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ST. PAUL'S HIGH BRIDGE

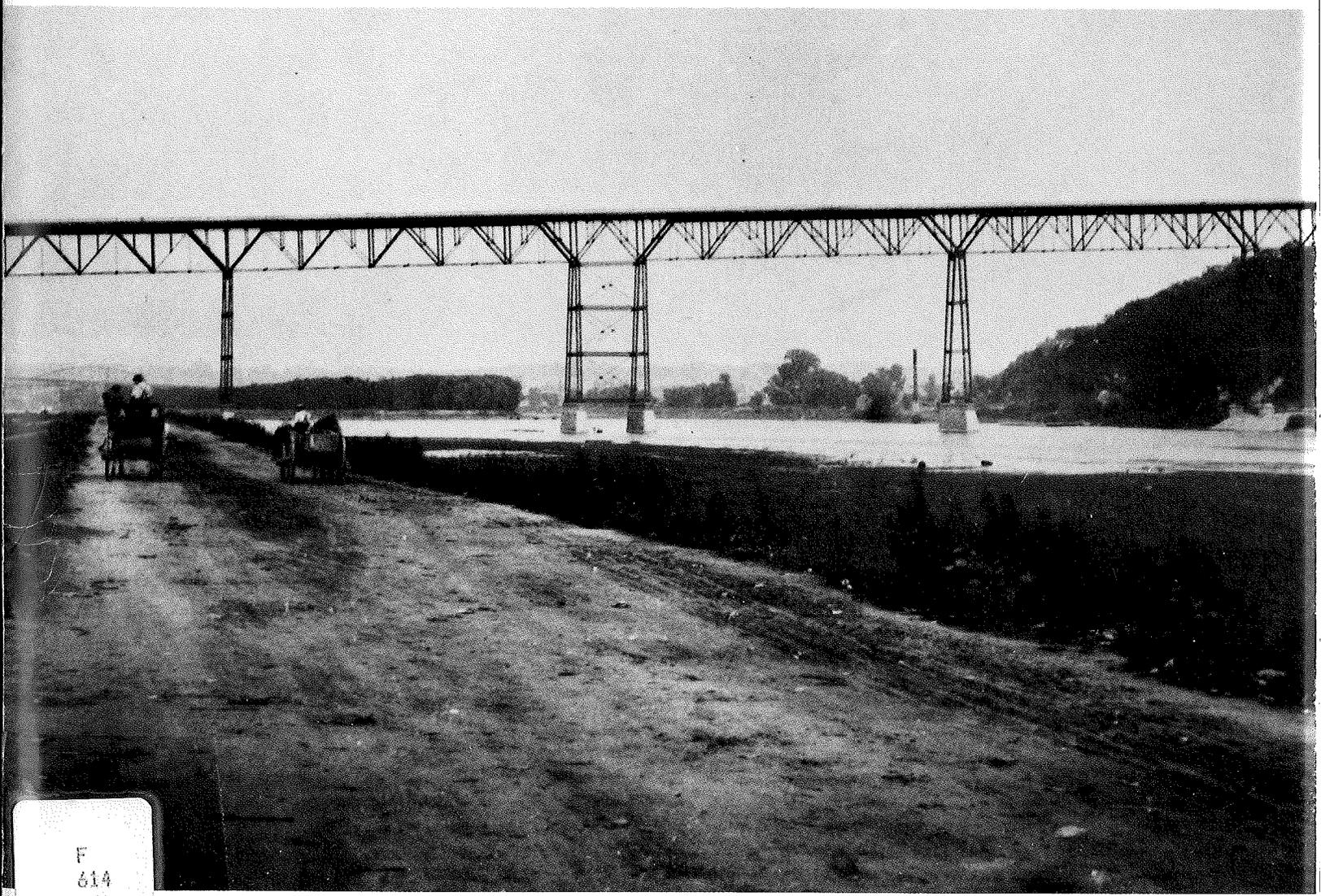
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A Photo-Essay of the History of
a St. Paul Landmark

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District Nine
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Dedicated to the communities of the West Side and West Seventh Street..

“Whoever we talk with seems to rank the High Bridge along with other important things in their lives like tap-water and sunshine. It’s been a natural extension of the surrounding sidewalks and streets; as much a part of this community as a body’s arms and legs.”

—Kathy Vadnais and David Thune
High Bridge Highs: a goodbye

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Smith Avenue High Bridge. ca. 1889.

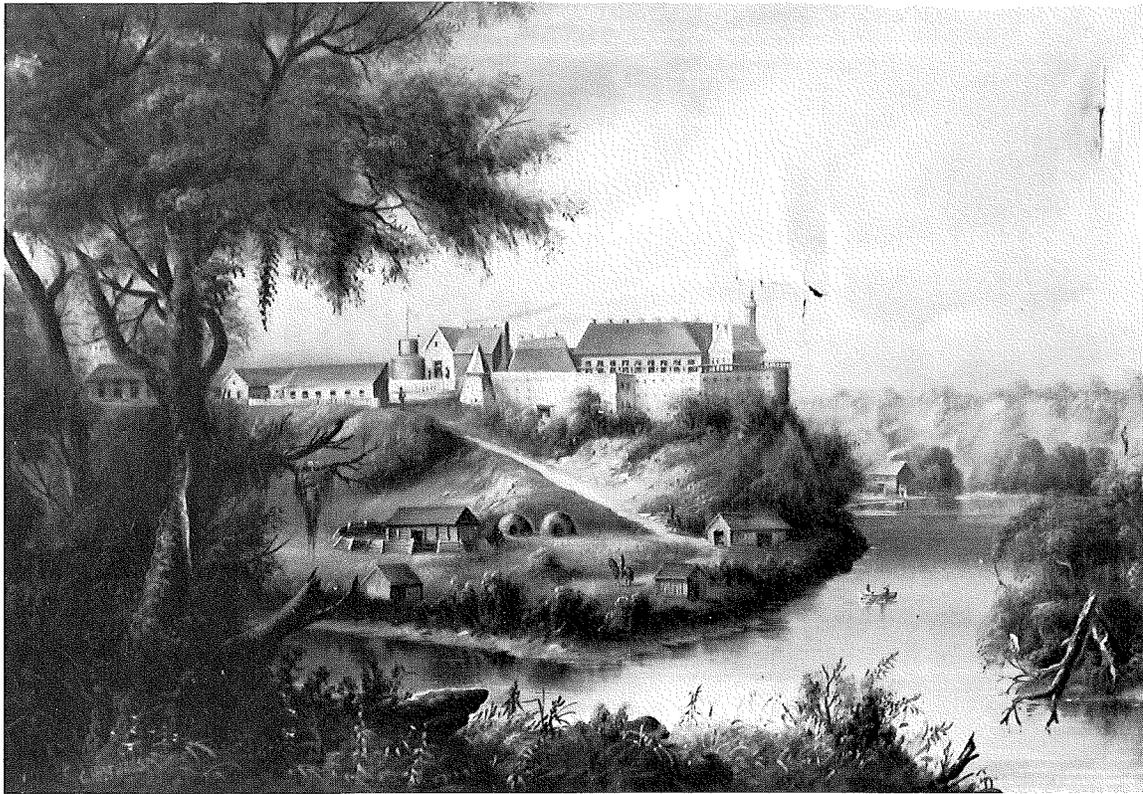
Introduction

The Smith Avenue High Bridge had been a vital transportation link in the city of St. Paul for nearly 96 years. The bridge was built to connect St. Paul's oldest residential neighborhood, West Seventh Street, with its newest at the time, Cherokee Heights, or the Upper West Side, the only remaining undeveloped neighborhood within walking distance of downtown St. Paul. The span provided the Upper West Side with a direct route to downtown St. Paul, and also provided the southern Ramsey and Dakota County farming areas with an important direct route for those who sought St. Paul as a marketplace.

The High Bridge was a rare example of nineteenth century bridge technology, and represented an intricate and graceful engineering solution to the problem of connecting two communities situated on high bluffs that are separated by a wide expanse of the Mississippi River flood

plain. Andrew Carnegie's Keystone Bridge Company designed the 2,770-foot wrought iron structure which towered from 80 to 191 feet above the river. The unique design of the High Bridge made it at once an important and visually prominent landmark for the entire city as well as for the two interdependent communities it served. Until its closing, the High Bridge played an integral role in the economic and social life of its local neighborhoods, and in the city as well.

The story of the High Bridge and its special place in the history of St. Paul is the subject of this essay. It also tells the story of the structure which will replace the High Bridge, and the particular and varied concerns surrounding the replacement of this unique and admired landmark.



Settler housing and activities surrounding Fort Snelling, ca. 1839. (Artist: C. Holthaus. Minnesota Historical Society.)

A Brief History of Early St. Paul

In the early 1820s, Fort Snelling was established at the confluence of the Minnesota and Mississippi Rivers as an outpost for the northwestern United States. At the time it was considered the “outpost of civilization,” the northernmost reach of the Northwest Passage. A few miles downstream from the fort, the city of St. Paul took root in the late 1830s when a number of fur traders, pioneers and discharged soldiers built cabins along the east bank of the Mississippi River. Although the site of St. Paul was at the head of practical navigation on the Mississippi and therefore a logical choice for its location, how the city’s settlers actually arrived there is an interesting story.

Settlers not connected with Fort Snelling had been living in close proximity of the fort since a treaty with the Sioux and Chippewa Indians signed in 1837 allowed them to do so. This so irritated the fort’s commandant, Major Joseph Plympton, that he decided formal boundaries of the military reservation should be drawn, believing that a military reservation should be used strictly for military purposes. Plympton, who was very contemptuous of the settlers, was “inclined to claim everything in

sight” for the reservation in order to evict the settlers. When the surveying was finished and the reservation boundaries established, no civilians were allowed to cut timber or to erect buildings or fences on the reservation. For this reason, the settlers were forced to leave.

In June of 1838, a colorful bootlegging settler named Pierre “Pig’s Eye” Parrant established himself and his saloon at Fountain Cave, located down the river from the fort near the present Randolph Street and Shepard Road. (There is now a roadside plaque marking this location.) Parrant was joined there by a few of the settlers who were forced out by Major Plympton. These included Abraham Perry, a Swiss watchmaker, and Benjamin and Pierre Gervais, pioneers from the Selkirk Colony in the Red River Valley in northern Minnesota. Again, Plympton tried to evict them, claiming the reservation boundaries extended well past Fountain Cave near to what later became known as Seven Corners. When the settlers refused to leave, soldiers were ordered to carry their household goods from their cabins and destroy the buildings. This done, the settlers were again forced to move. In making

this extended claim, Plympton was also able to include St. Anthony Falls within the fort's boundaries, a strategic ploy intended to limit the falls to military uses only. Eventually, only a great deal of surveying and investigation finally convinced the commandant that the fort's jurisdiction did not extend that far.

Parrant had already lost his claim at Fountain Cave prior to this eviction, and had moved further downstream to the site of what later became the foot of Jackson Street, on the lower landing. Perry and the Gervais brothers joined him there. Parrant opened his saloon, only to eventually sell it to Benjamin Gervais for \$10 because it was now out of reach of the fort's soldiers and suffered from a lack of business.

This Frenchman, "Pig's Eye" Parrant, is considered by many to be the first settler of St. Paul. When Parrant came to this area, he was nearly 60 years old, having been previously a soldier, a voyageur, and then a fur trader for the Northwest Company in his younger days. Early on, Parrant had suffered a knife wound in one eye, which gave him the nickname "Pig's Eye." According to historian J. Fletcher Williams, he was a

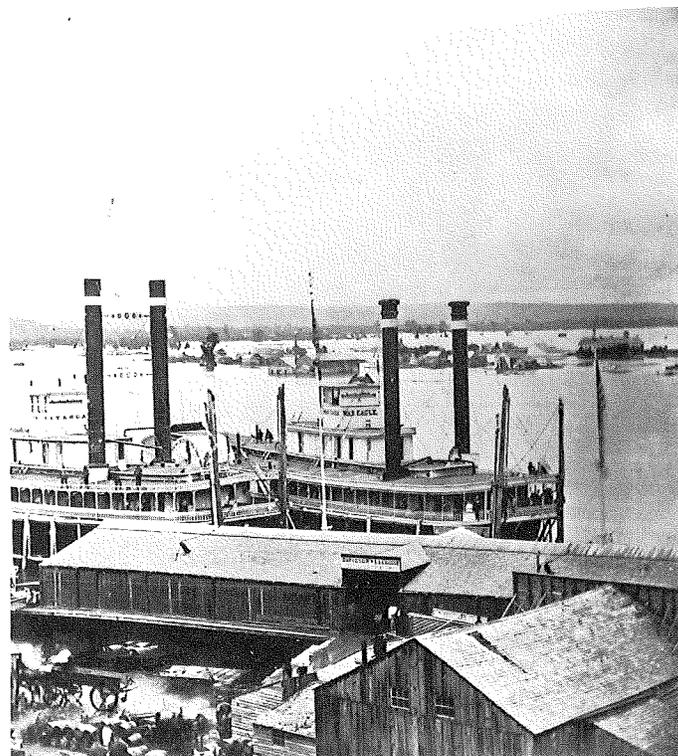
"coarse, ill-looking, low-browed fellow with only one eye. He spoke execrable English. His habits were intemperate and licentious... His eye was blind, marble-hued, crooked, with a sinister ring around the pupil, giving a kind of piggish expression to his sodden, low features."

Parrant's appearance and behavior hardly made him socially acceptable nor did he seem to want to be, for it was not very long after people settled near him that he moved on again. After selling his lower landing claim in 1844, he moved once again down river to a point then known as Grand Marais, ("the hay meadows") near the marshy area two miles downstream from the lower landing that now bears his nickname, Pig's Eye Lake. After a short time there, he announced he would head for Duluth, and was never heard from again.

Parrant is credited with being the first man to settle at the lower landing, but when he arrived, three discharged soldiers had already been in residence for about one month. These were Irishmen Edward Phelan, John Hays and William Evans, and Evans actually made the first claim on Dayton's Bluff.

