/28/1939

For Remarks and Special Notes See Reverse Side

Total Amount to Date	30,746.48
Percent Retained	
Net Amount This Estimate	30,746.48
Previous Net Estimate	27,508.50
Amount Payable	3,237.98

Estimate of Work on Rock Island Bridge Project
 Done by McCarthy Improvement Company
 For CITY OF ROCK ISLAND, ILLINOIS
 From 19 to 19 Contract No. 4 Estimate No. 15 - Final
HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY—NEW YORK

Item No.	Item No. Work Done and Materials Used	Quantities	Unit Price	Total Amounts
	1 Concrete in bases of piers	5436.7 C.Y.	19.10	103,840.97
	2 Concrete above bases of piers	5645.41 C.Y.	17.16	96,875.24
	3 Reinf. steel & misc. metal in concrete Item 1 and 2	177247 Lb.	.06	10,634.82
	4 Steel Piles for piers	46159 Lb.	.037	1,781.88
	5 Concrete in bents and walls	3411.35 C.Y.	18.00	61,404.30
	6 Concrete in pavement, walks, etc.	2301.09 C.Y.	12.00	27,613.08
	7 Reinf. steel & misc. metal in concrete Items 5 and 6	32279 Lb.	.05	16,113.95
	8 Steel Piles for bents	9243.50 L.F.	2.50	23,108.75
	9 Timber piles for walls	2579.25 L.F.	1.50	3,868.88
	" " " " cutoffs	289.0 L.F.	.75	216.75
	10 Sand fill for approaches	14871.50 C.Y.	.50	7,435.75
	11 Cut stone for Plazas			11,000.00
	12 Drainage system in Rock Island			5,000.00
	13 " " " Davenport			9,200.00
	14 Asphalt paving in Davenport & Rock Island	1040 S.Y.	1.50	1,560.00
	Unclassified Work Bills Previously Rendered Nos. <u>1 to 78, incl.</u>			74,078.54
	Unclassified Work Bills Accompanying this Estimate Nos. <u>79</u>			1,097.00
	Materials Remaining on Hand, Allowances, etc.			

We Certify that This Estimate is Correct
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
 By William Schmidt
 Resident Engineer
 Date Signed 6-20-41
 For Remarks and Special Notes See Reverse Side

Total Amount to Date	<u>454,829.91</u>
Percent Retained	<u>None</u>
Net Amount This Estimate	<u>454,829.91</u>
Previous Net Estimate	<u>453,732.91</u>
Amount Payable	<u>1,097.00</u>

UNCLASSIFIED WORK AND SUPPLEMENTAL AGREEMENTS
FOR CONTRACT 4, SUBSTRUCTURE
McCARTHY IMPROVEMENT COMPANY

Bill No.

1	Test core drillings, Piers 4 and 5	\$ 700.03
2	Test piles and probings, Piers 4 and 5	361.84
3	Test probings, Pier 3	257.21
4	Corner protection angles, Rock Island retaining walk	89.25
5	Test probings, Pier 1	23.88
6	Additional downspouts, Bents 8, 9, 10, 11, 12, 13 and 14	279.65
7	Catch basin between Bents 14 and 15	108.24
8	Water pipe and electric conduits, Davenport Plaza	430.21
9	Repairs to east wall, Davenport Plaza	979.26
10	Removal of paving base on Gaines and Second Streets, Davenport	57.91
11	Drain pipe, water pipe and conduit in Rock Island Plaza	364.01
12	Additional sewer connection at Rock Island abutment	12.49
13	Additional sewer connections, Bents 1, 2, 3 and 4	45.19
14	Sewer manhole near South Abutment	100.39
15	Changing curb and grating inlets to manholes at 2nd Ave. & 15th Street, Rock Island	237.68
16	Removal of alley pavement, Rock Island	30.77
17	Curb adjacent to building, west alley of Rock Island approach	56.33
18	Excavation for alley pavement between 1st & 2nd Streets, Davenport	105.28
19	Cutting inscriptions in stone posts, Davenport Plaza	128.40
20	Curb inlet north side of 2nd Ave., east of 15th St., R.I.	69.88
21	Conduit on east side of 15th St., South of 2nd Ave., R.I.	77.58
22	Conduit for traffic signal lights, 15th St. & 2nd Ave., R.I.	201.47
23	Pavement and curbs of 15th Street, 2nd to 3rd Ave., R.I.	8,198.37
24	Conduit, fountains to Administration Building	163.19
25	Flag pole sockets in sidewalks of Rock Island Plaza & approach	48.74
26	Conduit at 15th St. and 3rd Ave., R.I.	280.60
27	Sewer extension from catch basin in 15th St. for Adminis- tration Building	19.68
28	Traffic marker scores in street paving, R.I. & Davenport	60.65
29	Removal of tree from east side of 15th St., Rock Island	9.31
30	Landscaping of Plaza	1,542.00
31	Cable and bases for street lights, R.I. approach	289.09
32	Fountains for R.I. Plaza	10,886.00
33	White cement and aggregates center island of R.I. Plaza	187.05
34	Bolts for name plates and dowels for seats, R.I. Plaza	24.79
35	Catch basins in Rock Island Plaza	56.36
36	Street washing hydrants, R.I. Plaza	42.36
37	Toll house canopy	10,650.20
38	Toll Collection and register equipment	6,041.14
39	Street lighting on 15th St., Rock Island	3,505.53
40	Reinforcement of adjacent wall of Dawartz Building, Davenport	2,216.03
41	Turnstiles at toll houses	1,455.37
42	Temporary safety islands on Davenport approach	124.46

HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY, MO., NEW YORK, N.Y.

Bill No.

43	Screens and manhole covers	\$ 1,375.05
44	Inscription plates on Plazas	495.52
45	Shock eliminators at toll house	103.76
46	Storage yard fence under Davenport Viaduct	1,199.33
47	Temporary wood sidewalk in front of Administration Bldg.	54.28
48	Signs, bulletin boards, shelves at toll and locker houses	418.90
49	Pipe handrail, west end of Pier 3 and cabinet	170.18
50	Screens for drain holes, retaining walls of Plazas	31.28
51	Traffic signal lights and center island revisions, Davenport Plazas	932.59
52	Sewer and Water connections to property line at Adm. Bldg.	113.07
53	Equipment and supplies, toll houses and locker house	1,170.00
54	Advertising sign board at Milan, Illinois, one year	\$15.00
55	Caulking joints in fountain stone work, R.I. Plaza	44.10
56	Compensation for overtime and delays on R.I. Plaza construc- tion	912.00
57	Allowance for reinforcing steel ordered for R.I. Plaza curb but not used	29.75
58	Installation of safe in toll house	15.79
59	Smoke protection plates, Spans 21 and 22	5,326.13
60	Filler strip over roadway joint at Pier 3	61.80
61	Painting traffic lines on pavement	73.75
62	Trees around fountains and earth fill, R.I. Plaza	197.76
63	Changing electrical connections, lights in Davenport, Under- pass and time clock	86.01
64	Neon signs at toll house	764.15
65	Copper strainers for fountains, R.I. Plaza	19.95
66	Adjustment of claims	6,762.50
67	Stone walks for Rock Island Plaza	51.50
68	Concrete for center island, Davenport approach	387.59
69	Neon sign for safety island, Davenport approach	676.71
70	Covers for fountains	604.40
71	Alterations to blast plate in Span 26 to provide clearance	18.09
72	Air Compressor	143.97
73	Extension of flue stack through toll house canopy	32.12
74	Electric fan for locker house	30.90
75	Sweeper brush attachment for truck	466.15
76	Cinder spreader attachment for truck	193.90
77	Metal flashing plates on toll houses	44.29
78	Screens for locker house windows and doors	38.40
79	Two additional light standards for Rock Island Plaza	1,097.00
	TOTAL	\$75,175.54

Estimate of Work on MISSISSIPPI RIVER BRIDGE AT ROCK ISLAND, ILLINOIS
 Done by AMERICAN BRIDGE COMPANY
 For CITY OF ROCK ISLAND, ILLINOIS
 From August 1 1940 to August 15 1940 Contract No. 7 Estimate No. 3 - Final
 HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY — NEW YORK

Item No.	Item No. Work Done and Materials Used	Quantities	Unit Price	Total Amounts
1	STRUCTURAL METAL	16,777,000 lbs.	.056	\$ 939,512.00
2	CONCRETE	4,660.99 C.Y.	16.00	74,575.84
3	REINFORCING STEEL	1,405,701 lbs.	.0444	62,413.12
4	TOLL AND LOCKER HOUSES			6,080.00
5	ELECTRICAL WORK			19,986.00
SUPPLEMENTAL AGREEMENTS AND UNCLASSIFIED WORK ORDERS:				
ORDER NO.				
	2 Gutters Bent 14 - Pier 6			5,324.04
	*3 Access Doors to lights			380.00
	*4 Gutters - Rock Island Abutment			320.00
	5 Light at Bent 15			267.38
	6 Stairway - Toll House			33.73
	7 Holes for Utilities			190.00
	8 Drip Plates			1,785.13
	9 Conduit - 2nd Avenue			35.83
	10 Recesses for Detectors			1,187.58
	11 Lights - Davenport Approach			1,661.00
	12 Everdur Conduit			3,150.00
	13 Additional Conduit - Navigation Lgts.			280.00
	Unclassified Work Bills Previously Rendered Nos. 14 Drain Holes - Toll House			230.98
	15 Grade Revision			5,506.00
	Unclassified Work Bills Accompanying this Estimate Nos. 16 Sidewalk Angles			754.71
	17 Light at Bent 17			245.32
	18 Drainage Portals			106.01
	19 Mastic			36.50
	20 Drain pipe - Pier 3			175.63
	21 Temporary Floor Recesses			51.34
	22 Retouched damaged paint			50.00
	23 Change Location Power Pole			175.88
	24 Painting Toll House			125.15
	25 Leveling steel slabs			77.00
	** Repairs - Lighting System (Deduction) —			35.20
*Copies of work orders 3 and 4 submitted with estimate No. 9 **As per letter of W. G. Zimmerman to R. N. Bergendoff dated 11-6-40				

We Certify that This Estimate is Correct		Total Amount to Date	\$1,124,680.97
HOWARD, NEEDLES, TAMMEN & BERGENDOFF CONSULTING ENGINEERS		Percent Retained	0
By <u>William Schmidt</u> Resident Engineer		Net Amount This Estimate	1,124,680.97
Date Signed <u>Feb. 13, 1941</u>		Previous Net Estimate	1,046,662.54
For Remarks and Special Notes See Reverse Side		Amount Payable	78,018.43

