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Many Tons of Steel and Concrete in Bridge; Entire Year Required for Erection

Piers Sunk to Bedrock Far Below River Bed on Solid Footing of Limestone—Work Delayed by High Water in June

SKILL REQUIRED IN STEEL ERECTIION

Closest Figures in Fabrication and Erection with Allowance for Temperature Changes Results in Perfect Fit When Connecting Link is Placed.

The Plattsmouth bridge, being formally opened and dedicated today, is a modern structure in every respect. It was designed in accordance with standard specifications to accommodate the maximum traffic it will be required to carry for many, many years.

The total length of the bridge structure from east to west abutment is 1421 feet and 4 inches. The bridge floor is of concrete, and 20 feet wide, measured inside of the curbs. This floor, which is heavily reinforced to carry the traffic as estimated below, has a uniform ascending grade from east towards the west of 4½ per cent.

This steel structure is designed to carry in addition to its own weight a traffic load of 900 pounds per lineal foot of bridge, in addition to two 15-ton trucks, having a concentrated load of 12,000 pounds on each rear wheel. In addition to this traffic load the bridge is designed to stand a wind pressure of 30 pounds per square foot on the side area of the exposed floor construction and a load of 45 pounds per square foot on the side area of each truss. Ample provisions are also made to take care of impact or vibratory effects. In addition to these loads—which are considerably in excess of those the bridge will be required to carry for many years to come—the steel itself is designed with a factor of safety of 4, which means that it is capable of carrying four times the stresses which could be set up in the structure by the loads mentioned above.

The foundation of the bridge includes two abutments and six piers—all of massive, heavily reinforced concrete. The three main river piers were carried to solid bed rock foundations by the pneumatic process. Bed rock was encountered at a depth of 44 feet, 45 feet and 64 feet below standard high water.

A number of interesting things were encountered in the sinking of these piers. In sinking the shaft of pier number 1, which is the pier on the west river bank, it was necessary to pass through about 30 feet of loose boulders of various sizes. This mass of boulders contained at least four distinct varieties of stone—including sandstone, limestone and a variety of granite, very similar to that found in South Dakota. These boulders in most cases had rounded edges and worn surfaces, showing that they had evidently been transported for a long distance.

Mr. George S. Morrison, the eminent engineer who in the year 1881 designed and constructed the Burlington bridge located 250 feet upstream, encountered a similar deposit of boulders in the building of the west pier of this bridge. These boulders were probably brought to their present position by the glaciers which undoubtedly covered this part of the country many centuries ago.

R. A. LEUSSLER
of Omaha, Vice President Plattsmouth Bridge Company

In sinking the shaft for pier number 2 and number 3 it was necessary to pass through a thick bed of shale overlying the bed rock. This shale was of such a dense nature that it made excavation slow and difficult, much time being spent on its removal by the under-water workmen. The bed rock on which these river piers rest is a limestone deposit of very hard and peculiar character. Samples of this bed rock were tested and it was found to be capable of supporting a load many times in excess of that the bridge will ever be called upon to carry.

Great care was taken in the matter of the concrete used in the construction of these piers and abutments. The cement was carefully inspected and tested at the mill before shipment and a great many samples of the concrete as it was poured were taken and tested for strength in a modern testing machine to insure that only first class material was used in these foundations.

The superstructure of the bridge consists of seven steel spans. Starting at the east there are two 100-foot deck spans, then two 200-foot deck spans. From this point (Pier number 3) to the west, the superstructure consists of a cantilever bridge practically 809 feet long—made up of two anchor arms, each 203 feet long and a main channel span of about 403 feet. This main channel span consists of two cantilever arms each 101 feet long and extending out over the river from piers number one and two. These support the center or suspended span which is about 201 feet long.

The bridge floor is about 79 feet at pier number 1 and about 61 feet at pier number 2 above standard high water in the river. The War Department in granting their permission to build the bridge insisted on a clear channel span of at least 400 feet, with an unobstructed height above high water of at least 55 feet, in order to accommodate future possible river navigation.

The top of the steel tower at pier number 1 is about 61 feet above the bridge floor so that the total height of the structure above high water at this point is about 140 feet.