Whether Parrant was the first there or not, his nickname of Pig's Eye identified the tiny lower landing settlement up and down the river until 1841 when the Chapel of St. Paul was dedicated by Father Lucien Galtier, a Catholic priest who had come to the settlement two years earlier. During the dedication ceremony, Father Galtier wished that the settlement be named St. Paul, after the chapel, and it was.

The year 1843 brought more settlers to St. Paul via steamboat, and among them was John R. Irvine. Irvine had been talked into coming to the area by Henry Jackson. Both arrived in St. Paul after traveling together from Buffalo, New York, to Prairie du Chien in southwestern Wisconsin. According to another early St. Paul historian, W. B. Hennessy, Irvine



This was the lower levee in 1859, which remained quite active throughout the 1850s and 60s. (Photo: Illingworth. Minnesota Historical Society.)

“must have been led by instinct for it had little to commend it to his business sense when he arrived at the close of winter. He was convinced that there must sometime be a town at the head of navigation and he staked his all on the event. He was the first man to arrive in St. Paul with a set plan that he had the strength of mind enough to adhere to. Irvine may well be regarded as the first to arrive in St. Paul who, by his capacity and business judgement, contributed in a large way to the advancement of the interests of the city.”

The next year Irvine went back to Prairie du Chien, 175 miles to the south, to close his grocery business before the spring thaw. Once the river was moving, he loaded his possessions on a boat and headed for St. Paul.

According to Hennessy,

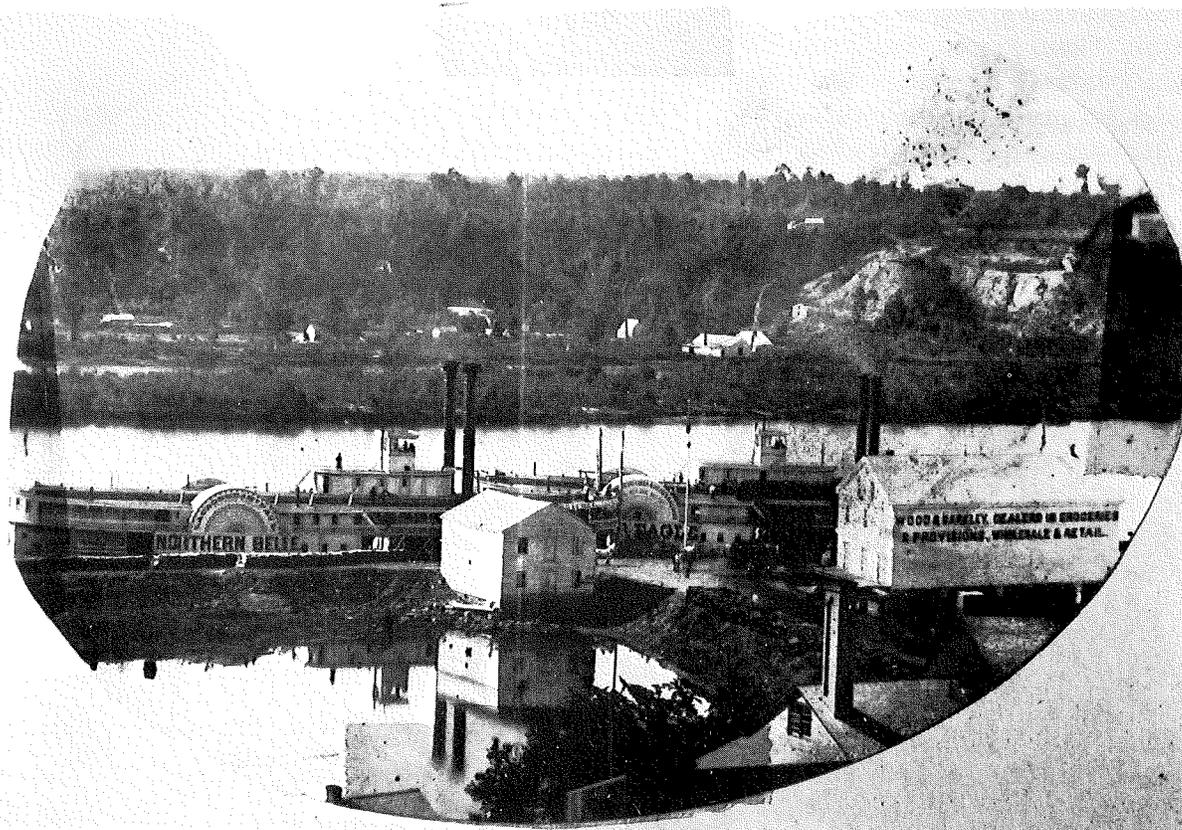
“He appears to have had the first thorough equipment for a store of that day and more of the necessities for furnishing a home than had been seen in St. Paul before.”

Irvine was indeed very enterprising, as his dealings concerning the area around the “upper landing” reveal. Irvine purchased 300 acres of land near the upper landing from Joseph Rondo, an earlier settler. The upper landing was approximately one half mile upstream from the lower

landing, at the foot of Chestnut Street. Irvine had the trees cleared between the landing and the hill above it, processed them in his sawmill, and sold much of the wood to steamboat captains for use as fuel. In this cleared area, he platted Irvine Park, and spurred the development of a residential neighborhood near the park by selling property to homebuilders.

Irvine himself was among the first to build a home next to the park. This area was the first permanent and enduring residential neighborhood in the city, and the park quickly became the most fashionable in the city. It was around Irvine Park that many of the state’s most prominent early citizens made their homes. Several of the mansions, including the city’s largest concentration of pre-Civil War houses, still remain in the rehabilitated neighborhood. The district was placed on the National Register of Historic Places in 1973, making it, appropriately, St. Paul’s first historic district on the National Register.

Separated by limestone bluffs, the upper and lower landings each had its own commerce and residents, and



The upper levee in 1860. This levee was not quite as active as the lower levee, but still maintained a thriving business. This view also shows the bluffs across the river and part of the sparsely settled upper West Side. (Minnesota Historical Society.)

Irvine Park in 1888. John Irvine's park was the meeting place for many of St. Paul's prominent families, and was the most elegant address in St. Paul before Summit Avenue. (Minnesota Historical Society.)



the economic rivalry between the two settlements was fierce. Competition was so intense between the two that it was said each ran by its own time, differing as much as fifteen minutes. Eventually, commerce overtook the lower landing and many of its residents moved to Dayton's Bluff, Irvine Park and Summit Avenue. Downtown St. Paul, as it appears today, was built up around the lower landing's commercial district which early on became known as Lowertown because of its proximity to that landing. This 17-block area of Lowertown was placed on the National Register of Historic Places as an historic district in 1983.

On March 4, 1849, the Minnesota Territory was organized and St. Paul was designated the territory's capital, by a compromise reached with Stillwater, which instead wanted the state's prison because of the income it could generate. Rapid land speculation and construction began as soon as the first steamboat of the season arrived with the good news on April 9. Within three weeks, the city had doubled in size. St. Paul was on its way.

The year 1857 proved to be one of substantial growth for St. Paul. In 1886, journalist Thomas Nelson noted that "never in the history of this city had immigration poured into it so rapidly as [in 1857] and St. Paul was claimed by visitors to be the liveliest town on the Mississippi River, a reputation it has sustained ever since... The Reader should remember that then we had no railroads, and that all travel came by boats and stages, consequently the river trade for 1857 was simply enormous."

By the late 1850s, St. Paul had expanded enough to require its first crossing of the Mississippi to the valuable land on the west side of the river. This crossing was the St. Paul Bridge, later to become the Wabasha Street Bridge. The area of flat land across the river from the lower landing, although geographically to the southeast, was known as the West Side because the Mississippi was perceived to run basically in a straight north-south direction. However, downstream from Fort Snelling the river bends to the north and then to the south again at the location of the lower landing, creating the wedge of land known as the West Side.

Michael Murray House, 35 Irvine Park. This is one of the larger homes facing the park and was built by Murray in 1890. Murray founded Northern Cooperage, a wooden barrel manufactory which operates today in its original building on the lower West Side, now known as Greif Bros. (Minnesota Historical Society.)



Dr. Justus Ohage House, 39 Irvine Park. Another imposing mansion facing the park, this home was built in 1889 by Dr. Ohage, who dedicated Harriet Island as a city park in 1905, and sponsored the city's first public baths there. (Minnesota Historical Society.)

Alexander Ramsey House, 265 South Exchange Street. This 1872 mansion is one block from Irvine Park, yet its location (and its owner) attracted many city and state leaders to live in this area. (Minnesota Historical Society.)



Seven Corners in 1895, the center of the upper levee business district for many years. (Minnesota Historical Society.)



The Growing West Side

White settlement in the West Side had actually begun after the 1851 signing of the Treaty de Traverse des Sioux. Earlier, Indians had been living there, as evidenced by 31 burial mounds on the flats of the West Side, or the Lower West Side. The area is divided by steep sandstone bluffs, at the top of which is Cherokee Heights or the Upper West Side. There was no rush to settle on the West Side, however, for, according to West Side historian Max Winkel,

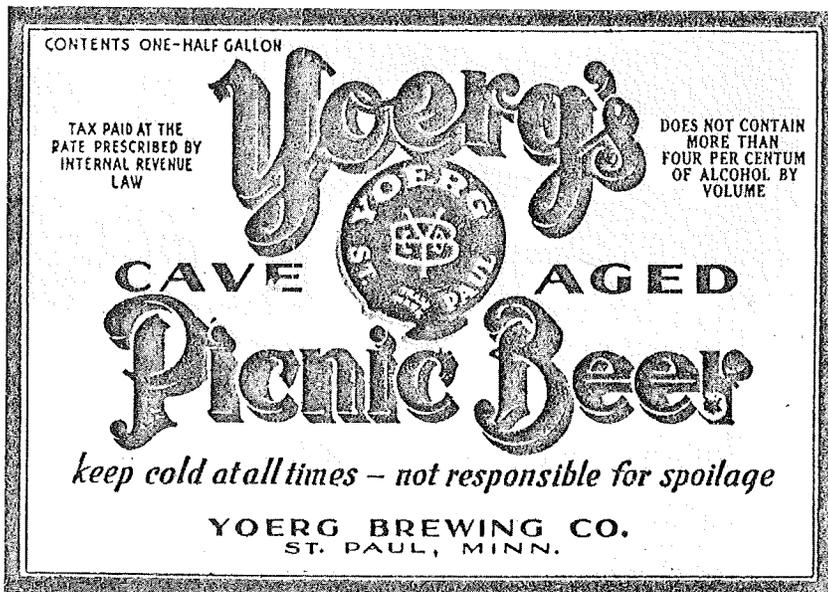
“even then the section in the bend of the river was not considered very desirable, as the land was subject to floods every spring, so it was not much good for farming. There were also still many Indians in the vicinity, and as their custom was to leave dead bodies above ground until completely decomposed, the stench kept settlers out until [Territorial] Governor Gorman finally put a stop to the practice.”

The West Side's first white settlers were predominantly French-Canadian voyageurs, followed by German and Irish immigrants. Large numbers of Germans settled there in the 1850s and 1860s. Some settlers chose slightly higher ground which did not experience flooding, near the present Isabel and Winifred Streets. The less fortunate had to reside on the lower ground. Many poor Irish immigrants were attracted to the flats because of its affordable housing and proximity to work opportunities. From the start, the flats had been a poor man's neighborhood, and never a desirable location to settle.

When the city of West St. Paul was chartered and incorporated in 1858, the same year Minnesota became a state, there were nearly 400 people living on the flats. One of the area's first white settlers, George W. H. Bell, was elected mayor. Mayor Bell and the new city council made vigorous attempts to attract people to live in the new city, but the city struggled under poor management and plunged deeply into debt. Until the St. Paul Bridge was completed in 1859, the only access to the lower West Side was by ferry, which also added to the city's problems of attracting people to settle there. West St. Paul's charter was revoked in 1862 and the area was put under the jurisdiction of Dakota County.

In the years 1873 to 1874, the city of St. Paul discussed annexing the West Side as its sixth ward for two reasons: to aid law enforcement—criminals could escape St. Paul authorities by crossing to the West Side and Dakota County—and to eliminate the Wabasha Street Bridge tolls which were inhibiting development on the West Side. It was for the latter reason that Dakota County approved the annexation to St. Paul, which was completed in 1874. The West Side was now permanently a part of St. Paul and Ramsey County. The area south of Annapolis Street remained in Dakota County as West St. Paul.

There was access to the Lower West Side via ferry and the St. Paul Bridge, and later by the Robert Street Bridge,



The label of a West Side brewery. (Ramsey County Historical Society.)

Little Italy in 1897.
One problem the
community
experienced every
spring was flooding,
which caused the
neighborhood to be
razed in 1952 after a
disastrous flood.
(Minnesota Historical
Society.)



which was completed in 1886. But the Upper West Side was virtually cut off from the flats because the rough, steep roads up the cliffs were too difficult to negotiate with a loaded wagon. The opening of the High Bridge in 1889 finally allowed and encouraged development to reach the bluffs, which had previously been the only undeveloped area within walking distance of downtown St. Paul.

The West Side attracted the beer industry to its locale because of the system of natural caves in the limestone bluffs. Many breweries used the caves for cooling and storing beer. Early industries that were established on the flats in addition to the breweries included foundries, quarries, and manufacturing. It was the proximity of these industries that attracted many newly arrived immigrants to settle on the West Side. In the late nineteenth century, eastern European and Russian Jews made their first home there before moving to the Highland Park area. After the turn of the century, a substantial Mexican-American community was established on the West Side, and since the 1940s several more ethnic groups have mixed into the neighborhood. Urban renewal in the 1960s cleared the residential areas and many of the original industrial buildings on the lower West Side for construction of the Riverview Industrial Park. This industrial park continues to provide jobs for much of the West Side population.