Estimate of Work on Rock Island Bridge Project

Done by Sam Weisman

For City of Rock Island, Illinois

From 19 to 19 Contract No. 8 Estimate No. Final

HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY — NEW YORK

Item No.	Item No. Work Done and Materials Used	Quantities	Unit Price	Total Amounts
1	Administration Building			\$14,493.00
2	Equipment			
	Truck		1,320.30	
	Snow plow		270.93	
	Tires and tubes		208.49	
	Tools		292.86	
	Office Furniture		667.27	
	Adding Machines		470.47	
	Typewriter		122.97	
	Check Writer		86.70	
	Water Cooler		188.59	
	Filing Cases		247.44	
	Venetian Blinds		70.64	
	Awnings		83.13	
	Electric Fan		38.25	
	Unit Heater		91.76	
	Ticket Punches		32.96	
	Metal tubes for storing plans		23.45	
	Refrigerator		117.98	
	Police Guns & Holsters		327.38	
	Truck Sweeper Attachments		59.72	
	Unclassified Work Bills Electric Clocks		86.51	
	Paint and painting equipment		916.74	5,724.54
	Unclassified Work Bills Accompanying this Estimate Nos.			
	Materials Remaining on Hand, Allowances, etc.			
	Unclassified Work Bills			4,265.86

We Certify that This Estimate is Correct

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS

By _____ Resident Engineer

Date Signed _____

For Remarks and Special Notes See Reverse Side

Total Amount to Date	\$24,483.40
Percent Retained	None
Net Amount This Estimate	\$24,483.40
Previous Net Estimate	
Amount Payable	

W. J. REESE TESTING LABORATORY
 118½ Twentieth Street,
 Rock Island, Illinois

For Shipment to - - - - - McCarthy Improvement Company
 Treated by - - - - - Wood Preserving Corp., North Little Rock, Ark.
 Kind of Material - - - - - Southern Pine Piles
 Date Treated - - - - - June 7, 1939

MATERIAL TREATED				MATERIAL REJECTED			
Pieces	Size	Length	B.M. or Lin.ft.	Pieces	Size	Length	B.M. or Lin.ft.
2	13@ $\frac{1}{4}$ -9	8'	16	3	Piles	20'	60
73	"	11'	803	2	"	11'	22
43	"	20'	860	(Rot, crooked and knots)			
118	TOTAL		1679	5	TOTAL		82

Charge No. 1345 Cubic Feet 1602 State of Seasoning Partially

Steam:

2 hrs. to 259°F. 0 to 20 lbs.
 12 hrs. at 259-267°F 20 - 25 lbs.

Vacuum:

1 hr. 0 to 22 in. Temp. 230°F to 180°F
 2 hrs. 22 to 25 in. Min. Temp. 155°F
 25 ins. final vacuum attained in 70 min.

Impregnation:

80 lbs. initial air attained in 25 min.
 180 lbs. max. preservative pressure.
 5 hrs. duration preservative pressure period
 190°F Min. 198° Max. preservative Temp. in cylinder.

Preservative:

100°F. Gals.	Lbs.	Lbs. per cu. ft.
Required 1780	16020	10
Injected 3198	28782	17.97
Retained 1826	16434	10.26

Pieces Accepted 118
 Pieces Rejected None

Preservative Analysis:

Sp. Gr. 38°C/15.5°C	1.079
Water	.70 %
Benzol Residue	.44 %
Coke Residue	1.48 %
Distilled up to 210°C	1.50 %
" 210 to 235°C	11.00 %
" 235 to 270°C	24.10 %
" 270 to 315°C	19.40 %
" 315 to 355°C	20.60 %
(Pitch residue of 355°C	23.10 %
Total - - - - -	99.70 %
Fraction 210-235°C	
approx. 75% solids at 25°C	
Date Analyzed - June 7th, 1939	

Each accepted pieces stamped -
 "AWW 12"
 Inspected by E. M. Chandler

Penetration; Penetration Satisfactory and Charge accepted.

W. J. REESE TESTING LABORATORY

By /s/ W. J. Reese
 W. J. Reese

cc. Mr. Keith Poffenbarger
 cc. Mr. W. Schmidt
 cc. Ash-Howard-Needles & Tammen (2)

HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY, MO., NEW YORK, N. Y.

W. J. REESE TESTING LABORATORY
 118½ Twentieth Street
 Rock Island, Illinois

No. 1057

Samples as submitted by Contractor for approval
 Contractor - McCarthy Improvement Co.

Re: Rock Island - Davenport Bridge at
 Rock Island, Illinois

Material - - - - - Sand
 from Rock Island Sand & Gravel Co.

Date Tested - - - - - April 10, 1939

Moisture Analysis: 4.7 per cent

Sieve Analysis:

Sieve No.	% Retained On	Per cent Coarser than each sieve
3/8	0	0
4	2.77	2.77
8	7.3	10.07
16	11.9	21.99
30	36.6	58.63
50	34.1	92.77
100	6.4	99.12
Pan	.9	

Fineness Modulus - - - 2.85

Specific Gravity - - - - - 2.58

Unit Wgt. - - - - - 116.79# per cu. ft.

Organic Impurities (A.S.T.M. C-40)
 Very Good (Light Color)

Coal and Lignite - - - - - Very slight trace

Material finer than #200 Sieve - - - .74 %

Sand meets with the Specifications.

W. J. REESE TESTING LABORATORY

By /s/ W. J. Reese

cc/Ash-Howard-Needles & Tammen
 Mr. Keith Poffenbarger
 Mr. W. Schmidt - Resident Engineer

HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY, MO., NEW YORK, N. Y., HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY, MO., NEW YORK, N. Y.

W. J. REESE TESTING LABORATORY
 118 $\frac{1}{2}$ Twentieth Street
 Rock Island, Illinois

No. 1056

Samples as submitted by Contractor for approval
 Contractor - McCarthy Improvement Company

Re: Rock Island - Davenport Bridge
 at Rock Island, Illinois

Material - - - Limestone from Dewey Portland Cement Co.
 Date Tested - - April 5, 1939

Moisture Analysis: .14 per cent

Sieve Analysis:

Sieve No.	Per Cent Retained on	Per Cent Coarser than each sieve
1 $\frac{1}{2}$	0	0
3/4	40.8	40.8
3/8	46.3	87.1
4	10.8	97.9
8	.6	98.5
16	.3	98.8
30	.2	99.0
50	.2	99.2
100	.1	99.3
Pan	.7	

Fineness Modulus - - - 7.21

Sodium Sulphate - Soundness
 per cent of loss at 5 cycles 9.63 %
 (According to A.S.T.M. C-88-37T)

Abrasion Test (A.S.T.M. D2-33)
 Per Cent of Wear - - - - 5.63 %
 French Coefficient - - - 7.1 %

Specific Gravity (A.S.T.M. C-127-36T) - - - - 2.67

Material finer than #200 Sieve - - - - - 1.48 %

Unit Wgt. - - - - - 93.13#/cu. ft.

The Limestone meets with the Specifications.

W. J. REESE TESTING LABORATORY

By /s/ W. J. Reese

cc/ Ash-Howard-Needles & Tammen (2)
 Mr. Keith Poffenbarger
 Mr. W. Schmidt - Resident Engineer

HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY, MO., NEW YORK, N.Y. HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY, MO., NEW YORK, N.Y.

W. J. REESE TESTING LABORATORY
118 1/2 Twentieth Street
Rock Island, Illinois

September 12, 1939

Report Number - 1156

Re: Mississippi River Bridge
at Rock Island, Illinois

CEMENT TEST:

Bin No. - 16A Size - 10,000 bbls.
Sampled - August 9th, 1939

Normal Consistency:

Average of 37 Samples - 24.6

Initial Set - - - - - 2 hrs. 15 min.
Final Set - - - - - 5 hrs. 5 min.

Tensile Strength:

Average of 24 - 3 day tests - 265
" " " - 7 day tests - 338

Heat of Hydration)
Fineness) Meet the Specification SS-C-206

Chemical Analysis:

Loss on Ignition - Average of 5 analysis - .96 %
Sulfuric Anhydride " 10 " - 1.50 %
Insoluble Residue " 6 " - .49 %
MgO " 5 " - 2.95 %

Cement tested meets all requirements of Federal Specifications
SS-C-206.

All tests performed in strict accordance with the requirements
of the Federal Specifications.

W. J. REESE TESTING LABORATORY

By /s/ W. J. Reese(jb)
W. J. Reese

- cc. Ash-Howard-Needles & Tammen (2)
- cc. Mr. Keith Poffenbarger
- cc. Mr. W. Schmidt, Resident Eng.

HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY, MO., NEW YORK, N.Y. HOWARD, NEEDLES, TAMMEN & BERGENDOFF

W. J. REESE TESTING LABORATORY
118 1/2 Twentieth Street
Rock Island, Illinois

September 7th, 1939

Re: Mississippi River Bridge
at Rock Island, Illinois

REPORT ON WATER ANALYSIS:

(Sampled 200 feet North of Pier No. 1 in line
of upstream edge of said Pier.)

Turbidity - - - - -	180 parts per million
pH (Colorimetric) - - - - -	7.7
Alkalinity to Methyl Orange (Calculated as Ca CO ₃) - - - - -	180 parts per million
Alkalinity to Phenolphthalein - - - - -	None
Total Solids present - - - - -	475.5 parts per million or 0.0474 %
Total Organic Matter - - - - -	78.5 parts per million or 0.00785 %

This sample of water shows quite an increase in turbidity, alkalinity, total solids and organic matter.

The alkalinity of City water at present time is 108 parts per million.

This sample shows no alkalinity to phenolphthalein, therefore there are no OH or CO₃ present; but only the HCO₃ radical.

WATER MEETS THE SPECIFICATIONS.

No water should be taken from a point closer to the Illinois shore than 200' East of Pier No. 1. At the present time the U. S. Engineer's dredge "Rock Island" is working and depositing material above this point causing dead water along the shore, which on preliminary test indicates a very high Turbidity along with a relatively high organic count.

Test made by - D. J. Cook.

W. J. REESE TESTING LABORATORY

By /s/ W. J. Reese
W. J. REESE

- cc. Ash-Howard-Needles & Tammen
- cc. Mr. Keith Poffenbarger
- cc. Mr. W. Schmidt, Resident Eng.

HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY, MO., NEW YORK, N. Y.

W. J. REESE TESTING LABORATORY

ROCK ISLAND, ILLINOIS

RECEIVED
MAY 31 1939

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SHEFFIELD STEEL COMPANY
& TAMMEN
KANSAS CITY, MO.

Job No. XL CH 8788
File No. 15208.7

1st REPORT OF INSPECTION AND TESTS OF STEEL

Manufactured by Sheffield Steel Company, Kansas City, Missouri.

For McCarthy Improvement Company.

Contract No.

Structure Mississippi River Bridge, Rock Island, Illinois to Davenport, Iowa.

Reported to W. J. Reese Testing Laboratory, Rock Island, Ill.