Scenic Driveway

Ornamental iron panels and lamp posts are provided at each portal and considerable care and thought has been given to the design of the bridge throughout in order that it may present a pleasing appearance. The hand railing is especially substantial and attractive.

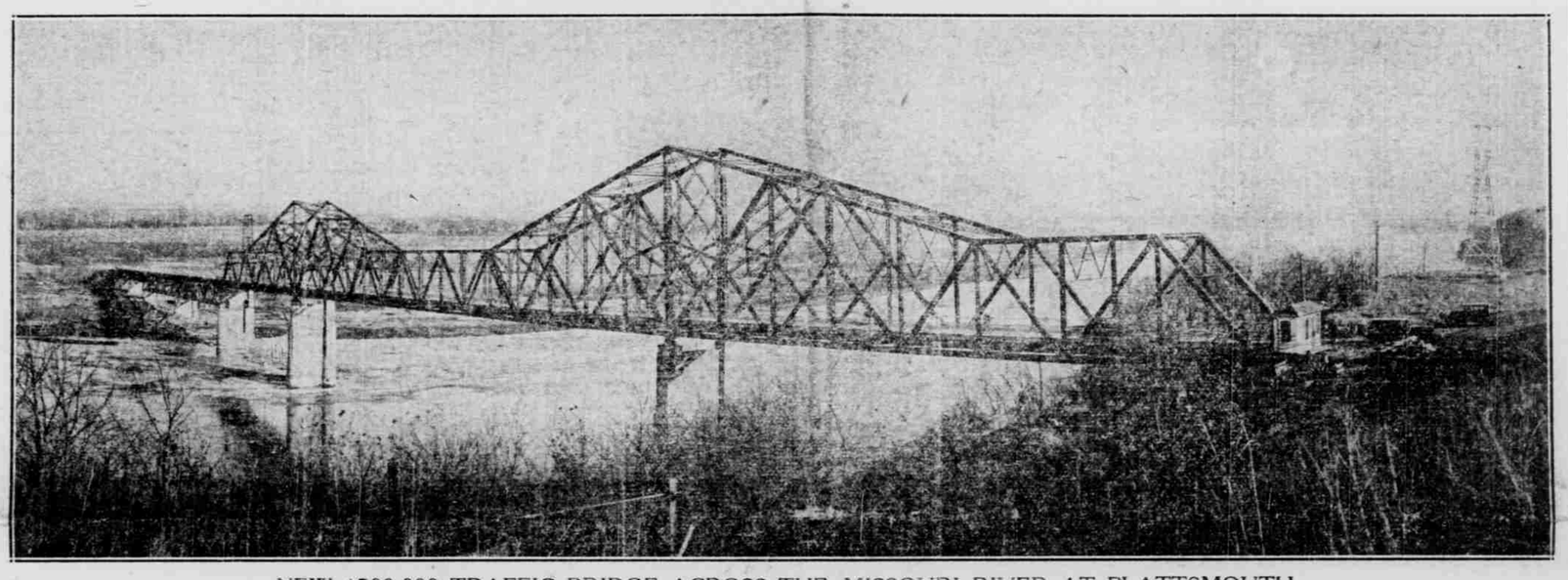
The road leading from Plattsmouth to the west portal of the bridge winds its way through the hills, enabling the tourist to obtain many beautiful views of the river and the surrounding country.

It was constructed with state and county aid on that portion outside the city limits, and the state also contributed financial assistance to that portion in the city limits. In order to eliminate grade crossing, a viaduct was built over the Burlington shop tracks, which, with its grade approaches, extends from Third to First streets. The cost of building this viaduct was divided between the Burlington railway, the bridge company and the City of Plattsmouth.

The City of Plattsmouth has had electric lights placed along that portion of the road within the city limits as well as on the viaduct over the shop tracks.

On the Iowa side of the river the road is being graded, preparatory to graveling at an early date. Portions of the route are being re-located to follow a more direct line, leading to Glenwood, from where paving leads north, east and south. The cost of this work is included in the Mills county good roads bond issue that was recently voted to complete the paving of U. S. 34 through the east part of that county and gravel several other highways connecting up the various towns of the county. As soon as the graveling is completed, this road will be a splendid all-weather road, being exceptionally well drained.