The West Seventh Street Community

There had been an oxcart trail connecting Fort Snelling with downtown St. Paul along the east bank of the Mississippi River since St. Paul began to grow in the late 1840s. This was called the Fort Road, eventually West Seventh Street, (and now again known as Fort road in recognition of its historical importance) then and now one of the city's major streets. A middle-class neighborhood composed of various ethnic groups grew up around Irvine Park and Fort Road. As noted before, Uppertown businesses and industries grew to be just as active as those at the lower landing. Uppertown industry included at least six breweries, railroad shops, foundries and factories. The business district itself centered on Seven Corners, at approximately the site of the St. Paul Civic Center. Many of the thousands of Polish, Czechoslovakian, German and Irish immigrants who disembarked from steamboats at the upper levee stayed to settle there because of the many work opportunities within walking distance from the residential areas.

An interesting community developed on the flats near the upper levee. Almost a city of its own, this neighborhood was at first Polish, but in the 1890s became almost entirely Italian and remained known as Little Italy until its



The High Bridge, with the McMillan Steps, in 1924. Residents of Little Italy crossed several railroad tracks to reach these steps, their quickest access to West Seventh Street and streetcar transportation. (Photo: St. Paul Daily News. Minnesota Historical Society.)

clearing in 1952. According to a 1938 researcher, Alice Lilliequist Sickels,

“As the levee became more crowded with settlers, houses were built on piles in the swampland between the levee and the mainland. Dirt, ashes, and refuse, diverted from their destination on the city dump, were filled in and around these new houses and gradually in this manner the other two streets of the levee, Mill and Loretto, were built up... For some years past the upper levee has been zoned for industry.”

Sickels points out that it was the “pick-and-shovel” work needed by the nearby railroads and the growing city that attracted the Italians to the levee.

The community was isolated from downtown and even West Seventh Street, making it seem even more its own, in addition to the fact that it was 93 percent Italian. Sickels described the isolation of the community:

“Although the upper levee is within one half mile from Seven Corners and the busiest streets of the city, an almost indiscernable bit of traffic goes through the levee. The nearest street car is one half mile away. There are no buses. To reach the area one must go in an automobile or on foot. In walking to the levee one must trans-

verse dark streets, cross a wide expanse of switch tracks and pass a number of warehouses.”

Additional access to the community was provided in 1924 when the neighboring Northern States Power Company erected a stairway for employees from the top of the High Bridge to the flats, which was fairly close to the small community built in the shadow of the bridge. There is evidence in the St. Paul city bridge records that another stairway, called the McMillan Stairway, had been built on the bridge in 1911, and was located much closer to the north end. (This was located at approximately Pier 9. See Appendix.) The McMillan Stairway was torn down in 1959 because lack of use and general deterioration had rendered it unsafe.

This isolated “Little Italy” was never approached by the developing and expanding city because of annual flooding. After a disastrous flood in 1951, the St. Paul Port Authority was finally forced to purchase the land and raze the buildings, replacing them with scrapyards. Ties to the community and its families had always been very strong and contributed to the atmosphere of permanence that Little Italy enjoyed until its unanticipated flooding.

The rest of the West Seventh Street residential neighborhood developed as an ethnically-mixed working class area. Many people living in the area worked for the nearby Christopher Stahlman Cave Brewery which later became the Schmidt Brewery, an industry still operating in the neighborhood. Further south, another pocket of industry developed between West Seventh Street and the river, in addition to that at the landings and the West Side. Although the residential areas were beginning to become run down, the interest in the restoration and preservation of the historic structures begun in the early 1970s by the Irvine Park Historic District spread renewed pride throughout the entire area. Renaming West Seventh Street as Fort Road is just one example of the area's efforts to focus on its important role in the history of St. Paul.

The picture of St. Paul just before the opening of the High Bridge in the late 1880s was one of bustling activity, financial and geographic growth, and optimism. Railroads were changing the face of this river city, which had for years been serviced mainly by boats and had consequently developed along the river near the levees. In 1888 alone, eight million passengers passed through St. Paul's Union Depot, with more than 150 trains arriving and departing daily. This figure is four times the present metropolitan area population of roughly two million peo-

ple and is in addition to the passengers still arriving by steamboat! The streetcar system begun in 1863 by James Burbank was rapidly expanding to accommodate the influx of immigrants. Third Street, now Kellogg Boulevard, was the commercial main street of Lowertown and the first road to be paved with cedar blocks. Later, the shopping district moved north to Sixth and Seventh Streets, but Third remained crowded with produce wagons, saloons, and employment offices for railroad and lumber workers.

Many of St. Paul's finest buildings were constructed in this booming period, including the Endicott Building, the Central Presbyterian Church, and the Pioneer Press Building, St. Paul's first skyscraper at 12 stories high, all built in 1889. The Schubert Club was organized in the mid-1880s and was hailed as St. Paul's most significant musical incident of the 19th century. Ice palaces built for the annual St. Paul Winter Carnival were generating as much interest and excitement as the Carnival itself as everyone wondered how much more beautiful each year's castle would be than the last. Summer cottages of the well-to-do could be found at White Bear Lake, which enjoyed a national reputation as being a fine resort area. Como Park was also becoming a popular place to spend a summer afternoon, accessible to downtowners by electric street car.



Third and Wabasha Streets in 1887. Third was St. Paul's "Main Street" in the 19th century. It became Kellogg Boulevard in 1929, named in honor of St. Paul native Frank B. Kellogg, a former U. S. Secretary of State. (Photo: Arthur C. Warner. Minnesota Historical Society.)



St. Paul's Union Depot, ca. 1890. Servicing eight million passengers in 1888 alone, this building dominated the St. Paul waterfront. (Minnesota Historical Society.)

Annexation by the late 1880s had expanded St. Paul to include St. Anthony Park, Lake Como, the West Side, and the area north of Fort Snelling, bringing the western boundary of St. Paul to meet the eastern boundary of Minneapolis along the Mississippi River and extending north along Emerald Street. Another crossing to the lower West Side, the Robert Street Bridge, had been opened in November of 1886. Fierce pride in the substantial growth of both of the Twin Cities and the desire of each to be better than the other had climaxed in an entertaining "census war" in 1890, with newspapers in both cities accusing the other of padding their census returns. For example, witness this headline from the *Minneapolis Journal*: "It Means War. The Mask of Hypocrisy Torn from Malignant Face of St. Paul—A Dastardly Outrage Committed on Minneapolis Citizens by the St. Paul

Gang." And from the *St. Paul Daily News*: "Arrested! Scheme to Swell the Population of the Flour City Knocked in the Head." Both cities pleaded their case before the United States Attorney General, and both were found to have exaggerated their numbers. Minneapolis had included even its cemetery population of over 18,000.

These glimpses into life in St. Paul at the time the High Bridge was being built help to form a picture of how important this link to the undeveloped area south of downtown St. Paul was to become. The city was nearly "bursting at its seams" and the Upper West Side was valuable and desirable land for business and residential districts. Credit for providing this link goes in large part to the man responsible for the building of the High Bridge, Robert Smith.

Robert A. Smith. This photo was taken for Smith's 1884-85 term in the St. Paul City Council, during which he served as president. (Photo: C. A. Zimmerman. Minnesota Historical Society.)



Mayor and Senator Smith

Robert A. Smith, for whom Smith Avenue is named, was a man very much involved in the politics of St. Paul. Born and raised in Booneville, Indiana, Smith had a law partnership in his home town for four years before arriving in Minnesota in 1853 to serve as private secretary to his brother-in-law, Territorial Governor Willis Gorman. After Smith arrived in St. Paul, he held many public offices, including territorial librarian, county treasurer, representative from the Third Ward to the City Council, president of the City Council, in the state legislature as both a representative and a senator, and as postmaster. His most prominent position, however, was as the Mayor of St. Paul, an office he held for a total of 15 years.

In addition to his several public positions, Smith joined the banking house of Dawson, Smith and Reed in 1866. He was an incorporator and officer of the Bank of Minnesota which succeeded Dawson, Smith and Schefter. Unfortunately, the Bank of Minnesota failed in 1896,

and left Smith penniless.

Several of Smith's terms of public office overlapped one another. For example, when he was a state senator (1886 to 1890), he was also Mayor of St. Paul (1887 to 1892). This combination provided him with an excellent position from which to see his plans through on both a state and city level, and proved to be of particular advantage in the case of the High Bridge.

In January of 1887, Senator Smith introduced to the Senate a resolution to issue \$500,000 in city bonds for the construction of a new bridge between the river bluffs near the Upper Landing. Smith had attempted to do this once earlier, in 1885, but the resolution, according to the *St. Paul Daily Globe*, was supposedly "lost to the shuffle in the Senate, and was never introduced." In December, 1886, when Smith had made public his intentions to introduce this resolution in the next legislative session, the *Daily Globe* commented,

"A mere glance at the city's development toward the west and on the opposite side of the river will convince anyone of the great advantages such a bridge would be and some think it strange that this bridge was not constructed in advance of the Robert Street Bridge."

Mayor Smith apparently had no problems convincing the City Council that the bridge was needed, but this wasn't the case with some members of the St. Paul Chamber of Commerce. A few members felt that the bridge bond bill had been passed through the Senate too quickly and quietly, and without the advice of the Chamber. In particular, Chamber member E. G. Noyes stated that because it happened so quickly, the city's residents didn't know what they were being saddled with, and that bonds for St. Paul parks were just as important. Noyes also claimed that the whole situation had "the appearance of a big real estate speculation" that gave advantage to those in the legislature who owned property on the West Side. Nonetheless, the bill was passed by the House of Representatives on January 17, 1887. According to city records, the next day the City Council directed the City Engineer to "prepare plans and specifications for the construction of a new wagon bridge over the Mississippi in the upper part of the city." A commission formed to choose the site of the bridge decided that it should be located between Forbes Street on the West Seventh end and Mohawk Avenue on the West Side. The corridor was named Smith Avenue in honor of Mayor Smith.

The next step in the process of building the High Bridge was to choose contractors for the superstructure (the deck, truss and towers), and the substructure (the

foundations, piers and abutments). General plans and specifications for each of these contracts were prepared by City Bridge Engineer Andreas W. Munster.

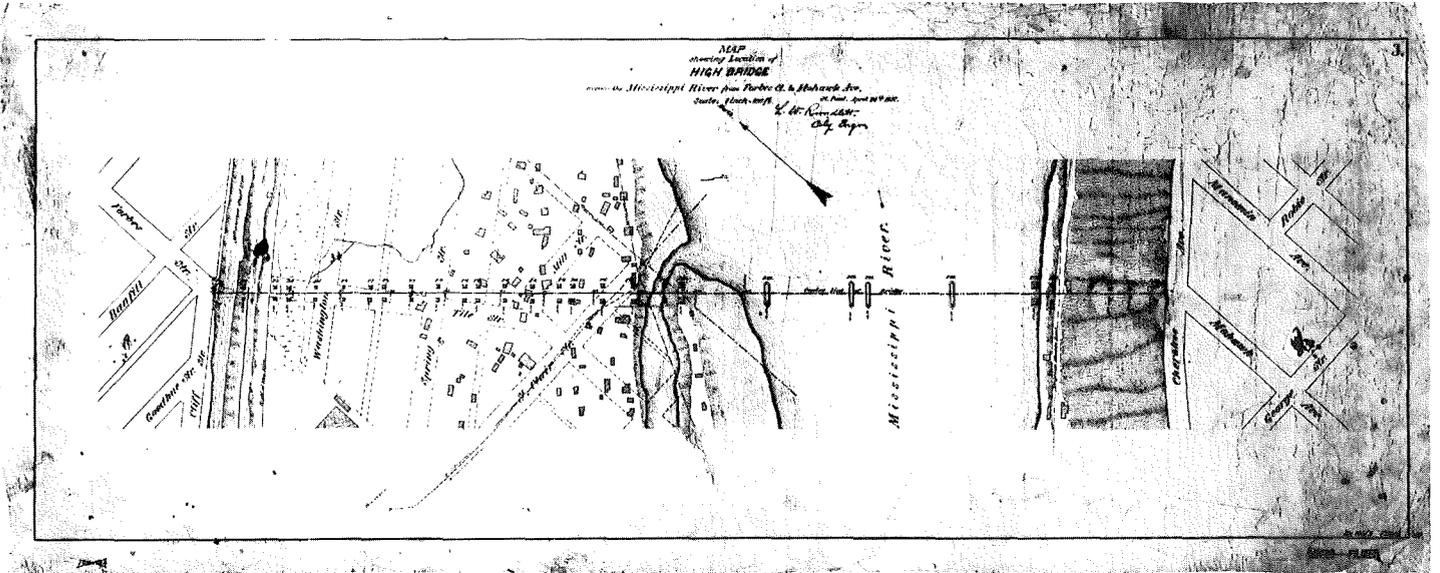
Five bids were received for the construction of the substructure. The contract was awarded to the lowest bidder, Arthur McMullen of McMullen and Morris Company from Minneapolis for \$139,119, on May 17, 1887. Work on the substructure began in July of that year.

The contract for the superstructure was not let quite so easily as that for the substructure. In fact, it generated considerable discussion. The two lowest bids received were \$311,000 from Morse Bridge Company of Youngstown, Ohio, and \$340,324 from Keystone Bridge Company of Pittsburgh, Pennsylvania. The Keystone bid was submitted by Charles L. Strobel who was a consultant engineer to Keystone from Chicago and represented Keystone in all transactions concerning the High Bridge. Although City Engineer L. W. Rundlett had recommended that the contract be let to the lowest bidder, the City Council awarded it to Keystone Bridge Company on July 5, 1887.

Just one month later, however, some council members called for reconsideration of the contract because of the suggestion that fraud had been involved in awarding the contract to Keystone, whose bid was \$29,324 higher than the Morse bid. Upon Council request, Section 19 of the Municipal Code concerning contracts was read by the council clerk. It read: "The Council shall award the contract to the lowest responsible bidder." City Engineer Rundlett admitted he recommended Morse Bridge Company to the Council primarily because they offered the



The upper levee in the 1870s. The bluff to the left is where the High Bridge was built to span this wide expanse of the Mississippi River. (Photo: Illingworth. Minnesota Historical Society.)