Date 5/24/39

No. of Pieces	DESCRIPTION	LENGTH		Heat Number	Yield Point per sq. in.	Ultimate Strength per sq. in.	Elong. Per Ct. in 8 in.	Red. of Area Per Ct.	Fracture	Bend Tests	CHEMICAL ANALYSIS				Grade
		Feet	Inches								Carbon	Mang't	Phosph.	Sulph.	
TESTS OF BARS USED IN WELDED STEEL TRUSSES															
.302	5/8" Rd. Pln.			4713	44,420	66,300	27.34	1/20	OK		.21	.53	.011	.029	Struct
.1901	1/2" " "			2513	42,350	60,080	25.78	3/40	"		.16	.37	.012	.036	"
.108	3/8" " "			2513	43,520	59,070	28.90	Full	"		.16	.37	.012	.036	"
Material meets requirements of Bars under Specifications A.S.T.M. A 15-35.															
TENSILE STRESS OF WELDS - Job Specifications															
Trusses Marked B & D - 5/8" Rd. Longitudinal 1/2" Rd. Diagonal															
LOAD TO FAILURE - 7,900 Lbs. Specifications - 6,568 Lbs.															
Trusses Marked A & C - 1/2" Rd. Longitudinal 3/8" Rd. Diagonal															
LOAD TO FAILURE - 6400Lbs. Specifications - 3630 Lbs.															
<u>SPECIFICATIONS FULLY MET</u>															
Inspector, M. W. Johnson.															

cc: 5-W. J. Reese Testing Laboratory
1-Chgo.
2-Pgh.

Handwritten initials

Material covered by this report
Complies with the specifications

M. W. Johnson
M. W. Johnson.

W. J. REESE TESTING LABORATORY

ROCK ISLAND, ILLINOIS

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RECEIVED
 ASH-HOWARD-NEEDLES & TAMMEN
 KANSAS CITY, MO.
 1939

72nd REPORT OF INSPECTION AND TESTS OF STEEL
 Manufactured by Carnegie-Illinois Steel Co., South Chicago, Ill.
 For American Bridge Co., Gary, Indiana
 Structure Mississippi River Bridge Rock Island, Ill. to Davenport, Iowa
 Reported to Ash-Howard-Needles & Tammen, Engrs., Kansas City Mo. Date 9-29-39
 Ch 8761
 File No. 15207.1
 Contract No. G 7470

No. of Pieces	DESCRIPTION	LENGTH		Heat Number	Yield Point per sq. in.	Ultimate Strength per sq. in.	Elong. Per Ct. in 8 in.	Red. of Area Per Ct.	Fracture	Sound Tests	CHEMICAL ANALYSIS				Grade
		Feet	Inches								Carbon	Mang's	Phos's	Sulph.	
1	12 x 25.0#	23	5 $\frac{3}{4}$	A1122867	38060	63540	26.25		C	OK	.21	.47	.009	.023	BOH
2	"	17	8 $\frac{3}{4}$	"	"	"	"	"	"	"	"	"	"	"	"
1	"	17	8 $\frac{1}{2}$	"	"	"	"	"	"	"	"	"	"	"	"
2	"	17	4	"	"	"	"	"	"	"	"	"	"	"	"
9	"	17	3 $\frac{5}{8}$	"	"	"	"	"	"	"	"	"	"	"	"
1	"	"	"	A174683	37880	63010	26.25		A	"	.21	.42	.010	.023	"

A.S.T.M. A 7-36

Material meets requirements of specification

Hammer stamp #7A

Shipped in car E.J. & E. 90006

Geo. Sternberg, Inspector

Shipped to day	7,111#
Previously Shipped	7,845,068#
Shipped to date	7,852,179#

R. J. [Signature]

W. J. REESE TESTING LABORATORY

ROCK ISLAND, ILLINOIS

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL.

13th REPORT OF INSPECTION OF FABRICATION

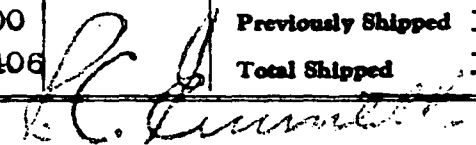
ORDER NO. Ch 8761
FILE NO. 15208.1

Description Toll Bridge-Rock Island Ill. to Davenport, Iowa
***At** American Bridge Co., Gary, Indiana **Contract No.** G 7474
For City of Rock Island, Ill. % American Bridge Co. **Date** 9-30-39
Reported to Ash-Howard-Needles & Tammen, Engrs., Kansas City, Missouri

REQUIRED MEMBERS		FINISHED		NUMBER SHIPPED	REMARKS
DESCRIPTION	NO.	THIS WEEK	TOTAL		
Div. #1-2-3-4-5-Spans	14 to 29 incl.				1 curb- Replace Rivet and Ream Hole in channel
Stringers	78		78	75	
Columns	2		2	2	1 curb- chip end of angle flush.
Lat. Angles	20		20	20	3 curbs- chip copes 1/4 inch.
Diaphragms	440		440	420	1 curb- 1 hole missing in flange.
Diagonals	16		16	16	10 curbs- To be repainted.
Curbs	126	40	70	52	Errors were corrected.
Girders	6		6	6	Painted- 1 coat Red Lead Primer.
Cross Girders	1		1	1	
Sidewalk Bkts.	138		138	138	20th Shipment- From R.I. Bridge
Sidewalk Stringers	128		128	128	21st Shipment
Sidewalk Supports	2		2	2	P. & L.E. 42727 - 36,943#
Shims	1910		1910	1910	
Exp. Dams	80		60	60	
Lead Plates	122		122	122	
Bearing Plates	74		74	74	
Kocker Plates	72		44	44	
Rocker Shoes	72		44	44	
Fixed Shoes	48		48	36	
Links	36		36	36	
Pins	96		96	96	
Pin Nuts	48		48	48	
Tap Bolts	8		8	8	
* Turned Bolts	635		635	635	
Anchor Bolts	2262		2262	2262	
Cardalet Rivet Bolts	1638		1638	1638	Shipped this Week 36,943#
Cut Washers	2400		2400	2400	Previously Shipped 1,643,820#
Rivets	32406		32406	32406	Total Shipped 1,680,763#

B.E. Crissinger,

INSPECTOR



W. J. REESE TESTING LABORATORY
118½ Twentieth Street
Rock Island, Illinois

ORDER NO. CH-8778 LABORATORY NO. 209941
CLIENT'S NO. Ltr. 5/8/39 FILE NUMBER 15208.6

R E P O R T

October 4th, 1939

Analysis of PAINT - RED LEAD
Representing 34 drums containing 1020 gallons
Sampled at E. I. DuPont de Nemours and Company
Chicago, Illinois
For Mississippi River Bridge
Rock Island, Ill. to Davenport, Ia.

	<u>RESULTS</u>	<u>SPECIFICATION</u>
PIGMENT	69.17 %	67.5 ± 2%
VEHICLE	30.83 %	32.5 " "
WEIGHT PER GALLON	20.49 %	Min. 19.5%

ANALYSIS OF PIGMENT

TRUE RED LEAD (Pb ₃ O ₄)	95.00 %	Min. 95.0%
LEAD MONOXIDE	4.67 %	Remainder
IMPURITIES	0.33 %	Max. 1.0%

ANALYSIS OF VEHICLE

NONVOLATILE	54.0 %	Min. 56.5 ± 2½%
VOLATILE	46.0 %	Max. 43.5 " 2½%

ANALYSIS BASED ON NONVOLATILE

GLYCEROL PHTHALATE	33.2 %	Min. 32.0%
ACID NUMBER	3.3	Max. 4.5
ROSIN	None	None

This sample complies with the above test requirements of the specifications.

Tested by - H. H. Craver

W. J. REESE TESTING LABORATORY

By /s/ W. J. Reese (jb)
W. J. Reese

PILE DRIVING RECORD

Project: Mississippi River Bridge at Rock Island, IllinoisPier: Bent No. 12Type of Hammer: Single Acting Vulcan #1 W: 5000# h: 3'Bearing Required by Specifications: 50 tons.Ash-Howard-Needles & Tammien, by M. E. Peters Inspector

Pile No.	Date Driven	Original Length			Pen. Last 10 Blow	S	Bearing Tons	Elev. Top Pile	Elev. Bott. Pile	Pay Length	Cut Off
		Lower	Upper	Total							
B12											
-1	5/17/39	27'				0.19"	51.7	553.00	529.21	23.79'	3.21'
2	5/17/39	27'				0.18	53.5	553.00	529.84	23.16	3.84
3	5/17/39	27				0.19	51.7	553.00	530.28	22.72	4.28
4	5/17/39	27				0.14	62.5	553.00	529.18	23.82	3.18
5	5/17/39	27				0.19	51.7	553.00	527.92	25.08	1.92
6	5/17/39	27				0.19	51.7	553.00	529.81	23.19	3.81
7	5/18/39	27				0.06	93.6	553.00	528.73	24.27	2.73
8	5/18/39	27				0.10	75.0	553.00	528.39	24.61	2.39
9	5/5/39	42				0.10	75.0	553.00	528.68	24.32	17.68
10	5/17/39	27				0.12	68.2	553.00	528.89	24.11	2.89
11	5/17/39	27				0.12	68.2	553.00	527.62	25.38	1.62
12	5/17/39	27				0.13	65.2	553.00	527.94	25.06	1.94
13	5/18/39	27				0.07	88.2	553.00	528.34	24.66	2.34
14	5/18/39	27				0.08	83.4	553.00	528.13	24.87	2.13
15	5/18/39	29				0.09	79.0	553.00	526.84	26.16	2.84
16	5/18/39	29				0.08	83.4	553.00	526.44	26.56	2.44
17	5/18/39	29				0.06	93.6	553.00	526.79	26.21	2.79
18	5/18/39	29				0.08	83.4	553.00	525.38	27.62	1.38
19	5/18/39	29				0.06	93.6	553.00	525.02	27.98	1.02
20	5/18/39	29				0.05	100.0	553.00	526.06	26.94	2.06
21	5/18/39	29				0.07	88.2	553.00	526.64	26.36	2.64

(See Sheet No. 2)

Date: 5/24/1939 Verified/s/ William Schmidt
Resident Engineer

ASH-HOWARD-NEEDLES & TAMMEN

PILE DRIVING RECORD

Project: Mississippi River Bridge at Rock Island, Illinois

Pier: Bent No. 12

Type of Hammer: Single Acting Vulcan #1 W: 5000# h: 3'

Bearing Required by Specifications: 50 Tons.