GOV. ARTHUR J. WEAVER



NEW $700,000 TRAFFIC BRIDGE ACROSS THE MISSOURI RIVER AT PLATTSMOUTH

Intricate Figuring Required

The 403 foot steel structure over the main channel of the river was erected entirely by cantilever methods—the steel being cantilevered out over the river for a distance of two hundred one and one-half feet from piers No. 1 and No. 2 to the point of meeting without the aid of temporary underpinning or false work, as was used in the erection of the Blair bridge.

This necessitated precision work not only in the location of the piers themselves, but especially in the fabrication and erection of the steel, and the affect of the temperature had to be carefully taken into account. The structural steel itself was fabricated during the summer months when the temperature averaged 90 degrees, and it was assumed that the erection would be performed during the latter part of the month of October with an anticipated temperature of about 50 degrees—this being the average temperature for this locality at that time of the year as shown by the Government weather bureau reports. This, therefore, meant that there would be a probable difference in temperature of at least 40 degrees between the time of fabrication of the steel and its erection, and this difference in temperature is sufficient to cause a difference in the length of the top chord of the cantilever bridge of about 3⅜ inches, for which variation in length it was, of course, necessary to provide.

When the work had progressed to a point where the joining together could be accomplished the weather continued persistently warm and a delay of several days was necessitated before the temperature dropped to the desired mark.

Then the derricks at both cantilevered ends hoisted the center sections of the floor support and dropped them into place, with the holes matching perfectly and the riveters were able to go ahead with the work of tying the structure together without a single alteration. The upper chord required a lower temperature, and a delay of another day was required before the mercury dropped to the desired point, when it too was slipped into place with the same precision as the floor supports.

Pouring of the concrete floor over this section was rapidly completed, the work being protected against below freezing temperatures.

This main channel cantilever span of 403 feet acts practicaly as three separate spans—two cantilever arms extending out from each river pier, and an independent suspended span 200 feet long, carried by means of hangers at the end of these cantilever arms. The Plattsmouth bridge is the only example of cantilever construction in this vicinity.

Construction work on the bridge was started in December, 1928, and about a year was required for its erection, although this time could have been cut considerably had not the June rise of last year carried out the false work leading to the midstream pier then partially sunk to bed rock. It was several weeks before receding waters permitted rebuilding of the tramway and the completion of the pier. During this time the pier construction company was forced to mark time, keeping a part of their men busy with a subcontract for the laying of the cement floor at the east and west ends of the structure.

Two lives were lost in the erection of the piers, one from burns suffered while working in an underwater compartment, supposedly from the ignition of matches in his pocket, and the other from being struck by a falling section of formwork, during the sinking of pier No. 1.

Precautionary safety methods were taken in the erection of the steel, even to the extent of providing a boatman on the river beneath the workers to rescue anyone who might fall or be blown from atop the structure more than 100 feet above the water, and as a result of this safety first planning, no serious accidents occurred during the several months required to complete this hazardous task.

The bridge was designed by the engineering department of the Omaha Steel Works. The firm of Modjeski & Chase, of New York, recognized international bridge authorities, were the consulting engineers and approved the design and construction. The bridge was fabricated and erected by the Omaha Steel Works, of Omaha, Nebraska.

C. C. WESCOTT,
President Plattsmouth Chamber of Commerce
Plattsmouth, Nebr.

HENRY A. SCHNEIDER
President Plattsmouth Bridge Company,
Plattsmouth, Nebr.

GOV. WEAVER GUEST TODAY

Hon. Arthur J. Weaver, governor of Nebraska and one of the state's foremost citizens, is the most prominent guest in Plattsmouth today to attend the bridge opening ceremonies, at which he will deliver the principal address.

Plattsmouth is always glad to welcome Arthur Weaver, citizen of our neighboring town of Falls City, and one of the most ardent supporters of Missouri river navigation in the middle west.

He is an eloquent speaker and has appeared here at various times in the past at Happy Hundred supper, 4th of July celebration, etc.