This location map of the High Bridge is from the original plans for the bridge, and shows the chosen corridor and approximate pier placement. The original plans also displayed three other location alternatives considered for the bridge. These were approximately, from south to north and using present day street names: Ohio Street at Isabel to Sherman and Ryan (which was only one-half block south of Irvine Park); Ohio Street at Isabel to Elm and Ryan; and Cherokee Avenue at King Street to Dousman.

lowest bid, he not being especially versed in bridge building. An unidentified civil engineer was therefore consulted by the Council Committee on Streets and Bridges and both plans were once again considered.

Committee discussion of the awarded contract's adherence with the Municipal Code seemed to shift from the word "shall" to that of "responsible" in light of the consulted civil engineer's comments on the individual proposals. As discovered by this engineer, the Morse plans were not as qualified structurally as those Keystone had submitted. In addition, it was pointed out to the Committee that in several other bridge contracts around the Twin Cities, the Morse Bridge Company was consistently the lowest bidder, but many contracts were awarded to higher bidders with superior designs. In fact, the Minneapolis City Engineer advised the Committee that, "the Morse Bridge Company, notwithstanding their lower price, did not offer the best bridges in proportion to their prices." This issue was precisely the concern of St. Paul's City Council.

In a *St. Paul Daily Globe* article, William Hamm, Chairman of the city council's Committee on Streets and Bridges, explained the Committee's decision to award the contract to Keystone. "A majority of the Committee came to the conclusion that the city would get more for its money under the bid of Mr. Strobel than under any other bid received." Mr. Hamm went on to say that the Strobel proposal would build "a more permanent, better de-

signed and more serviceable bridge in every way." The suggestion that the Council had unlawfully awarded the superstructure contract to Keystone was thus discredited and the Council judged itself responsible in its action.

This investigation still did not calm the suspicions of all concerned, as evidenced by this indignant article that appeared in *Engineering News* on August 13, 1887:

"A very nice controversy of a very discreditable character to the city authorities, has arisen over a bridge contract in St. Paul. The bridge is of some size, to span the Mississippi River, and the two lowest bids were—Morse Bridge Company \$311,000; Keystone Bridge Company \$340,324, an excess of \$29,324, both bids having been made in accordance with precise specifications. After a week's study City Engineer Rundlett reported in favor of the Morse bid. Mr. C. F. Loweth, consulting bridge engineer for various St. Paul roads, submitted a concurring opinion. Nevertheless a committee of the Common Council to which the report was referred divided 3 to 3 on the two bids, and then the Council voted 8 to 4 in favor of the higher bid. This action was found to be illegal because the Keystone Company had no bond filed, and then a later meeting was held awarding the contract to Mr. Strobel personally (who filed a bond) by a vote of 7 to 5. The only explanation which the majority offered in reply to the vehement protest of the minority was that an alleged expert, whose name they would not divulge, considered the Keystone plan the best. Indignation was at once manifested, and the controller, who seems to be a competent and vigilant officer, notified Mr. Strobel that he could not recognize the contract as it was in violation of the city charter, which requires work

to be let to the lowest responsible bidder who conforms to specifications.

It is entirely possible that the Council's action may have been in fact wise, because the design they chose was in fact the best. Tis a thing which has happened and may happen again. But whether this be so or not does not affect the certain fact that this defiance of professional opinions and of established and necessary safeguards by functionaries whose opinion as to either design is worth noting is grossly improper and binds directly to corrupt methods. The general assumption will be, not unnaturally, that they were themselves influ-

enced by corrupt motives, but it is not necessary to assume this to comprehend their conduct. It may easily be but another example of how liable men dressed in a little brief authority, most ignorant of what they're most assured, play such fantastic tricks before high heaven as make the angels weep. A little flattery and deference, a little stroking down the back, a few champagne cocktails, and that sort of thing goes further with a host of these petty functionaries than direct bribery. But whichever horn of the dilemma be chosen (and one must be) the Common Council of St. Paul shows up in a pretty bad light."

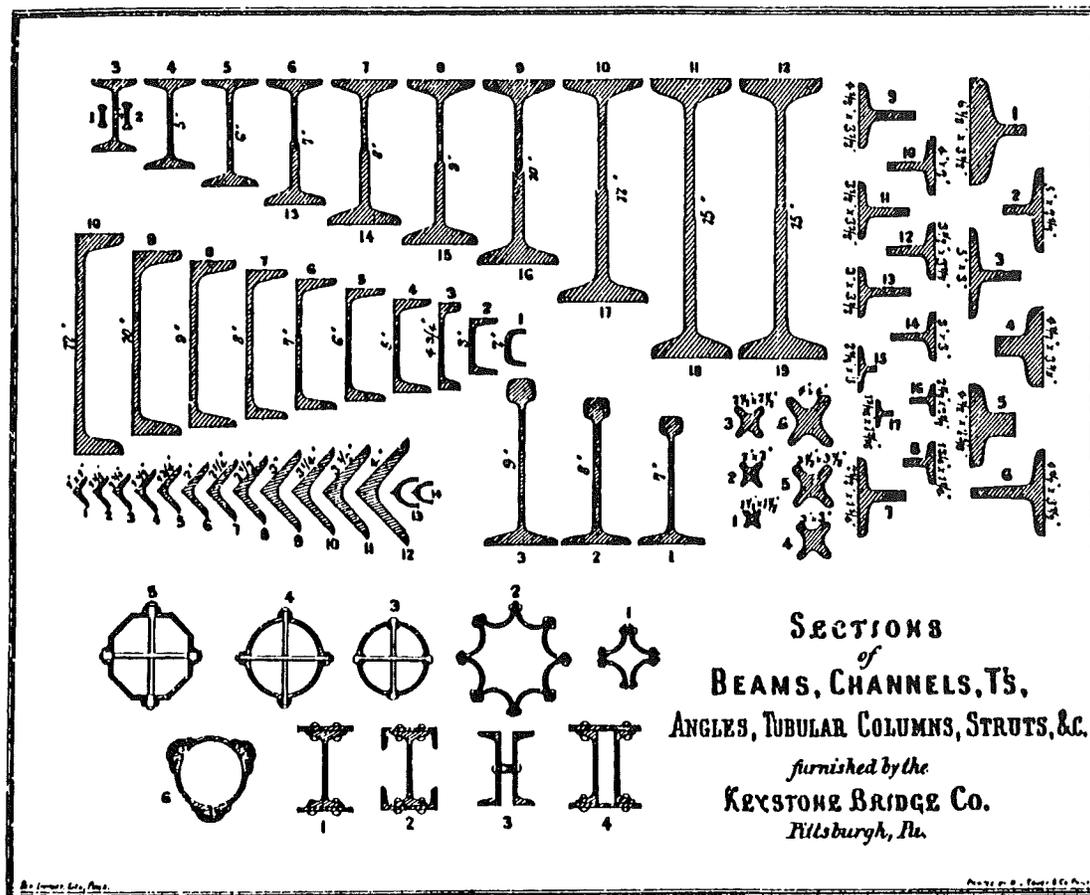
Andrew Carnegie and the Keystone Bridge Company

Keystone Bridge Company was organized from the bridge-building firm of Piper and Schiffler in 1865. Andrew Carnegie, Jacob H. Linville, John Piper, Aaron Schiffler and Tom Scott each invested \$1,250 to found Piper and Schiffler in 1862. Carnegie, at that time, was the director of a section of the Pennsylvania Railroad, which he left in 1865 to reorganize Piper and Schiffler into Keystone Bridge Company and became Keystone's vice president. Linville became president of Keystone after serving as engineer to the Pennsylvania Railroad, where he had specialized in the construction of bridges and buildings for the railroad's tracks and trains. Schiffler had been general bridge supervisor and in charge of bridges on the railroad's lines. Piper was a highly skilled mechanic for the railroad. And Scott was a good friend and sometime investment partner of Carnegie's from the railroad.

John Piper and Jacob Linville were the true visionaries of the company, with their idea of building bridges of iron that had the flexibility of wood, a material often used

in earlier bridges. One of the two most troublesome problems mechanic Piper had experienced was the danger flood and fire presented to the wooden railroad bridges then in existence. Carnegie reviewed with enthusiasm Piper's and Linville's designs for a small cast iron replacement bridge on the line. Aaron Schiffler also approved of the plans and determined that it would be only a short time before all the railroad's wooden bridges would be replaced with Piper's and Linville's iron bridges. Consequently, Piper, Schiffler, and Linville were all receptive to Carnegie's idea that they form a bridge-building firm in Pennsylvania.

The company first used cast iron, and although initially the material was satisfactory for the relatively short spans Keystone was building in Pennsylvania, it quickly became apparent that cast iron was not capable of supporting the longer spans needed for the Missouri and Mississippi Rivers. Carnegie prided himself in being one of the first to recognize wrought iron as a superior building



These are catalogue examples of the standard shapes developed by Keystone Bridge Company that were made available according to each bridge's specifications. Standardization was one reason Keystone became one of the leading bridge builders in the nation in the late 19th century. (From the files of the Division of Civil and Mechanical Engineering, Smithsonian Institution.)

material to cast iron. In his autobiography, Carnegie told this story of how he won a bridge contract in Dubuque, Iowa in 1868, which would span the Mississippi. This project was considered a great undertaking at the time.

"We found we were not the lowest bidder. Our chief rival was a bridge-building concern in Chicago to which the board had decided to award the contract. I lingered and talked with some of the directors. They were delightfully ignorant of the merits of cast and wrought iron. We had always made the upper chord of the bridge of the latter, while our rivals' was made of cast-iron. This furnished my text. I pictured the result of a steamer striking against the one and against the other. In the case of the wrought-iron chord it would probably only bend; in the case of the cast iron it would certainly break; and down would come the bridge. One of the directors, the well-known Perry Smith, was fortunately able to enforce my argument, by stating to the board that what I said was undoubtedly the case about cast-iron. The other night he had run his buggy in the dark against a lamp-post which was of cast-iron and the lamp-post had broken to pieces.

" 'Ah, gentlemen,' I said, 'there is the point. A little more money and you could have had the indestructible wrought-iron and your bridge would stand against any steamboat. We never have built and we never will build a cheap bridge. Ours don't fall.' "

Keystone quickly expanded to include the design and fabrication of highway bridges in addition to railroad bridges, and soon was one of the most prolific bridge-building firms in the country. This expansion included the formation of the Union Iron Works, situated next to Keystone in Pittsburgh, which was the direct supplier of standard rolled iron shapes to Keystone. The mills incorporated the use of the universal mill, a rolling machine which could roll plates of various widths, with finished rolled edges, up to twenty-four inches wide. Eventually this mill was improved and enlarged upon and finally could produce almost any dimension desired. For this reason, Andrew Carnegie was confident that he could meet any bridge's specifications, and used this knowledge to his advantage in contract negotiations. Set-

ting up the Union Iron Works (later Carnegie, Kloman and Company) and the Keystone Bridge Company in such close proximity of one another also represented Carnegie's first move toward the vertical organization of his business interests which eventually became the huge conglomerate of the Carnegie Steel Company.

Although Keystone Bridge Company was never one of the most profitable of Carnegie's concerns, according to biographer Joseph Wall, it was his favorite because of

"the pleasure he took in directing the construction of those great edifices, the best in American architectural design, engineering skill, and iron manufacturing—mighty monuments that would endure for generations as testimonials to the practical application of technical genius."

The use of steel came into bridge building in the early 1870s, and the physical limitations of cast and wrought iron in long spans (more than 400 feet) were overcome. As well as pioneering the use of iron, Keystone was the

first to use cast steel in bridge construction. The company supplied the material for the famous Ead's Bridge in St. Louis, which in 1874 incorporated the longest steel beams ever rolled in America at that time, which were used in an arched span of 520 feet.

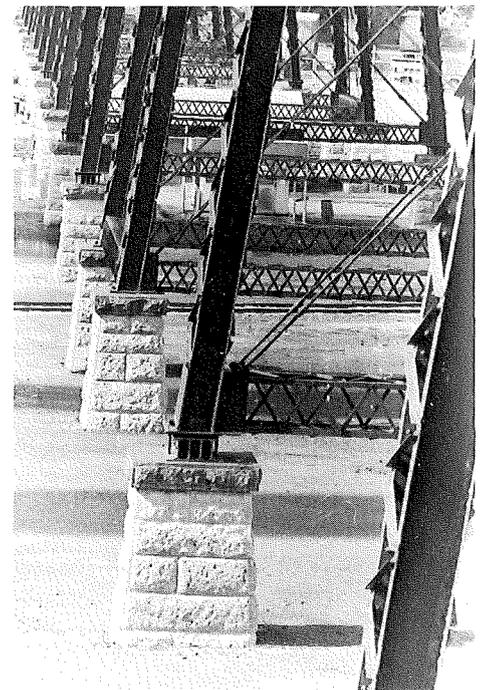
Wrought iron, however, was the material specified for St. Paul's High Bridge, primarily because it was less expensive than steel (an important factor in a bridge the length and height of the High Bridge) and the longest spans were only 250 feet. There had been inquiry from interested bridge-building firms as to the possibility of using steel in some smaller members of the truss, including the eyebars, because of the rising popularity of steel. According to files in the City of St. Paul Bridge Department, City Engineer Rundlett did allow that steel could be used in these specific members if they conformed to the same unit strains provided for similar iron members. The plans submitted by the Keystone Company used wrought iron in all members.

Design of the High Bridge

The substructure of the High Bridge consisted of 25 dry land piers including the two abutments, and four river piers. On these piers stood the supports for the superstructure, 27 "bents," the tall two-legged structures. Each bent's two legs were tied together by horizontal struts and diagonal cross-bracing rods, which provide extra rigidity. Fourteen of the bents were tied to one another to form seven four-legged "braced towers."

All dry land pier masonry used Mankato sandstone, topped with loadbearing Mankato granite. All dry land foundation masonry used St. Paul limestone, built on two layers of timber, one eight-inch pine layer and one eight-inch oak layer.

The river piers were solid pedestals (as opposed to the pedestal pairs of the dry land piers). These piers were built with Mankato sandstone, with two courses of Mankato granite comprising integral icebreakers, which sheared ice floes and minimized the amount of impact vibration up through the structure. The foundation masonry of the river piers was of St. Paul limestone, which rested on layers of timber: one six-inch and two eight-inch layers of pine, and one eight-inch layer of oak.