Ash-Howard-Needles & Tammem, by M. E. Peters Inspector

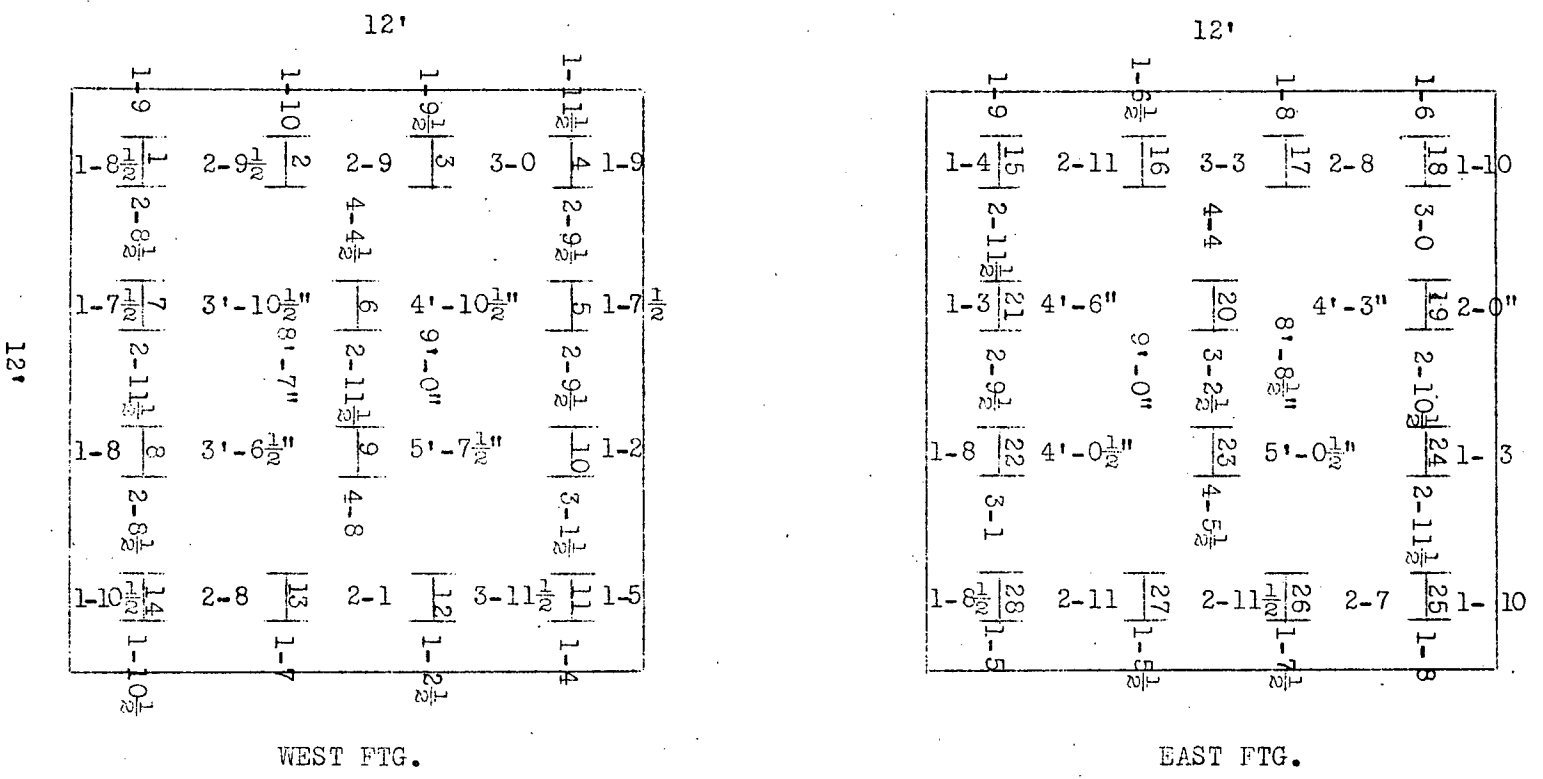
Pile No.	Date Driven	Original Length			Pen. Last 10 Blow	S	Bearing	Elev. Top Pile	Elev. Bott. Pile	Pay Length	Cut Off
		Lower	Upper	Total							
B12 -22	5/18/39	29'				0.05"	100.0	553.00	525.99	27.01	1.99
23	5/5/39	42				0.06	93.6	553.00	526.28	26.72	15.28
24	5/18/39	29				0.10	75.00	553.00	524.93	28.07	0.93
25	5/18/39	29				0.09	79.0	553.00	525.51	27.49	1.51
26	5/18/39	29				0.12	68.2	553.00	524.20	28.80	0.20
27	5/18/39	29				0.09	79.0	553.00	524.87	28.13	0.87
28	5/18/39	29				0.10	75.0	553.00	526.00	27.00	2.00

Date: 5/24/1939 Verified

/s/ William Schmidt
Resident Engineer

HOWARD, NEEDLES, TAMMEN & BERGENDOFF, CONSULTING ENGINEERS, KANSAS CITY, MO., NEW YORK, N. Y.

NORTH



Note: Due to large rock in fill, piles moved out of position in driving.

BENT NO. 12

W. J. REESE TESTING LABORATORY
 118 $\frac{1}{2}$ Twentieth Street
 Rock Island, Illinois

August 10, 1939

Re: Mississippi River Bridge
 at Rock Island, Illinois

REPORT ON CONCRETE CYLINDER COMPRESSION TESTS:
 CLASS 30 CONCRETE -----

The following cylinders were tested at 28 days. --

Cylinder Mark	Date Made	Date Delivered	Date Tested	Compressive Strength (lbs. per sq. in.)	Contractor
P5 - 38	7/12/39	7/15/39	8/9/39	6382# per sq. in.	McCarthy
P5 - 40	"	"	"	6219# " " "	"
P5 - 42	"	"	"	6578# " " "	"

The following cylinders were tested at 7 days. --

Cylinder Mark	Date Made	Date Delivered	Date Tested	Compressive Strength (lbs. per sq. in.)	Contractor
NG - #3	7/31/39	8/3/39	8/7/39	3720# per sq. in.	McCarthy
B5 - #5	8/1/39	8/3/39	8/8/39	3993# " " "	Priester's
P4 - 41	8/2/39	8/5/39	8/9/39	3217# " " "	McCarthy
P4 - 43	"	"	"	2629# " " "	"
B6 - #3	"	8/4/39	"	4202# " " "	Priester's

The Specifications for Class 30 Concrete require:
 2000# per sq. in. at 7 days.
 3000# per sq. in. at 28 days.

THE ABOVE TESTED CYLINDERS MEET THE SPECIFICATIONS.

W. J. REESE TESTING LABORATORY

By /s/ W. J. Reese
 W. J. Reese

cc/ Ash-Howard-Needles & Tammen (2 copies)
 Mr. Keith Poffenbarger
 Mr. William Schmidt, Resident Eng.
 Mr. McCarthy Improvement Company
 Priester Construction Company

PERMANENT BENCHMARKS

Elevations are above mean sea level and are referred to Government benchmark at Clock Tower Building on Arsenal Island. Each benchmark consists of a tack in a lead plug.

<u>Location</u>	<u>Elevation</u>
South abutment, west end of curb	562.54
Bent 1, top of west pedestal, S.W. Corner	562.54
Bent 2, top of west pedestal, S.W. Corner	562.52
Bent 3, top of west pedestal, S.W. Corner	562.68
Bent 4, top of west pedestal, S.W. Corner	562.65
Bent 5, top of west pedestal, S.W. Corner	562.48
Bent 6, top of west pedestal, S.W. Corner	562.48
Bent 7, top of west pedestal, S.W. Corner	562.09
Pier 1, top east column near S.W. Corner	586.38
Pier 1, top west column near S.E. Corner	586.41
Pier 2, top east col. ctr. line pier west of shoes	599.92
Pier 2, top west col. ctr. line pier east of shoes	599.87
Pier 3, top east col. ctr. line pier west of shoes	605.29
Pier 3, top west col. ctr. line pier east of shoes	605.28
Pier 4, top east col. ctr. line pier west of shoes	602.24
Pier 4, top west col. ctr. line pier east of shoes	602.23
Pier 5, top east col. ctr. line pier west of shoes	596.81
Pier 5, top west col. ctr. line pier east of shoes	596.81
Pier 6, top east col. ctr. line pier west of shoes	591.60
Pier 6, top west col. ctr. line pier east of shoes	591.57
Bent 8, top of west pedestal, S.W. Corner	560.94
Bent 9, top of west pedestal, S.W. Corner	560.91
Bent 10, top of west pedestal, S.W. Corner	560.96
Bent 11, top of west pedestal, S.W. Corner	560.95
Bent 12, top of west pedestal, S.W. Corner	560.96
Bent 13, top of west pedestal, S.W. Corner	560.99
Bent 14, top of west pedestal, S.W. Corner	561.50
Bent 15, top of west pedestal, S.W. Corner	561.70
Bent 16, top of west pedestal, S.W. Corner	561.99
Bent 17, top of west pedestal, S.W. Corner	562.22
Bent 18, top of west pedestal, S.W. Corner	562.50
Bent 19, top of west pedestal, S.W. Corner	562.69
Bent 20, top of west pedestal, S.W. Corner	562.97
Bent 21, top of west pedestal, S.W. Corner	564.97
Bent 22, top of west pedestal, S.W. Corner	564.93
North abutment, west end beam seat	568.33

CLEAR OPENING AT ROADWAY JOINTS

(Measured Aug. 29, 1940 @ 65° F.)

<u>Location</u>	<u>Width</u>	<u>Location</u>	<u>Width</u>
So. Abut.	7-1/4"	Pier 4	4-3/16"
Span 7	2-13/16"	Span 12	
Pier 1	5"	Jt. 1	1"
Span 9		Jt. 2	13/16"
Jt. 1	1-1/16"	Jt. 3	7/8"
Jt. 2	1-1/8"	Pier 5	6-1/16"
Jt. 3	1-1/4"	Span 13	
Pier 2	4-7/8"	Jt. 1	13/16"
Span 10		Jt. 2	7/8"
Jt. 1	1"	Jt. 3	15/16"
Jt. 2	1-1/16"	Pier 6	6"
Jt. 3	1-3/16"	Span 17	3-1/8"
Jt. 4	1-1/8"	Span 19	3-1/4"
Span 11		Span 23	3"
Jt. 1	1-1/16"	No. Abut.	7-1/16"
Jt. 2	1-1/8"		
Jt. 3	1"		
Jt. 4	15/16"		

SETTING OF EXPANSION SHOES
(Measured Aug. 28 and 29, 1940)

<u>Location</u>	<u>Temperature</u> °F.	<u>Offset of Fin from C.L. of Base Plate</u>	
		<u>Upstream</u>	<u>Downstream</u>