This is Mr. Weaver's first official visit to Plattsmouth since becoming governor, and his willingness to take time from his busy life as chief executive of Nebraska and come down to participate in the celebration incident to our bridge opening is greatly appreciated by the people of Plattsmouth.

TOLL TAKERS ON VACATION

This day of dedication, filled as it is with hustle and bustle for everyone of the officers of the bridge company and Chamber of Commerce, is one of quietness and serenity for the men who take toll at the new bridge regularly 24 hours out of every day—excepting this one.

Since the bridge was thrown open to public traffic February 1st, these two men, Clarence Cotner and Philip Horn, have alternated with twelve hour shifts at the toll house at the Nebraska end of the bridge.

But, today—ah, that is different. The decree of the bridge company that there shall be no toll charged over the bridge from early morning until the last of the dance crowd from Iowa wends its way wearily homeward at "Two O'clock in the Morning."

Albert Cotner, the pleasant young man who took toll at the Platte river bridge until it was made free from the proceeds of the toll collected has the day shift while Philip Horn officiates in this capacity at night.

It's vacation day for these boys, so let's shout with joy. Hip, hip, hurrah; no tolls today.

MUCH PAINT REQUIRED

Many gallons of paint were required to cover the steel work in the new bridge and give it the shiny gloss appearance it presents.

In contrast to the black on the rest of the bridge, the hand railing stands out with a coat of aluminum colored paint that makes it visible at night as well as in the daytime.

Frequent repainting of the structure will be necessary to preserve the steel and it will be no ordinary sized paint bill every time it has to be gone over, either.

Long Story From Conception of Bridge Plans to the Time of Letting Contract for Structure

Many Obstacles Had to be Overcome Including Passage of Bill by Congress and Gaining War Department's Consent

CHAMBER OF COMMERCE ON THE JOB

Lent Its Aid at Every Turn—Traffic Survey Necessary Before Eastern Investors Would Underwrite Bond Issue—Roadway Another Problem.

On one of the coldest nights of the entire winter of 1925-26, there was incubated in a small hall at Eagle the tiny spark of life that has brought us to this occasion—namely, the dedication of a new $700,000 Missouri river bridge at Plattsmouth.

Present at that meeting, which had been called by J. A. Gardner, then editor of the Eagle Beacon, was a large delegation from Plattsmouth, including the Missouri River Bridge committee of the Plattsmouth Chamber of Commerce. Bert George and Charles Roper also came out from Lincoln to attend the meeting and give the bridge boosters some information on South Dakota's program of bridge building. Officers were elected and the date set for another meeting at Elmwood a few weeks hence. This also proved to be a cold night, though not nearly the equal of the one before. There was a larger attendance and further progress made at the Elmwood meeting.

As president of the newly organized Cass County Bridge & Highway Association, Mr. Gardner expended much time and considerable of his own personal funds, boosting for the multi-bridge plan, and it was not until after the meeting held here at the Presbyterian church a couple of months later, when the collection of membership fees was decided upon, that Mr. Gardner was reimbursed for the money he had expended.

Later representatives of the Cass county association met with bridge boosters from other cities up and down the river to form the state association, with John Hopkins, of Omaha, as president, and Judge Begley of this city named to a place on the executive board.

At all these meetings Lincoln delegates were strong supporters of getting a bridge at Plattsmouth, giving the local men who were anxious to push the proposition encouragement and enthusiasm to go ahead.

After the state legislature failed to pass the desired bills at its session of 1927, Plattsmouth grew impatient at delay and the men who were behind the project got busy and worked out a plan of their own that would not only get the bridge for the community, but that without the subscribing of a single dollar (other than for the volunteer purchase of stock) and has proven by far the most feasible plan of all.

JOHN W. TOWLE
of Omaha, Treasurer of Plattsmouth Bridge Company

Other towns that have got or are getting bridges are forced to put up from a third to a half the cost out of their own communities. This was not the case with the Plattsmouth bridge.

The crying need of a bridge at Plattsmouth was one that would not be downed. It was a subject of discussion whenever civic bodies met, and when the Chamber of Commerce was reorganized January 1st, 1928, the first important committee to be

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