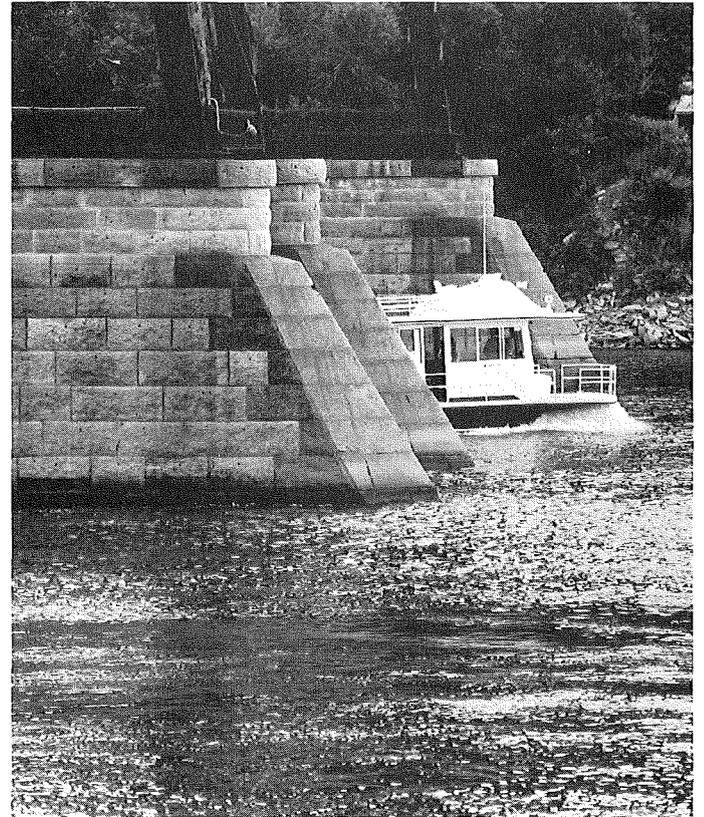


Land piers, showing bents and a braced tower. (Don Stevens, Mn/Dot.)

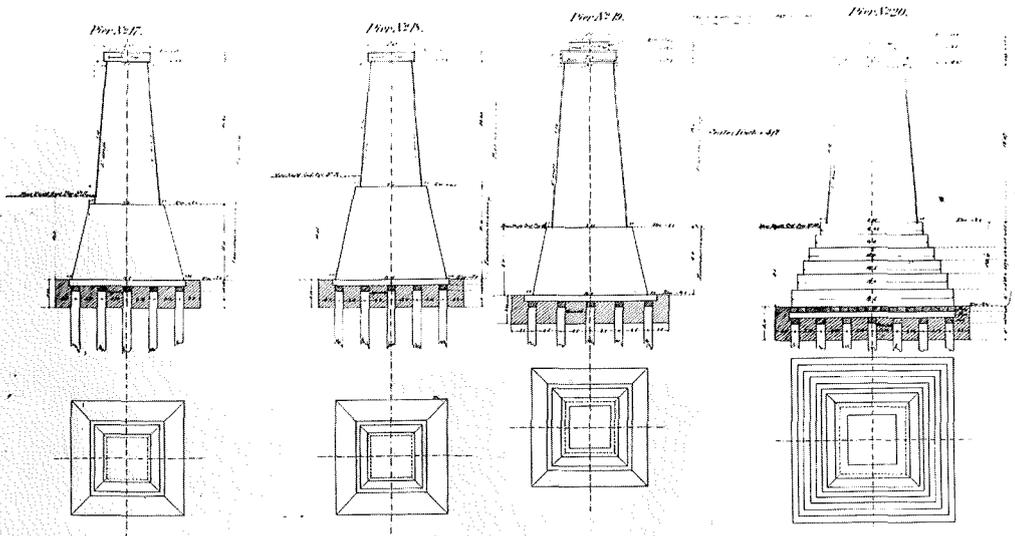
The design of the superstructure of the High Bridge can be described as an inverted and subdivided Warren deck truss which used the pin and eyebar method of construction. Truss bridges, consisting of members vertically arranged in a triangular pattern, can be used when the crossing is too long to be spanned economically by simple plate girders. In the Warren truss design, which was patented by two British engineers in 1848, the triangle is equilateral, which provides rigid construction inasmuch as there can be with no relative movement between the bars. This concept of triangulation was carried throughout the entire structure, and is practical as well—considerably less metal was required in the Warren truss than in other truss designs.

In common with other trusses, the Warren has parallel, longitudinal upper and lower members. The uppermost member is called the top chord, the lowermost is the bottom chord. All other members between the top and bottom chords, whether diagonal or vertical, are called web members. The Warren truss consists of a single triangulation of diagonals—the diagonals do not cross each other between their points of intersection on the top or bottom chords.

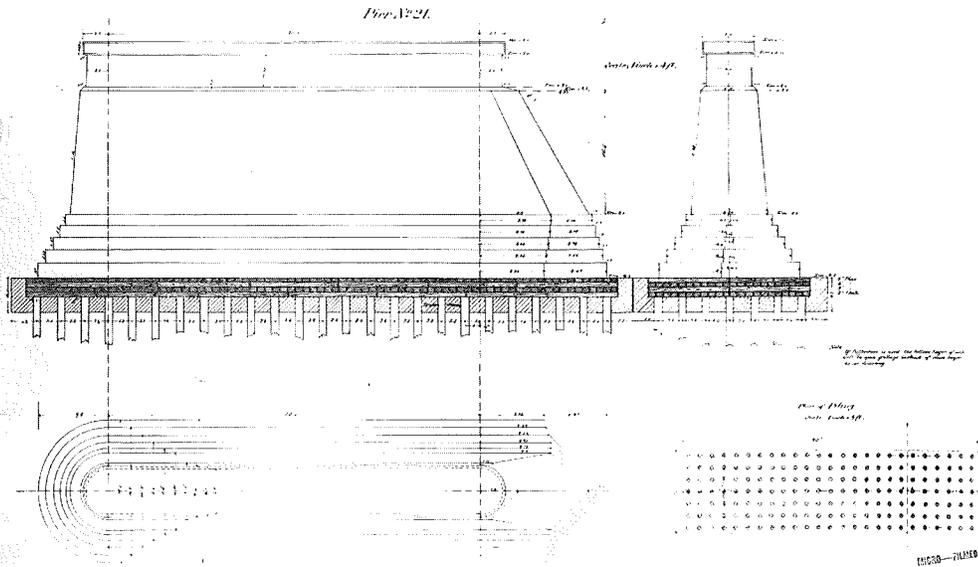
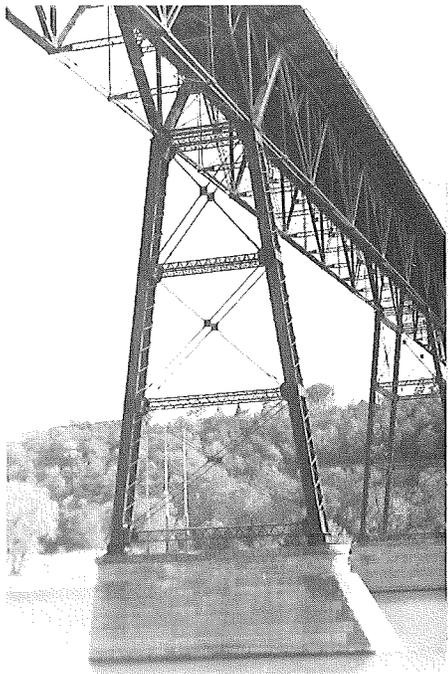
The High Bridge's four river spans were of the inverted Warren deck truss design. A deck truss has the deck structure on the top chord of the superstructure web. A through truss has the deck structure supported by the bottom chord of the web—passage is through the superstructure. The subdivided Warren was used in special cases where the floor was to be shallower and spans longer than normal. Inverting this subdivided Warren design and placing additional vertical members in the truss system provided more immediate support for the deck in the case of the High Bridge.



View showing the massive size of the river piers in comparison to the boat. The integral icebreakers can also be seen—those darkly shaded masonry pieces on the right edge of the piers. (Don Stevens, Mn/DOT.)



Elevations and sections of land piers 17-20, from the original plans. See the Appendix for the location of these piers within the bridge.

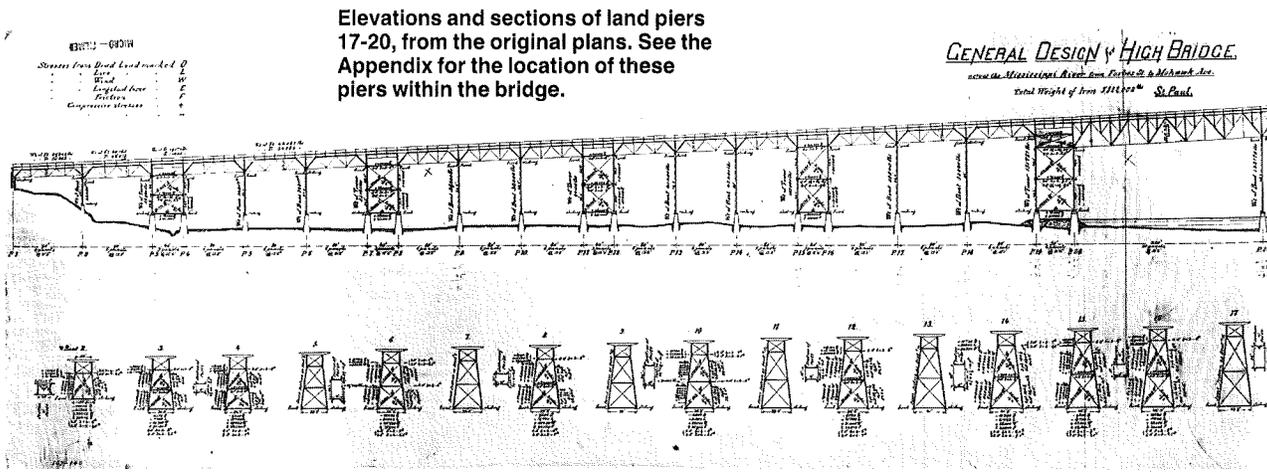


Another distinguishing factor in the design of the High Bridge was the method of construction used, called the "pin and eyebar" connection. Wide forged eyebars made of wrought iron were introduced by J. H. Linville in 1861 for use in a bridge over the Schuylkill River on the Pennsylvania Railroad line. The pin and eyebar method preceded the general use of rivets as connectors, and was recognized worldwide as the standard American practice in bridge building by the 1880s. According to European and American bridge historian Llewellyn Edwards, there were several reasons for the favored use of pin and eyebar connections, the principal reason being economic:

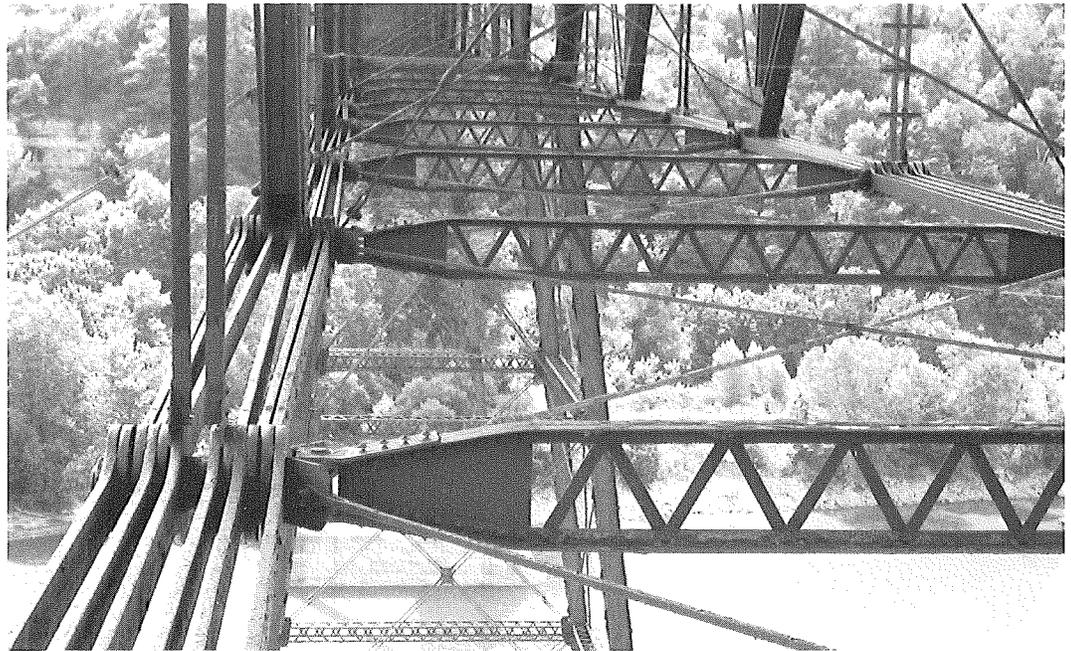
"When designed for a given loading it was lighter in weight; it could be fabricated in the shops and shipped to its destination without shop assembling its members; it required less time, less equipment, and less skilled labor to erect and, all in all, it cost less than fully riveted work."

However, pins were inherently less rigid than rivets and required more supportive web members for stability in winds and increasing loadings. Pin and eyebar construction diminished in popularity with the invention of the portable pneumatic riveter, which allowed riveting to be done faster in the field, thus producing stronger and more reliable rivets.

Theoretically, pin and eyeball construction was acceptable, according to Edwards, but major objections to the practice eventually arose because of maintenance and service considerations. "In some cases the rupture of a single joint could result in the complete collapse of the structure, and joint movements induced wear and looseness." From 1890 to 1915, both pin and eyebar and rivet construction methods were used, with pin and eyebar connections primarily used in longer spans (250 feet and longer) where weight was a consideration. After 1915,



River piers 21-24, showing bents and braced tower. (David Gonzales for HAER.) Also, elevations and sections of river pier 21, from the original plans for the bridge.