ROCKER SHOES

So. Abut.	72	3/8" N	1/16" N
Bent 1	72	1/2" N	1/8" N
Bent 2	72	5/16" N	1/8" N
Bent 3	72	7/16" N	11/32" N
Bent 5	72	1/8" S	3/16" S
Bent 6	72	1/4" N	11/32" N
Pier 1	65	7/32" S	15/32" S
Pier 6	78	23/32" N	31/32" N
Bent 9	78	Plumb	1/8" N
Bent 10	78	13/32" N	13/32" N
Bent 12	78	1/16" S	3/32" S
Bent 13	78	3/32" N	9/16" S
Bent 14	78	Plumb	5/16" S
Bent 16	78	7/16" N	17/32" N
Bent 17	78	13/32" S	5/16" S
Bent 18	78	1/8" S	7/32" S
Bent 20	78	1/16" N	9/32" N
Bent 21	76	5/16" S	7/32" S
Bent 22	76	7/16" S	1/4" S
No. Abut.	76	3/8" S	3/32" S

ROLLER SHOES

Pier 1	65	1/8" N	3/32" N
Pier 2	65	1-1/2" N	1-1/2" N
Pier 4	65	1-1/4" S	1-1/4" S
Pier 5	78	1/16" N	1/4" N
Pier 6	78	5/16" S	11/32" S

PUBLIC - NO. 446 - 75TH CONGRESS

CHAPTER 48 - 3D SESSION

H. R. 8466

AN ACT

Authorizing the City of Rock Island, Illinois, or its assigns, to construct, maintain, and operate a toll bridge across the Mississippi River at or near Rock Island, Illinois, and to a place at or near the city of Davenport, Iowa.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to promote interstate commerce, improve the postal service, and provide for military and other purposes, the city of Rock Island, Illinois, or its assigns be, and is hereby, authorized to construct, maintain, and operate a bridge and approaches thereto across the Mississippi River, at a point suitable to the interests of navigation, at or near Rock Island, Illinois, and to a place at or near Davenport, Iowa, in accordance with the provisions of the Act entitled "An Act to regulate the construction of bridges over navigable waters", approved March 23, 1906, and subject to the conditions and limitations contained in this Act.

Sec. 2. There is hereby conferred upon the city of Rock Island, Illinois, or its assigns, all such rights and powers to enter upon lands and to acquire, condemn, occupy, possess, and use real estate and other property needed for the location, construction, maintenance, and operation of such bridge and its approaches as are possessed by railroad corporations for railroad purposes or by bridge corporations for bridge purposes in the State in which such real estate or other property is situated, upon making

just compensation therefor, to be ascertained and paid according to the laws of such State, and the proceedings therefor shall be the same as in the condemnation or expropriation of property for public purposes in such State.

Sec. 3. The city of Rock Island, Illinois, or its assigns, is hereby authorized to fix and charge tolls for transit over such bridge, and the rates of toll so fixed shall be the legal rates until changed by the Secretary of War under the authority contained in the Act of March 23, 1906.

Sec. 4. In fixing the rates of toll to be charged for the use of such bridge the same shall be so adjusted as to provide a fund sufficient to pay for the reasonable cost of maintaining, repairing, and operating the bridge and its approaches under economical management, and to provide a sinking fund sufficient to amortize the cost of such bridge and its approaches, including reasonable interest and financing cost, as soon as possible, under reasonable charges, but within a period of not to exceed thirty years from the completion thereof. After a sinking fund sufficient for such amortization shall have been so provided, such bridge shall thereafter be maintained and operated free of tolls. An accurate record of the cost of the bridge and its approaches; the expenditures for maintaining, repairing, and operating the same; and of the daily tolls collected shall be kept and shall be available for the information of all persons interested.

Sec. 5. The right to alter, amend, or repeal this Act is hereby expressly reserved.

Approved, March 18, 1938.

PUBLIC - NO. 58 - 76TH CONGRESS

CHAPTER 102 - 1ST SESSION

H. R. 4527

AN ACT

To extend the times for commencing and completing the construction of a bridge across the Mississippi River at or near Rock Island, Illinois, to a place at or near the city of Davenport, Iowa.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the times for commencing and completing the construction of a bridge across the Mississippi River at or near Rock Island, Illinois, to a place at or near the city of Davenport, Iowa authorized to be built by the city of Rock Island, Illinois, or its assigns, by an Act of Congress approved March 18, 1938, are hereby extended one and three years, respectively, from the date of the approval of this Act.

Sec. 2. The right to alter, amend, or repeal this Act is hereby expressly reserved.

Approved, April 26, 1939.

AN ACT enabling cities, villages and incorporated towns within the State of Illinois to acquire, construct, improve, operate, maintain and repair a bridge or bridges within their corporate limits or within five (5) miles of their corporate limits, over any river forming a boundary of the said State; to issue bonds, payable solely out of the net revenues of such bridge or bridges; and to enter into contracts therefor; to fix and collect tolls and charges to be used for the payment of such bonds and to meet any obligations under such contracts; and to pay the cost of maintenance, operation and repair of such bridges; to execute contracts or take action necessary or desirable in connection with the acquisition, construction, improvement, operation, maintenance and repair of such bridge or bridges; providing for the issuance and payment of such bonds and the remedies of the holders thereof. (Filed July 5, 1935, L. 1935, p.294.)

BE IT ENACTED BY THE PEOPLE OF THE STATE OF ILLINOIS, REPRESENTED IN THE GENERAL ASSEMBLY:

Chapter 24. 520f. Terms defined. PPl. The following terms wherever used or referred to in this act, shall have the following meaning unless a different meaning appears from the context.

(a) The term "municipality" shall mean any city, village or incorporated town or the State of Illinois:

(b) The term "bridge" shall mean any bridge over any river forming a boundary of this state and all property, right-of-way easements, approaches and franchises in connection therewith and may mean two or more of such bridges;

(c) The term "net revenues" shall mean the gross revenues of a bridge less the reasonable cost of operating, maintaining and repairing said bridge;

(d) The term "United States" shall mean the United States of America and any agent or agency thereof including (but without limitation) the Federal Emergency Administration of Public Works;

(e) The term "holder" shall mean the holder or holders of any of the bonds issued under the authority of this Act.

520g. Municipalities, authorized to acquire, construct, operate bridge, collect tolls, borrow money. pp2. Each municipality of this State is hereby authorized and empowered:

(a) To acquire, by purchase or otherwise, construct, improve, operate, maintain and repair any bridge within the corporate limits or within 5 miles of the corporate limits of such municipality;

(b) To acquire, purchase, hold, use, lease, mortgage, sell, transfer, and dispose of any property, real, personal or mixed, tangible, or any interest therein in connection with any such bridge;

(c) To fix, alter, charge, collect, segregate and apply tolls and other charges for transit over and use of any such bridge;

(d) To borrow money, make and issue bonds payable from and secured by a pledge of the net revenues of the bridge for the construction or improvement of which such bonds may be reissued;

(e) To cooperate with any adjoining State or any political subdivision or agency thereof in the acquisition, construction, improvement, operation, maintenance and repair of any bridge, and in defraying the cost thereof;

(f) To make contracts of every kind and nature and to execute all instruments necessary or convenient for the carrying out of the purposes of this Act; and

(g) Without limitation of the foregoing, to borrow money and to accept grants from the United States and any other person or persons and to enter into any and all contracts with the United States and such other person or persons in connection therewith.

520h. Issuance of Revenue bonds. pp3. Without limiting any powers anywhere in this Act granted, any municipality is hereby authorized to provide for the payment of the cost of acquiring, constructing or improving any bridge or for any portion of such cost by an issue or issues of revenue bonds of such municipality, payable solely from the net revenues of the bridge so acquired, constructed or improved. Such bonds shall be authorized by ordinance of the governing body of the municipality and shall be in substantially the form set forth in such ordinance. Such bonds may be serial or terms; redeemable, with or without premium, or non-redeemable; and shall bear interest at a rate not exceeding 6% per annum, payable at such time or times as may be provided, and shall mature at such time or times not exceeding the life of the bridge for the acquisition, construction or improvement of which they shall be issued, estimated by the governing body of the municipality, but in no event exceeding 40 years, and in such amount or amounts and at such place or places as shall be prescribed in the ordinance authorizing their issuance.

Any ordinance or ordinances authorizing such bonds may contain provisions, which shall be part of the contract with the holders of such bonds, as to (a) the date or dates, maturity or maturities, denominations, rate of interest, place or places and medium of payment of such bonds and any other details in connection with such bonds or their issuance, (b) the rates of tolls and other charges to be charged by the municipality for transit over or use of the bridge and the segregation and application of the same, (c) the registration of the bonds as to principal only or as to both principal and interest, and the interchangeability and exchangeability of such bonds, (d) the redemption of the bonds, and the price at which they shall be redeemable, (e) the setting aside of reserves or sinking funds and the regulation and disposition thereof, (f) limitations upon the issuance of additional bonds payable from the revenues of such bridge or upon the rights of the holders of such additional bonds and (g) any other or additional agreements with the holders of such bonds or any covenants or restrictions necessary or desirable to safeguard the interests of such holders. The bonds shall be signed by such officers as the governing body of the municipality shall determine and coupon bonds shall have attached thereto interest coupons bearing the facsimile signatures of such officer or officers as the governing body of the municipality shall determine; all as shall be prescribed in such ordinance or ordinances. Any such bonds may be issued and delivered, notwithstanding the fact that one or more of the officers signing such bonds, or one or more of the officers whose facsimile signature shall be upon the coupons or any thereof, shall have ceased to be such officer or officer at the time when such bonds shall actually be delivered.

APPROVAL OF LOCATION AND PLANS OF BRIDGE

(Authorized by Congress)

Whereas, By an act of Congress, approved March 18, 1938, _____

entitled, "A Bill Authorizing the city of Rock Island, Illinois, or its assigns to construct, maintain, and operate a toll bridge across the Mississippi River at or near Rock Island, Illinois, and to a place at or near the city of Davenport, Iowa.

the CITY OF ROCK ISLAND, ILLINOIS, _____ is

authorized to construct, maintain, and operate a bridge and approaches thereto, across the Mississippi River, at a point suitable to the interests of navigation, at or near Rock Island, Illinois, and to a place at or near Davenport, Iowa.

in accordance with the provisions of the act of Congress entitled "An act to regulate the construction of bridges over navigable waters," approved March 23, 1906, whereby it is provided that such bridge shall not be built or commenced until the plans and specifications for its construction, together with such drawings and map of location thereof as may be required for a full understanding of the subject, have been submitted to and approved by the Chief of Engineers and by the Secretary of War;

And whereas, The said — CITY OF ROCK ISLAND, ILLINOIS, — has

submitted for examination and approval plans, specifications, drawings, and map of location of a bridge proposed to be built across said—river— at said place, which comply with the requirements of said act of March 23, 1906;

Now, therefore, This is to certify that the proposed location and said specifications and the plans which are hereto attached are hereby approved by the Chief of Engineers and by the Secretary of War, pursuant to the above-mentioned acts of Congress, subject to the following conditions:

1. That the District Engineer of the Engineer-Department at Large in charge of the district within which the bridge is to be built may supervise its construction in order that said plans shall be complied with.