Pin and eyebar connections on the lower chord. (Don Stevens, Mn/DOT.)

and many advances in bridge building technology, rivets were used almost exclusively.

The High Bridge was actually composed of three different superstructure designs which had been modified to suit the span lengths required at this location. The most visually striking were the five river spans which were of the subdivided Warren deck truss design already discussed. These spans comprised nearly half the length of the bridge, a total of 1,320 feet from Pier 19 to Pier 27. The other 19 shorter spans (40 feet to 90 feet) were of either riveted lattice girder or riveted plate girder construction. The combination of these different design and construction methods in the High Bridge illustrates Edwards's statement that pin and eyebar connections were used in longer spans and riveted connections in shorter spans.

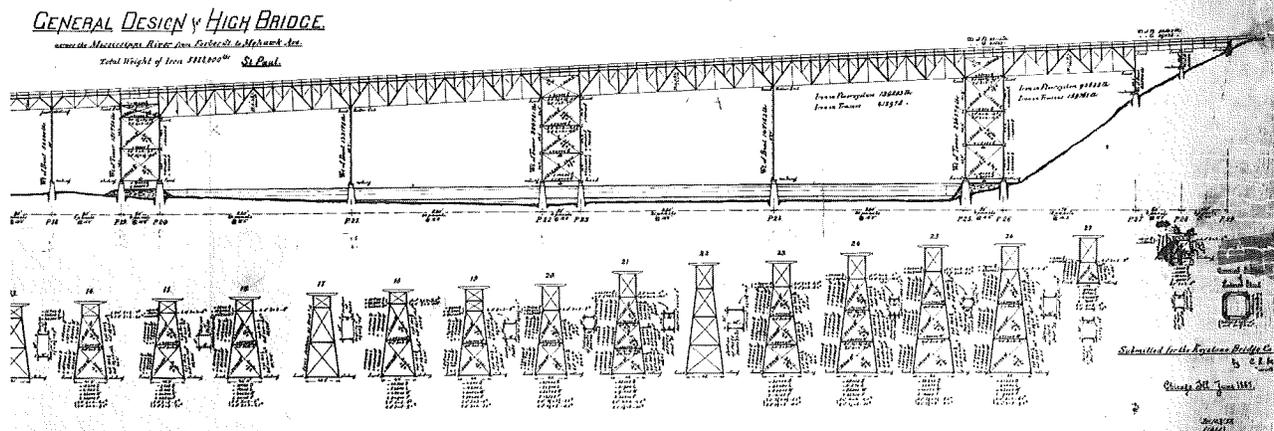
The High Bridge was originally assembled across the

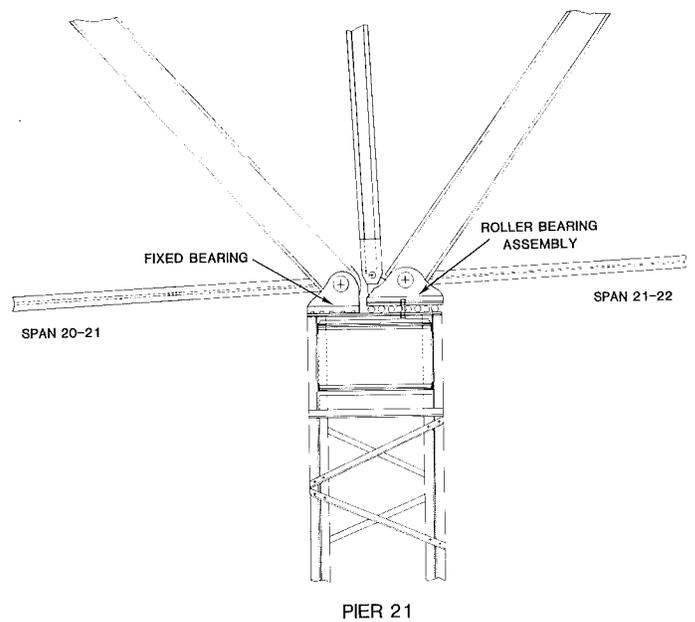
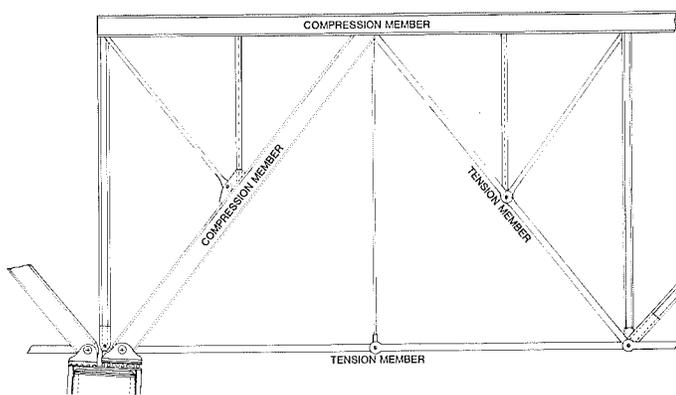
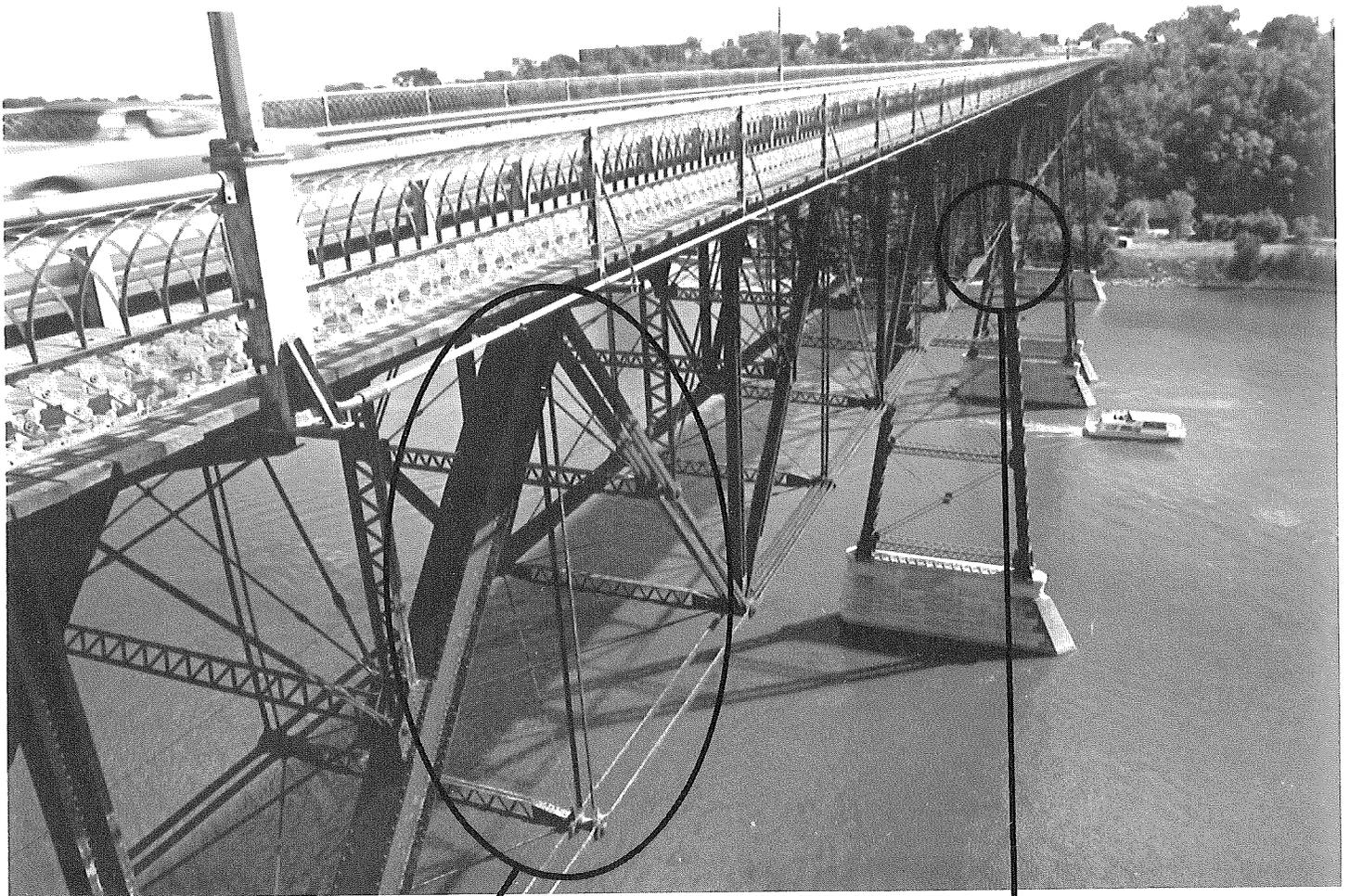
Mississippi by a subcontractor to Keystone Bridge Company, the Horace E. Horton Company from Rochester, Minnesota. Nearly one million pieces of wrought iron weighing more than 3,000 tons were used in the bridge. In an eyewitness account of the construction of the bridge in 1888, it was reported that

“as compared with the Robert street bridge the amount of material to be employed is twice as great, and is equal to the entire material used in the construction of the Twentieth avenue north, the steel arch, Franklin avenue and Lake street bridges at Minneapolis. These facts will give some idea, perhaps, of the greatness of the work that is underway up there.” (St. Paul and Minneapolis Pioneer Press.)

The bridge was 80 feet above the normal water elevation at the north abutment and 191 feet above at the south abutment. This created a continuous four-percent grade, rising to the south, with the exception of the northernmost

From the original plans, 1887.





How a truss works: the compression members are the principal load-bearing members, and the tension members are designed to hold the compression members in place. The bearing assemblies at the tops of the bents accommodate the expansion and contraction movement that naturally occurs within the truss. At one end of each span is a fixed bearing, and at the other end of each span is a sliding or roller bearing which moves with the bridge. (Photo: Don Stevens, Mn/DOT. Diagrams: Jack Krasky, Mn/DOT.)

span of 90 feet which was reconstructed in 1933 and had a three-percent grade. The bridge measured 2,770 feet in length, over one half mile.

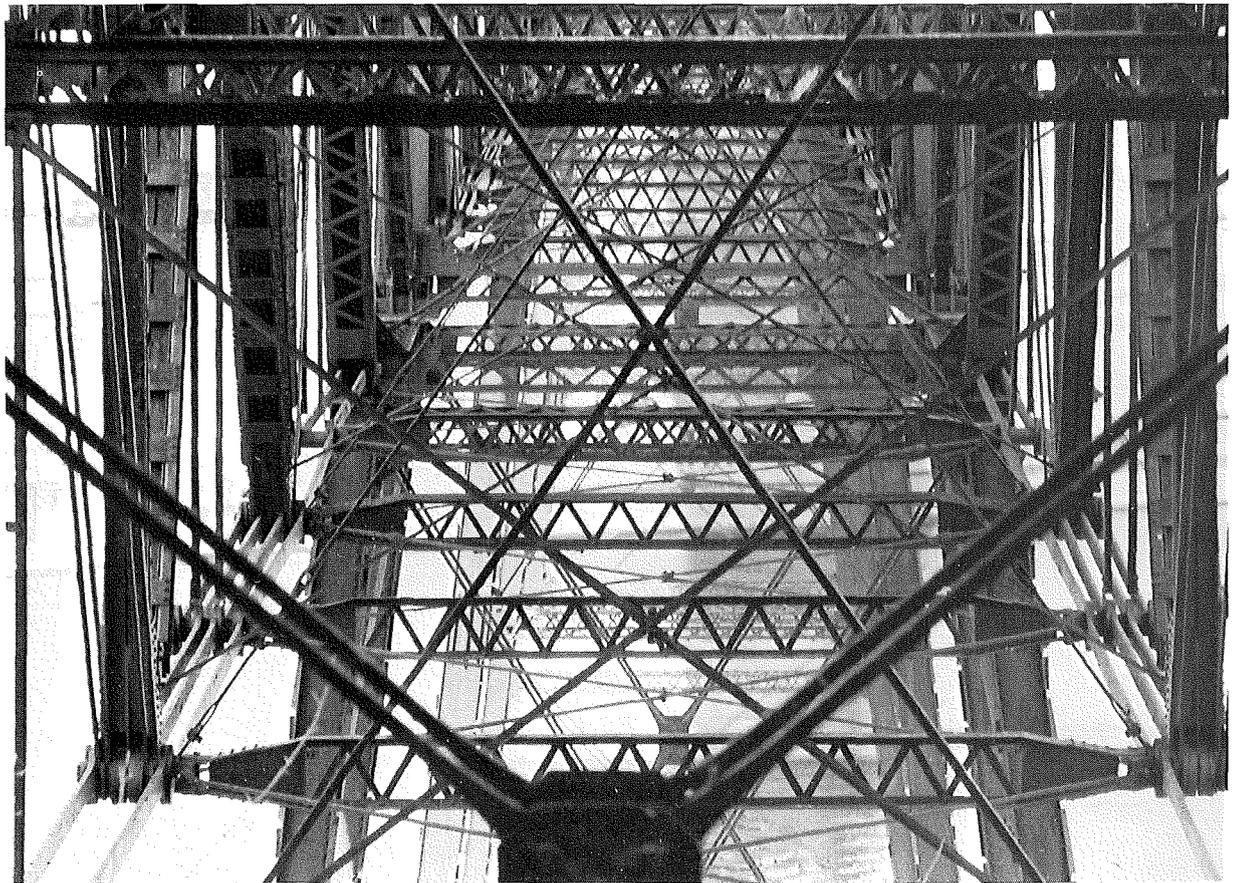
Originally, the bridge's roadway was 24 feet wide, surfaced with four-inch cedar blocks laid over four-inch pine planks which were set in tar, and bordered with eight-inch pine curbs. The cedar blocks were, at that time, considered a superior road surface because hard carriage wheels were quieter on the wooden surface than the more commonly used brick or cobblestone.

(However, in 1912, a petition was circulated, asking the city to resurface the bridge. On frosty mornings or after rain, horses would lose their footing on the slippery wood blocks. Groups of men with their teams of horses would have to wait on either side of the bridge until the

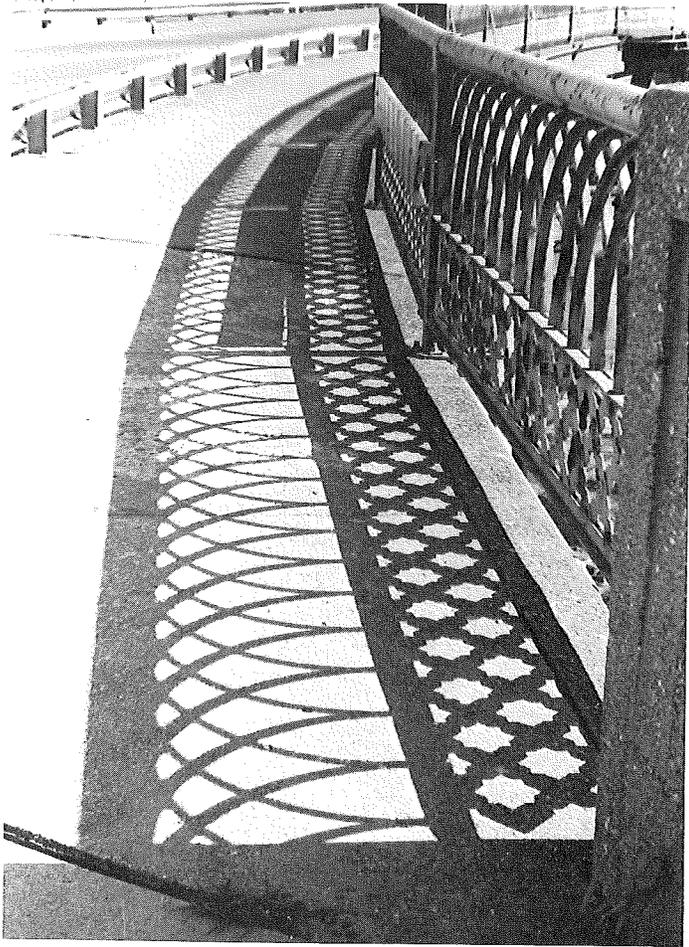
sun had sufficiently warmed and dried the bridge before attempting to cross. The petition had no immediate effect, because the wood block surface was not replaced until 1958.)

Sidewalks on either side of the roadway were eight feet one-inch wide, paved with three-inch thick pine planks, and were separated from the roadway by wooden guard railings. The sidewalk railings were made of ornamental wrought iron.

Construction on the bridge began with excavation of the river for the piers in July of 1887, and was completed with painting the bridge in a red lead paint (described as "brilliant red" in one newspaper account) and laying of the cedar blocks in May 1889. The High Bridge was opened on Saturday, May 25, 1889.

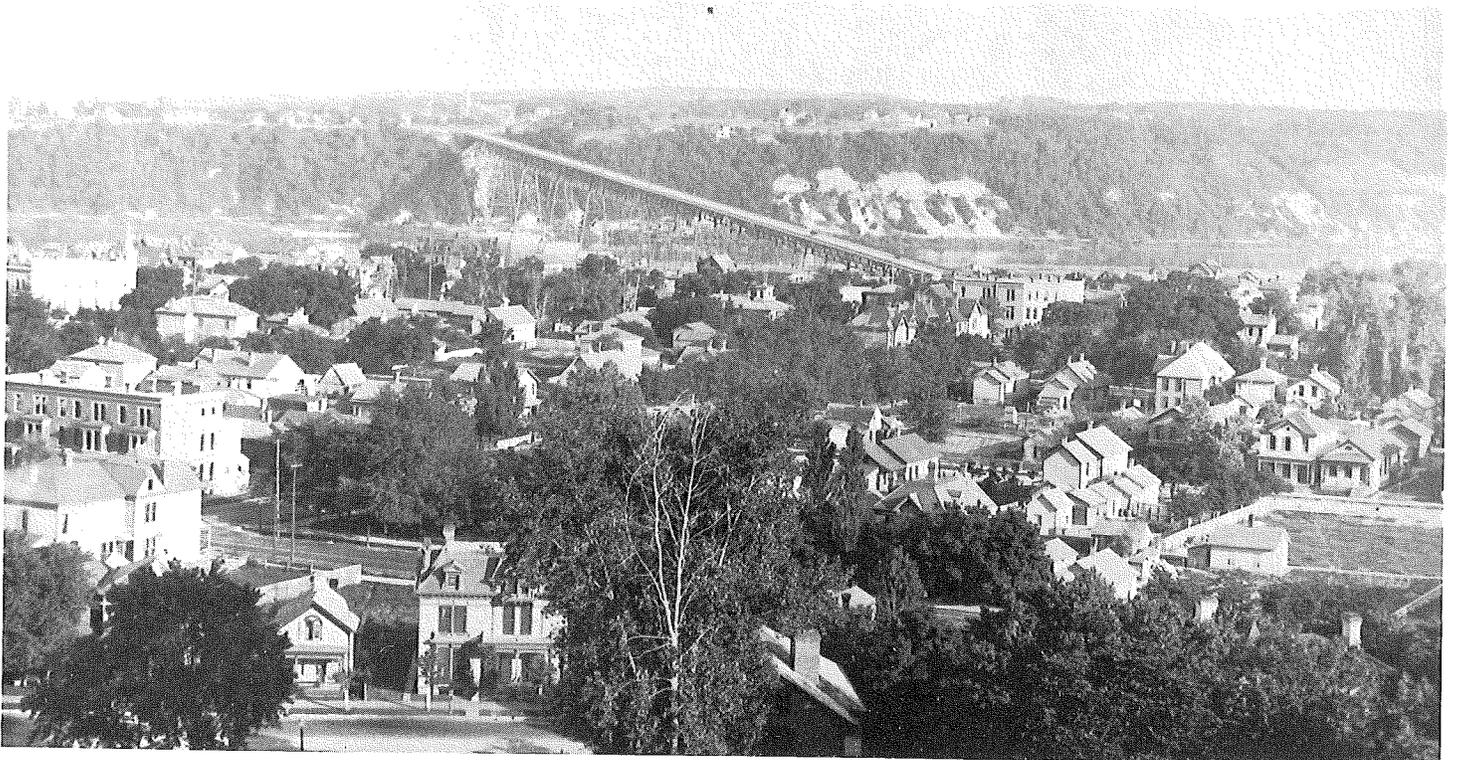


The High Bridge was erected with nearly one million pieces of wrought iron. (Don Stevens, Mn/DOT.)



Decorative wrought iron railing. (Don Stevens, Mn/DOT.)

This 1891 photo shows development occurring on the upper West Side around the end of the High Bridge. This photo also gives a good indication of the 4% grade of the bridge. (Minnesota Historical Society.)



Weathering 96 Years

Although at the time of its closing the High Bridge looked basically the same as when it was built 95 years earlier, there had been several changes made in the fabric of the structure. Inspections and minor repairs were made almost continually throughout its history. A few of the major repairs will be highlighted here.

The first major repair to the bridge came in the form of actually replacing part of it. On August 20, 1904, a severe storm registering winds in excess of 180 mph (before the anemometer broke) hit St. Paul, and the High Bridge. The wind ripped the five southernmost spans (250', 170', 50' and two 60' spans) from the rest of the structure and dropped them 100 yards downstream. Contemporary account in the *St. Paul Pioneer Press* reported,

"The wind cut out the span completely...as it was, the wind in its work of destruction made useless the most expensive bridge in the city. Not a rod nor brace connecting the span with the piers was left hanging to the uninjured structure. Everything was carried out."

There was no question in 1904 that the High Bridge would have to be rebuilt. The link it provided the neighborhoods on both sides of the river was very important, and the direct access to downtown and workplace was especially vital to those living on the Upper West Side. In addition, Smith Avenue was part of a transportation route into the countryside which, when connected with Dodd and Mendota Roads, formed a main highway serving the southern Dakota County farming areas as the direct route to downtown St. Paul.

At first it was thought that part of the tangled wreckage could be salvaged from the river for reuse, but unfortunately the damage was too severe. The rebuilt portion of the bridge was reconstructed according to the plans of the original bridge with the exception of being built with mild steel rather than wrought iron. "Mild steel" is an imprecise term that denotes a low-carbon unalloyed structural steel. Although it is stronger than wrought iron structurally, it is more susceptible to rust and corrosion because the material contains less of the impurities which inhibit rust expansion than wrought iron does. These rebuilt spans were the most severely deteriorated at the time of the bridge's closing.

In the reconstruction, only those few modifications to the original plans which were required to facilitate shopwork were permitted, with the consent of the City Bridge Engineer. The steel members were fabricated by Carnegie Steel Company, which was subcontracted by the St. Paul Foundry Company. The Chicago Bridge and Iron Company (formerly the Horace E. Horton Company from Rochester, Minnesota) again assembled the rebuilt section. The Kelly and Atkinson Company, another bridge building concern from Chicago, recovered the wreckage from the river and used the wrought iron in the falsework used to construct other bridges. The total cost of the reconstruction was \$61,000. The High Bridge was reopened in June of 1905.

The Pioneer Press
prints the
Reliable News of the World
It sells and prints more news than
any other paper in the state.

The Daily News

VOL. LI—NO. 235.

SAINT PAUL, MINN., MONDAY

SAINTLY CITY SURVIVED

Shorn of Only a Few of Its Many the Northwest Great

AMERICAN WARSHIP FOILS THE JAPANESE

She Quietly Slips in Between a Japanese Destroyer and the Russian Cruiser Askold.

Russian Cruiser Novik Is Destroyed in an Engagement With Two of Japan's Fast Cruisers.

Japanese Capture the Northernmost Fort of the Western Line of Defenses at Port Arthur.

.....
 The Japanese have swept the Russians from
 the northernmost fort of the western line of the
 defense at Port Arthur. The Russians, it is reported,
 have been driven from the fort on several occasions.
 The Russian warship Novik was destroyed in an
 engagement with two of Japan's fast cruisers.
 The American warship, the Albatross, was
 reported to have slipped in between a Japanese
 destroyer and the Russian cruiser Askold.
 The Japanese are reported to have captured
 the northernmost fort of the western line of
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 the northernmost fort of the western line of
 defenses at Port Arthur.

DEATH AND DESTRUCTION IN RURAL DISTRICTS

Four Lives Are Lost and
People Are Known
Killed Near

Stillwater Suffers a
\$100,000—Wires
of St. Paul

At least seven lives were lost, many buildings were demolished and crops were badly damaged by the cyclone in districts outside of the Twin Cities.
 At Wisconsin four people were killed, and near Glencoe it is known that three persons lost their lives.
 Rumors are current of fatalities at other points, but these cannot be confirmed.
 The extent of the storm north and west of St. Paul is as yet unknown. Telegraphic communication is cut off, and up to late this morning even the railroads had no wires.
 The Northern Pacific had no wires working last night. The Aberdeen di-
 line, and it did not
 noon to-day.
 The Soo line wires
 last night, and no
 reported. The Soo, h
 received message acco
 storm over North W
 120 miles east of St
 were carried down 10
 was opened late last
 life or serious dama
 ported.
 The lines leading s
 the storm apparently
 about St. Paul. The
 River division of the
 from St. Paul last n

Pioneer Press.

THE WEATHER:

Fair and warmer Monday and Tuesday; fresh north-west winds.

AUGUST 22, 1904. —TWELVE PAGES.

PRICE TWO CENTS (OR FIVE CENTS)

MEETS ITS WORST STORM

Meets the Rising Sun.

DESTRUCTION IN RURAL DISTRICTS

at Waconia and Three
own to Have Been
near Glencoe.

Property Loss of About
North and West
Are Down.

Mourning for the ~~Three~~ Known Dead Is
Tempered By Joy at the Almost Mirac-
ulous Escapes of the Many
Slightly Injured.

The Wrecked High Bridge Is the Most Ser-
ious Property Loss Caused By the Storm
in Its Passage Over the City.

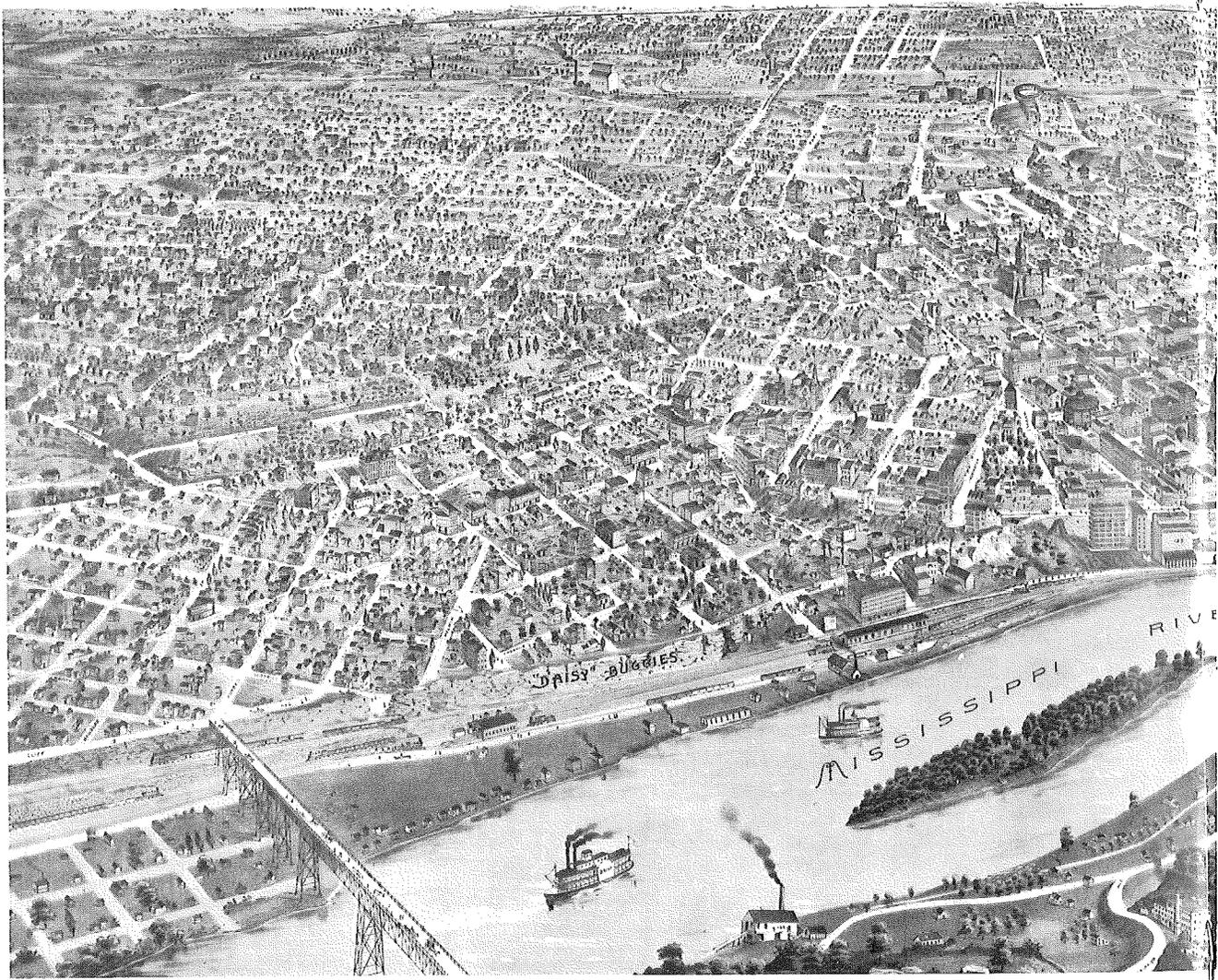
While the Aggregate Money Loss Is Heavy
It is so Widely Distributed as to
Be Forgotten By the Losers.