2. That all work shall be so conducted that the free navigation of the waterway shall not be unreasonably interfered with; that the present navigable depths shall

Copy of 371 (Rock Island (Illinois) - Davenport (Iowa)) - 1/10/38

not be impaired; and that the channel or channels through the structure shall be promptly cleared of all falsework, piling, or other obstructions placed therein or caused by the construction of the bridge, to the satisfaction of the said district engineer, when in his judgment the construction work has reached a point where such action should be taken, and in any case not later than — **ninety** - days after the bridge has been opened to traffic.

3. That during construction the full width of the channel through the main channel spans shall be kept clear and unobstructed at all times during the navigation season (March 1st to December 1st.)

4. That suitable gages shall be installed and maintained on each end of the center channel pier to indicate clearly and directly the least vertical clearance available under the channel spans. The gradations shall be in feet, and shall be 12 inches wide, with alternate feet black and white, each fifth foot being designated by the proper numeral 12 inches high and of proportional width.

5. That such guard fences, booms or other pier protection as the District Engineer may order in the interests of navigation above or at either or both of the channel spans, shall be constructed and maintained by the owners of the bridge without expense to the United States.

Witness my hand this — 16th — day of — May — , 1938.

J. L. Schley
J. L. SCHLEY,
Major General,
Chief of Engineers.

Witness my hand this — 18th — day of — May — , 1938.

Louis Johnson
LOUIS JOHNSON,

The Assistant Secretary of War.

WAR DEPARTMENT
SPECIAL INSTRUMENT

WHEREAS, By an instrument signed May 18, 1938, the Assistant Secretary of War approved plans for a bridge to be constructed under authority of an Act of Congress approved March 18, 1938, across the Mississippi River between Rock Island, Illinois, and Davenport, Iowa, by the City of Rock Island, Illinois.

AND WHEREAS, The CITY OF ROCK ISLAND now submits for approval modified plans which provide for shifting the Davenport end of the structure about 300 feet downstream, eliminating one pier in the river, and revising the length of spans to provide two channel spans each 500 feet long and three spans each 360 feet long, instead of two 500-foot spans, two 300-foot spans and two 160-foot spans, as previously approved; and an increase in the vertical clearance of the three 360-foot spans, the vertical clearance of the 500-foot spans to remain unchanged.

NOW THEREFORE, This is to certify that said modified plans hereto attached are hereby approved subject to the conditions of the previous instrument of approval.

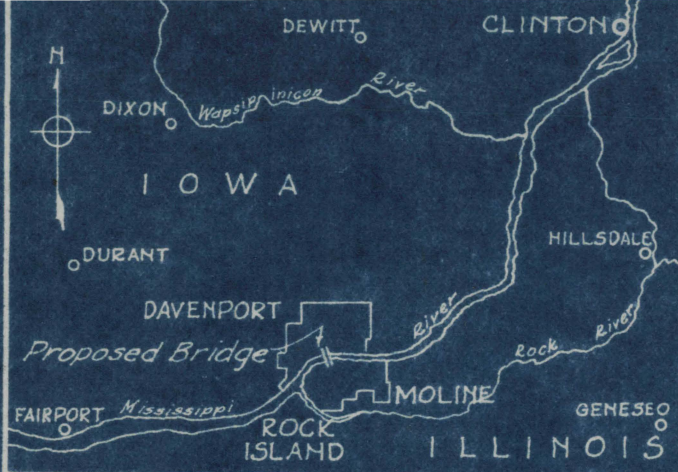
WITNES my hand this 16th day of August, 1938.

(s) E. C. Tyler,
Brigadier General,
Acting Chief of Engineers.

WITNES my hand this 18th day of August, 1938.

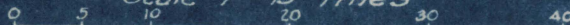
(s) *Paul H. Craig*
Acting Secretary of War.

Copy to 6371 Rock Island (MR) - Davis (R) 5/12 with 7 attached



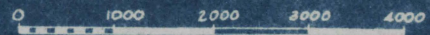
VICINITY MAP

Scale 1" = 13 Miles

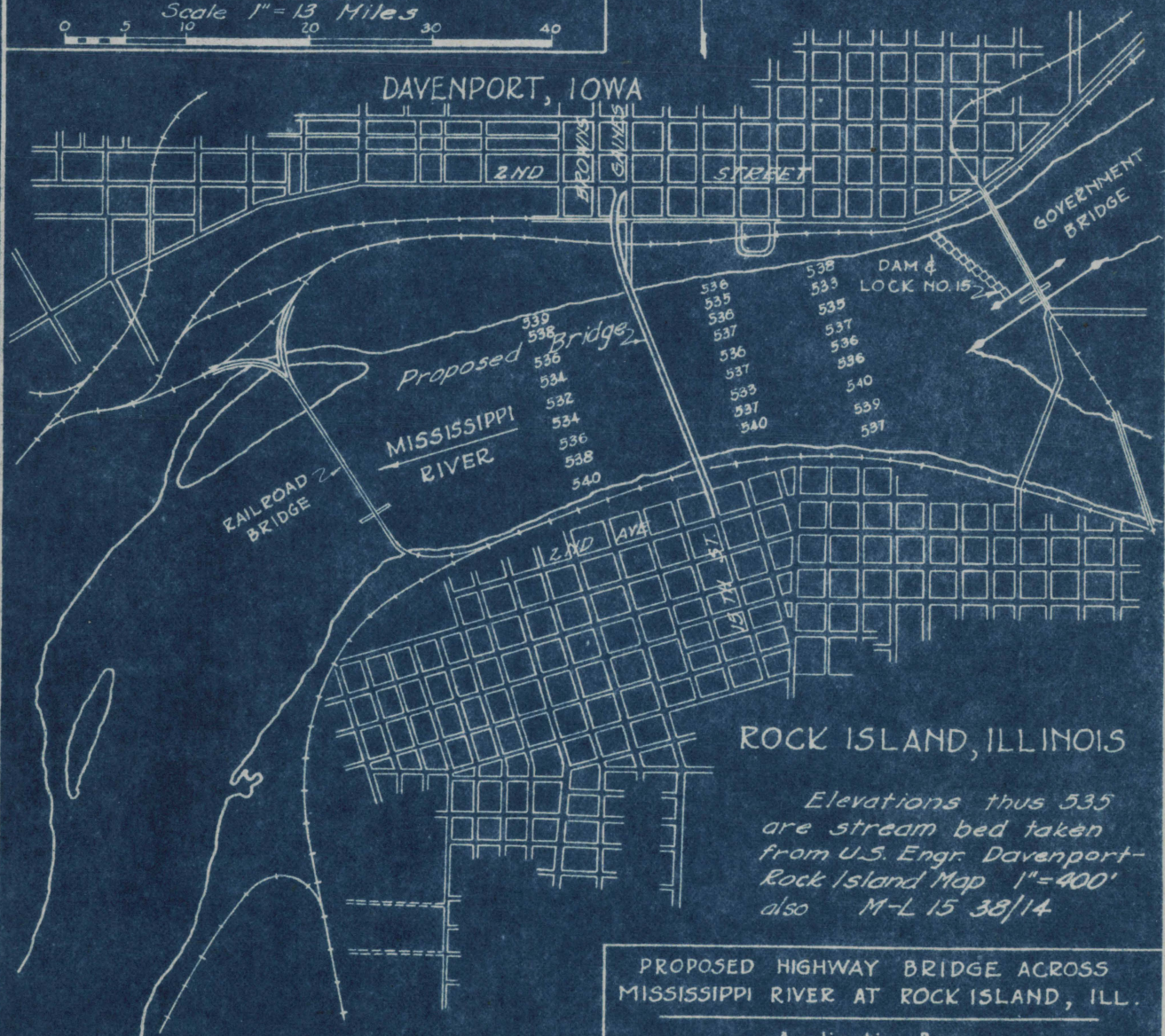


LOCALITY MAP

Scale 1" = 2000'



Traced from Sh. 74 Upper Mississippi River Survey 1929-1930, Corps of Engrs

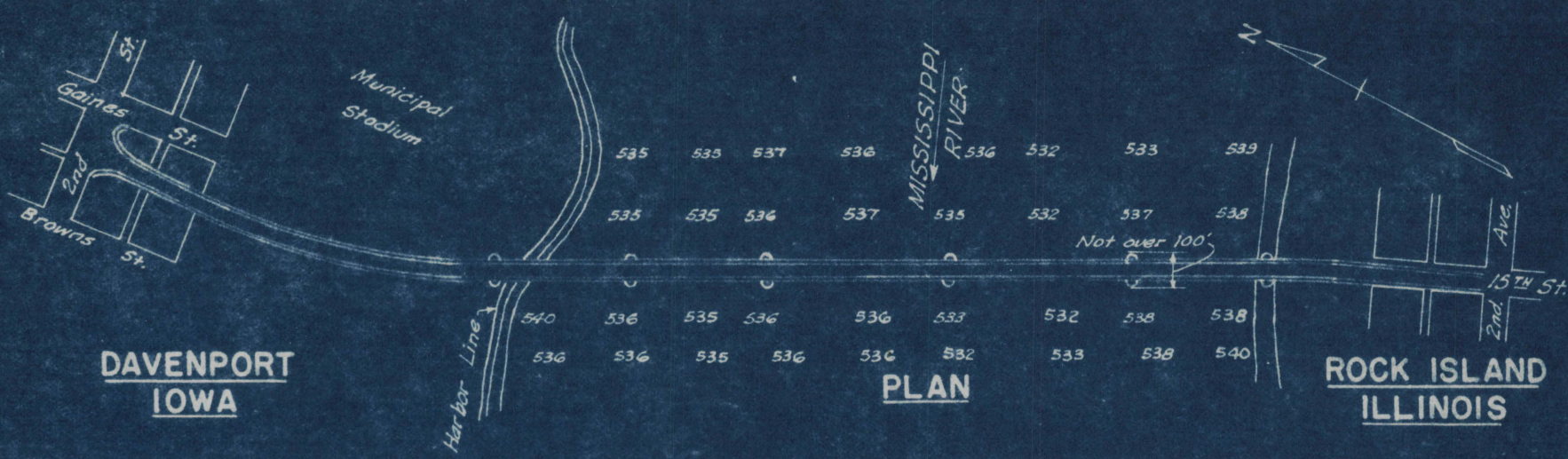


ROCK ISLAND, ILLINOIS

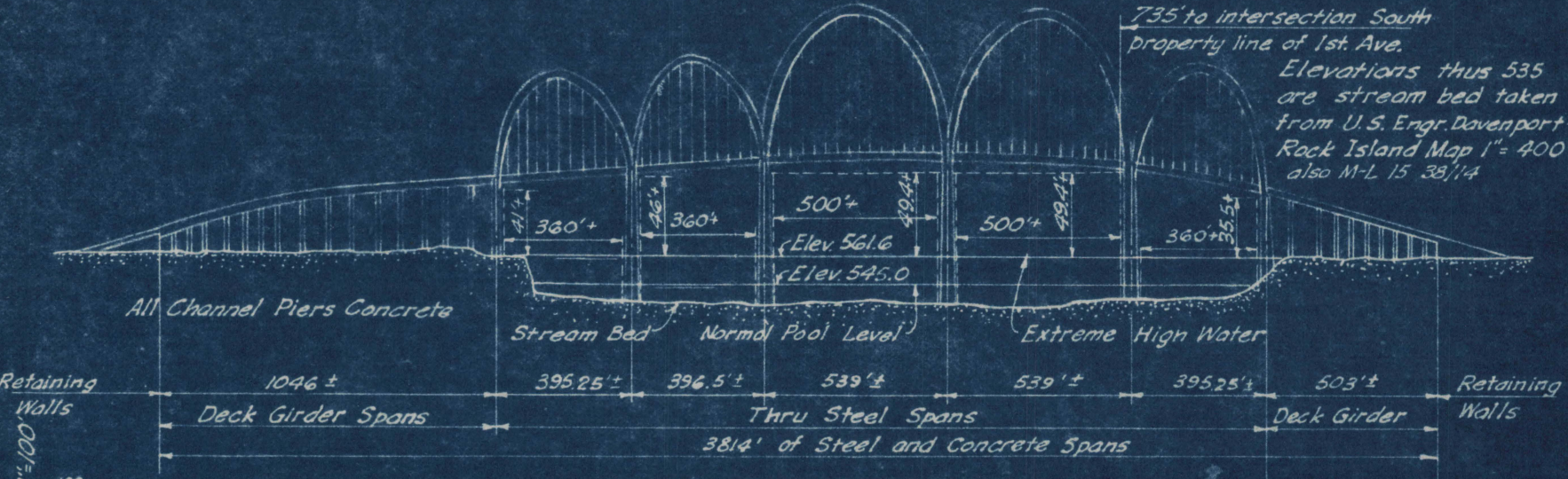
Elevations thus 535 are stream bed taken from U.S. Engr. Davenport-Rock Island Map 1"=400' also M-L 15 38/14

PROPOSED HIGHWAY BRIDGE ACROSS MISSISSIPPI RIVER AT ROCK ISLAND, ILL.

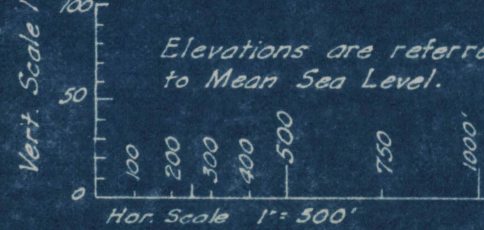
Application By
City of Rock Island, Illinois
Date July 1, 1938. Sheet 1 of 2



PLAN



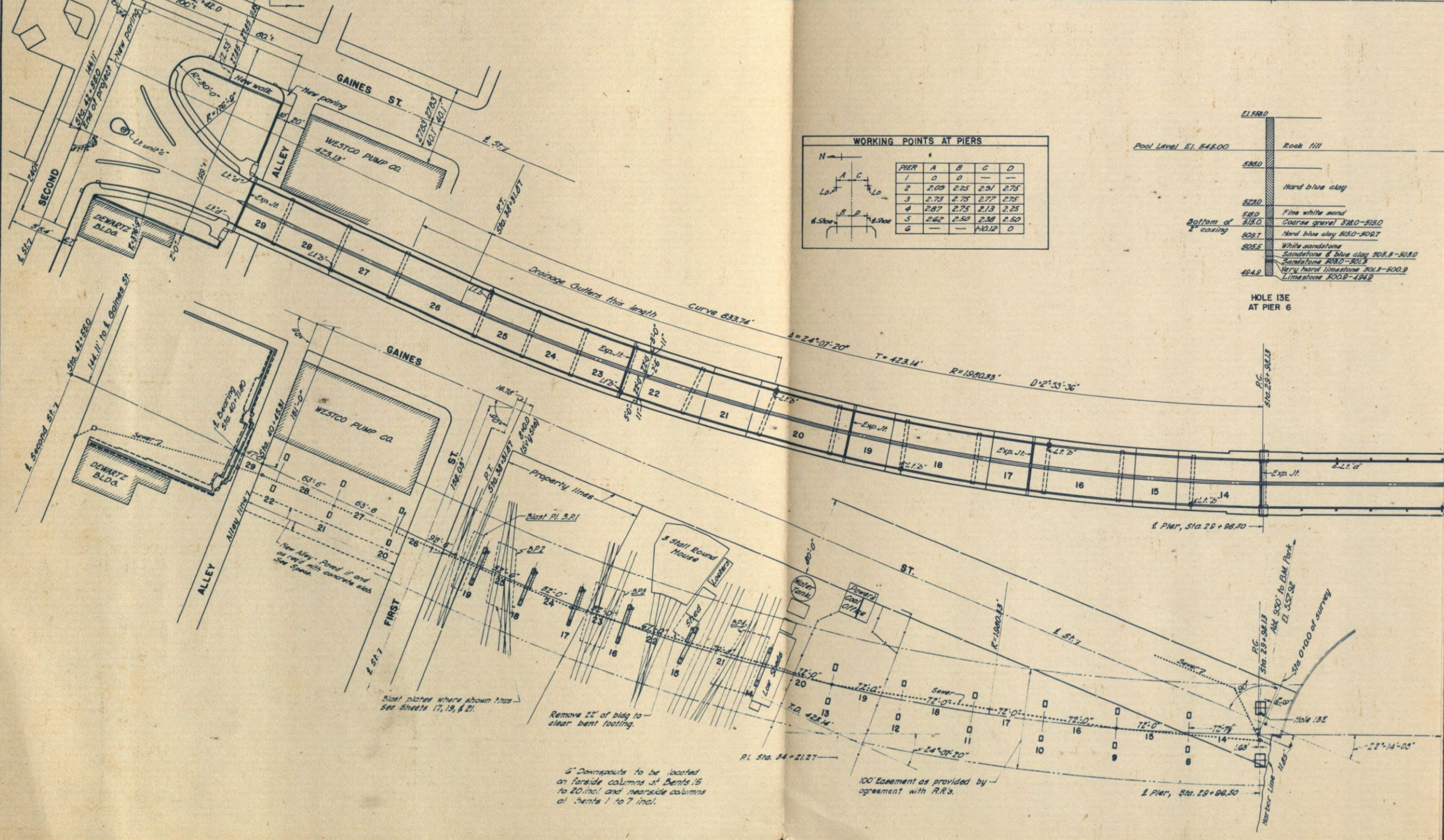
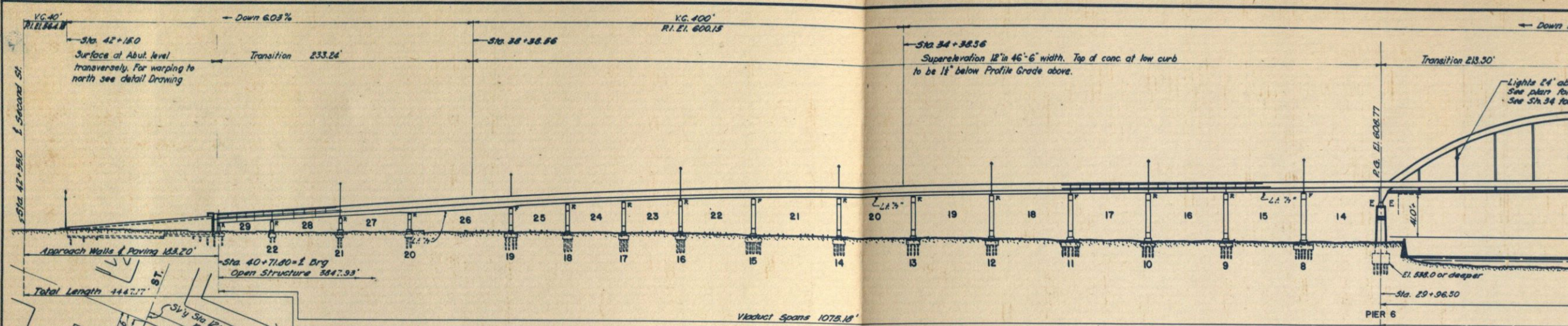
735' to intersection South property line of 1st Ave.
 Elevations thus 535 are stream bed taken from U.S. Engr. Davenport-Rock Island Map 1" = 400' also M-L 15 38/14



PROPOSED HIGHWAY BRIDGE ACROSS MISSISSIPPI RIVER AT ROCK ISLAND, ILL.

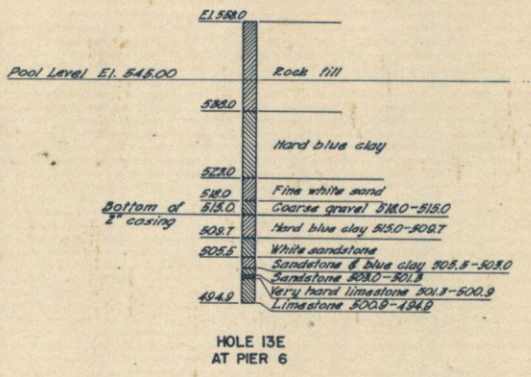
Application By
 City of Rock Island, Illinois
 Date July 1, 1938.

Sheet 2 of 2



WORKING POINTS AT PIERS

PIER	A	B	C	D
1	0	0	—	—
2	2.09	2.25	2.31	2.75
3	2.73	2.75	2.77	2.75
4	2.87	2.75	2.13	2.25
5	2.62	2.50	2.38	2.50
6	—	—	40.12	0

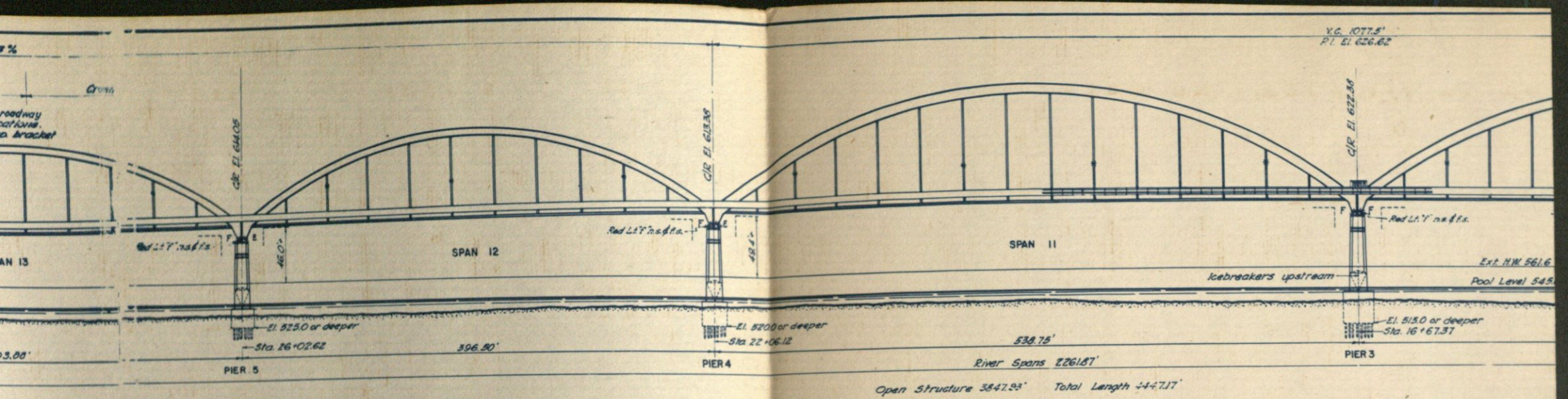


Most plates where shown thus see sheets 17, 19, & 21.

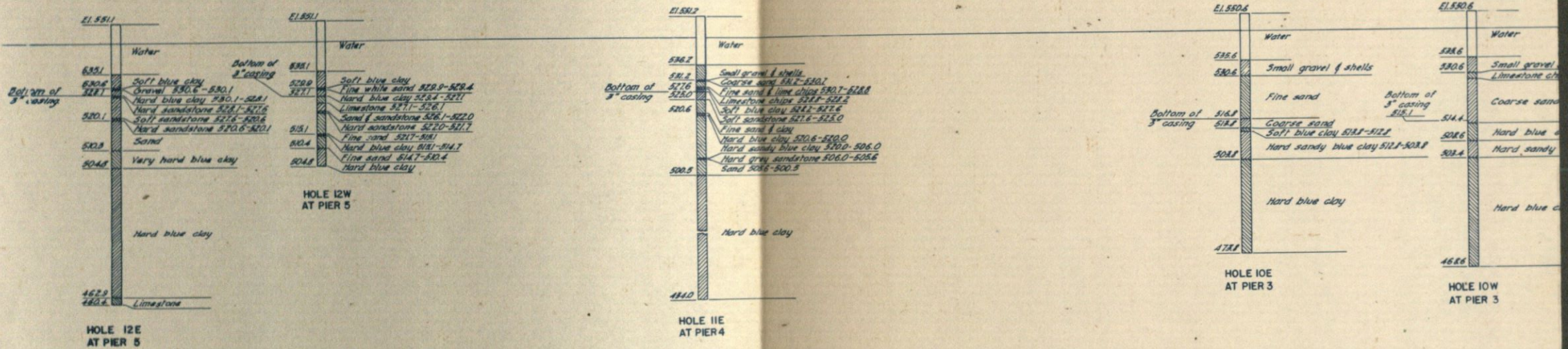
Remove 22' of bldg to clear bent footing.

6" Downspouts to be located on outside columns of Bents 15 to 20 incl. and inside columns of Bents 1 to 7 incl.

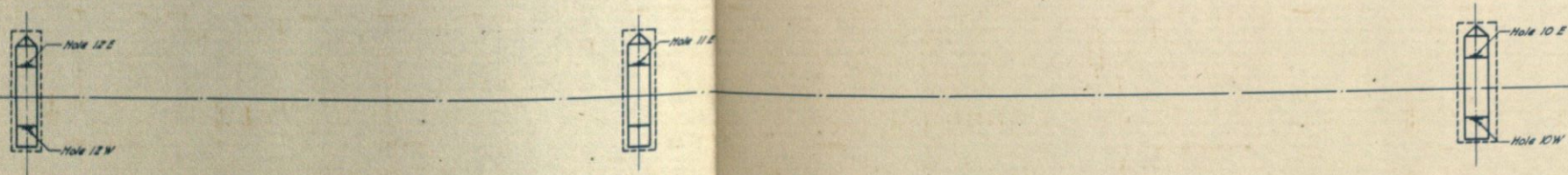
100' Easement as provided by agreement with R.R's.



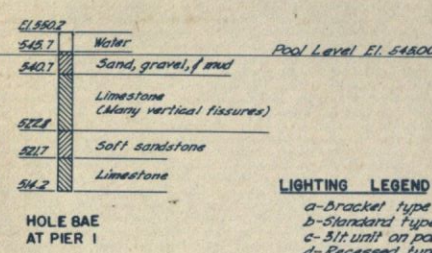
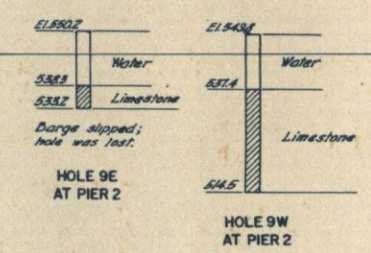
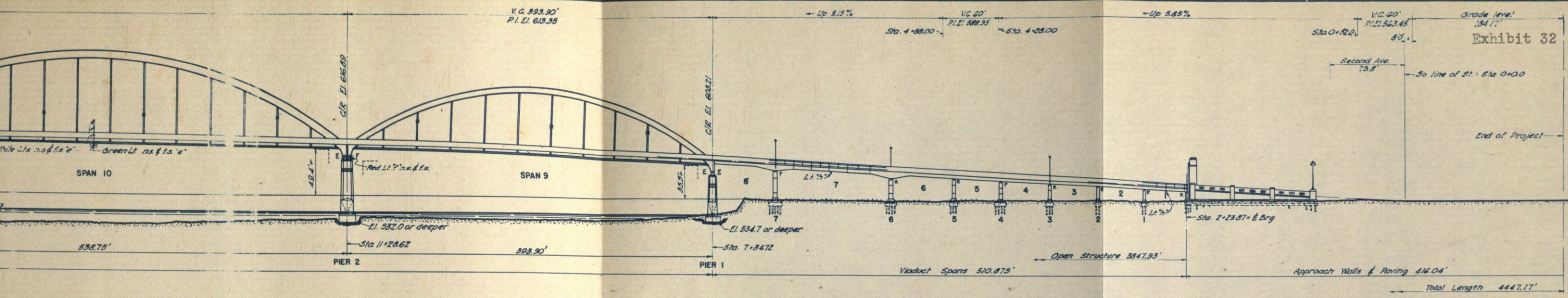
ELEVATION



DECK PLAN



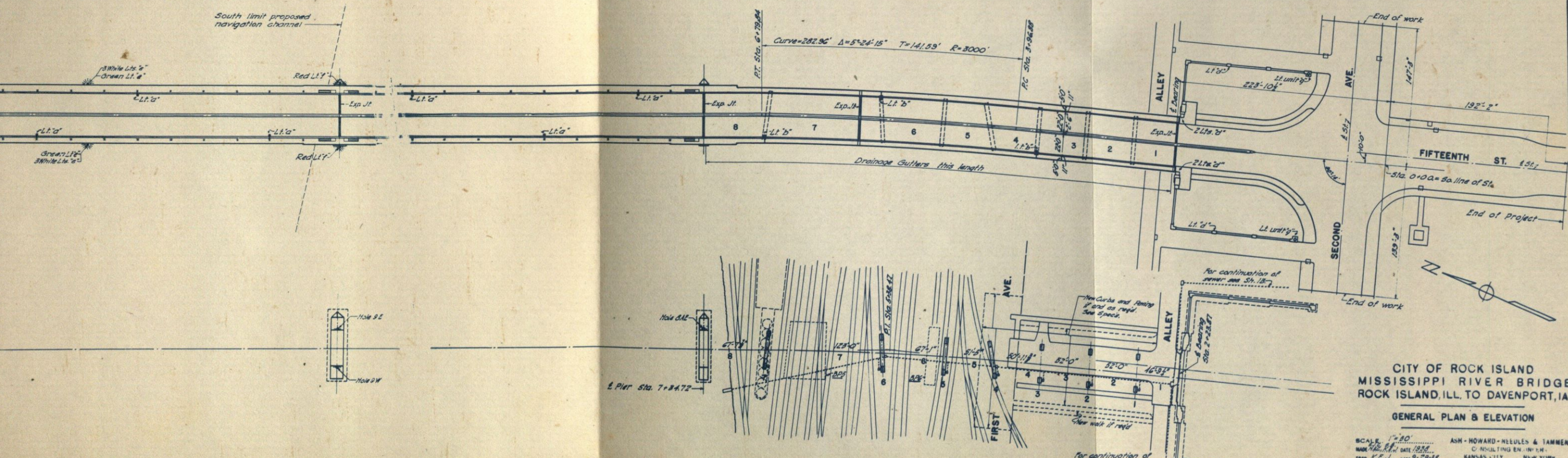
GROUND PLAN



LIGHTING LEGEND:
 a-Bracket type on river spans-17 req'd.
 b-Standard type on viaduct spans-10 req'd.
 c-5 ft unit on pole near ends of project- req'd.
 d-Recessed type in pylons, etc.-8 req'd.
 e-Navigation lts. at mid-channel-8 req'd.
 f-Navigation lts. at piers-8 req'd.
 g-2 ft units on poles near end of project-2 req'd.
 h-Highway light units under viaduct-5 req'd.
 For Misc. Lighting Details see Sh. 33.

GENERAL NOTES

SPECIFICATIONS: AASHTO except as modified. (a) Reinforced Concrete Slab Design, U.S. Bur. Pub. Roads, Journal of Highway Research, Vol. 18, No. 8.
 (b) Unit Stresses silicon steel, AREA 1935 Spec. for Steel Ry. Bridges.
 (c) Reinforcing Steel in Tension 18000 #/sq. in.
LOADING: (a) Floor system, Hangers, and similar members, a 20-Ton Truck per 11' lane placed symmetrically in lanes.
 (e) For Arches, Girders, Substructure, and all other parts of the structure use 1-15 Equivalent Loading except that in cases where the 20-Ton Truck loading will give greater stresses, it shall be used.
 For (d) and (e) for 2 lanes loaded use 100%, 3 lanes 85%, and 4 lanes 75% of above loading.
 For sidewalk loading see 1935 AASHTO Specifications.
IMPACT: 60% for End Floorbeams.
LONGIT. FORCES: Traction, 10% of Live Load of 2 traffic lanes. Wind, 15# per sq. ft. on loaded and 30# per sq. ft. on unloaded structure.
LATERAL FORCES: Wind 15# per sq. ft. on loaded and 30# per sq. ft. on unloaded structure. Force of 200# per lin. ft. due to moving load with wind on same included.
JACKING: Allow 30% increased stresses for full dead load of arch ribs at points provided.



CITY OF ROCK ISLAND
 MISSISSIPPI RIVER BRIDGE
 ROCK ISLAND, ILL. TO DAVENPORT, IA.
GENERAL PLAN & ELEVATION

SCALE: 1"=20'
 NAME: H. B. HOWARD, ENGINEER
 DATE: 1935
 PROJECT: MISSISSIPPI RIVER BRIDGE
 CITY: ROCK ISLAND, ILL.
 STATE: ILLINOIS