St. Paul rose with the sun yesterday morning, expecting to find a devastated city, and was surprised. The extreme fears of those who had experienced the terrifying winds, the dazzling flashes of lightning, the deafening peals of thunder and the roar of hurtling timbers were not realized.

The greatest single property loss was the destruction of two spans of the high bridge, a burden which will fall upon the city at large. Any attempt to estimate the aggregate property loss would be but the wildest guess. The damage is distributed among thousands of residents and hundreds of business houses. Until scores of weeks have been thoroughly examined it cannot be measured.

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res west were working
to serious damage was
e, however, report re-
ceivants a severe
Wiscons extending
St. Pau The wires
a for mile but a line
last night No loss of
amage to t rns was re-

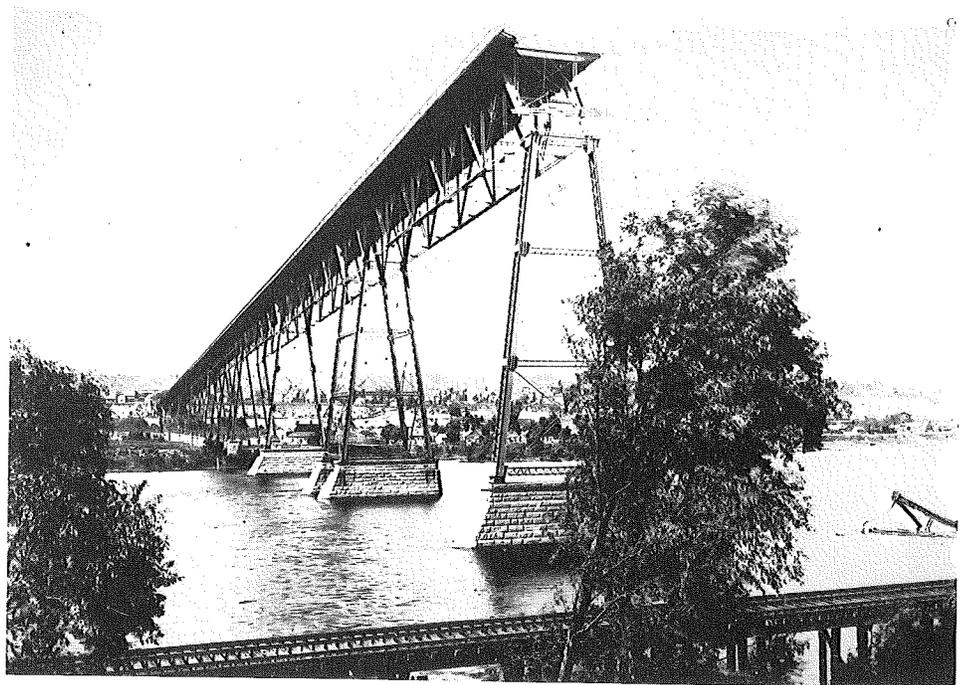
tended south to Red Wing, but that it did no serious damage. The Iowa and Minnesota division dispatchers worked from South Minneapolis.
The Omaha reported that the storm extended about ten miles east of Hudson and that it carried down wires. The dispatchers of the Eastern division were sent to Roberts, Wis., and worked from that point. The storm extended only as far as Rutledge, on the Western division, and the dispatchers worked from St. James as usual. The damage reported along the line was slight.
The Chicago Great Western wires were in working order last night. The



An artist's "bird's eye" view of St. Paul in 1888. (Minnesota Historical Society.)



Tangled mess of High Bridge wrought iron after the 1904 windstorm. (Photo: Haas and Wright. Minnesota Historical Society.)



"Not a rod nor brace was left hanging . . ." 1904 windstorm destruction of spans 25-28 of the High Bridge. (Minnesota Historical Society.)

Falsework used in the 1904-05 reconstruction of the High Bridge. (Photo: Albert Munson, Minnesota Historical Society.)

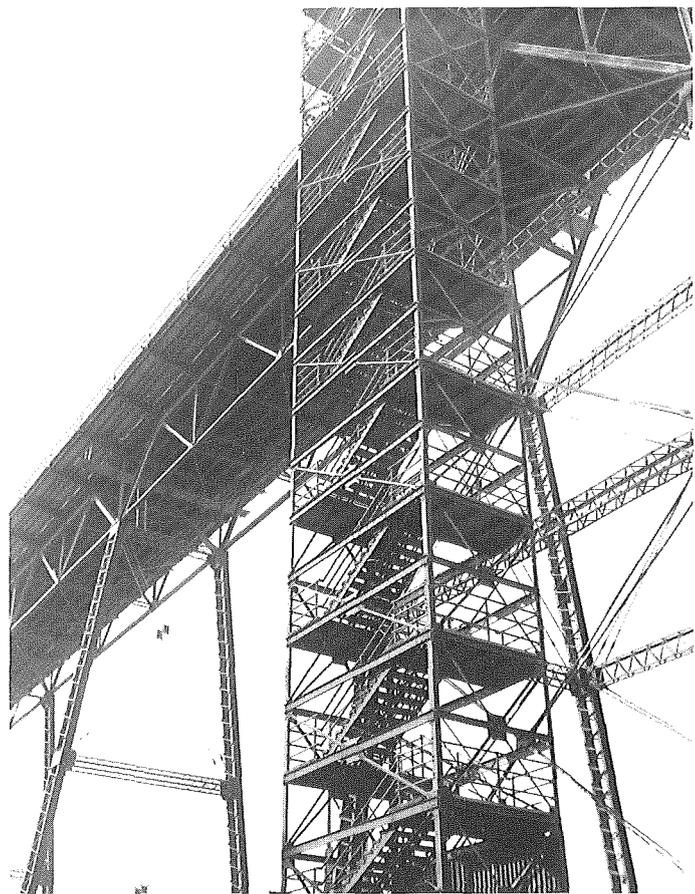


Reopening of the High Bridge in June of 1905. (Minnesota Historical Society.)



In 1915, a request was made of the St. Paul City Bridge Engineer to determine if the High Bridge could withstand the extra loading of a street car line. Several reasons were given as to why this was not feasible, mainly because of the bridge's inherent structural limitations. The loading and unit stresses of 1889 were considered efficient for a wagon bridge of that day. Heavier traffic was allowed if it moved across the bridge at slow speed. However, 40-ton street cars, in addition to the vibration they would generate in moving across the structure, would greatly overstress all of the floor members, creating exceedingly dangerous conditions. In correspondence concerning this issue, the city engineer stated, "this bridge was built [26] years ago and was designed for a loading considerably lighter than would be the case if the bridge were built today." It is interesting to note that as early as 1915, 70 years ago, state and local officials and engineers realized that the bridge was underdesigned for the modern vehicle speeds of that era.

In 1933, the bridge was passed from the jurisdiction of the City of St. Paul to that of the Minnesota Highway Department (MHD), now the Minnesota Department of Transportation (Mn/DOT). As a part of this change, Smith Avenue was designated Trunk Highway 49 and



When the river flats on the north side of the river would flood, access to the flats was blocked; consequently, Northern States Power Company (NSP) employees needed a stairway from the bridge deck to near the plant, which was located immediately west of the bridge. This steel stairway was financed by NSP and built by the city of St. Paul alongside piers 19 and 20 in 1924. (David Gonzales for HAER.)



Flared and widened approach of reconstructed span 1. (Don Stevens, Mn/DOT.)

part of the state's arterial highway system. In that same year, MHD began work to reconstruct the northernmost span of the bridge where smoke from coal burning Chicago, Milwaukee and St. Paul Railroad trains passing beneath the spans was presumed to be the cause of accelerated deterioration of the bridge's wrought iron. In addition, there was a sharp east turn in Smith Avenue at the north end, northbound vehicles had difficulty negotiating the turn while descending the rather steep four-percent grade. The reconstructed span, which was built of reinforced concrete at a three-percent grade, also provided a west turn onto Cliff Street where no access had previously existed. After spending over \$550,000 in repairs, the MHD reopened the bridge on May 24, 1934.

The periodic and expensive maintenance process of scraping, the sand-blasting and repainting the High Bridge was discontinued after 1958, by both the city and Mn/DOT, when officials determined that it was more important to be able to regularly observe the effects of corrosion and pack rust between hidden structural members and the bare outside surfaces than it was to keep the bridge painted. Preserving all possible visual clues to the actual condition of the aging bridge was considered vital at this stage. In addition, because of the inherent weakness in the design of the bridge, it was no longer possible to inspect, clean or repaint many structural members.

Furthermore, there was concern that the sandblasting process may have been contributing to accelerated section loss.*

The High Bridge was closed again for four months in 1958 for inspection and extensive repairs. Repairs completed by the Whiting-Turner Company of Baltimore, Maryland included replacement of the deck structure and cedar block roadway with a concrete-filled steel grid deck covered with bituminous overlay, placement of new steel guardrails which reduced the sidewalks to seven feet, replacement of the original wood plank sidewalks, again with wood planks, and the addition of new street lighting.

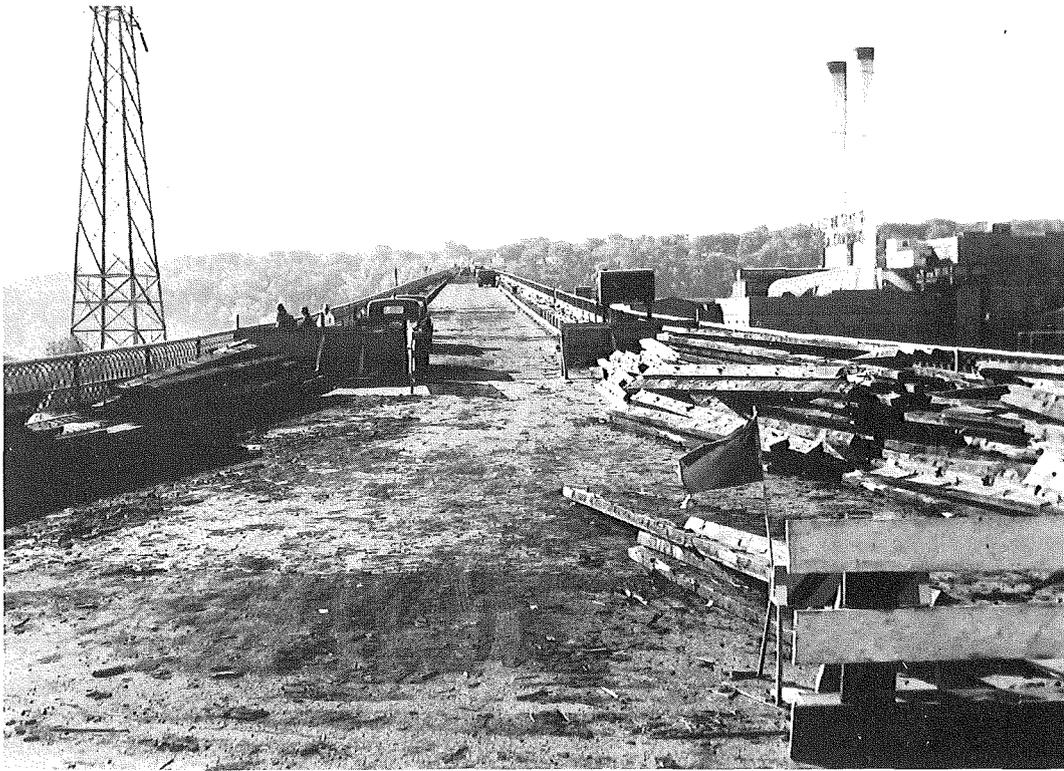
Mn/DOT closed the bridge in March of 1977 following an in-depth inspection to repair the superstructure and substructure. This inspection revealed severe and irreversible deterioration in many structural members. Some primary structural members were replaced, others were reinforced with steel, the total cost nearly \$200,000. This inspection also brought to the local neighborhood's attention the fact that the High Bridge was not going to last forever.

Mn/DOT conducted in-depth investigations of the structural condition of the bridge again in 1980 and 1983-84. Extensive maintenance and repairs costing \$100,000 were required in 1980 to attempt to insure that the bridge would stay open until the replacement bridge was 90%

* Section Loss—wearing away or eroding of the structural materials of wrought iron and steel.



Span 1, reconstructed in concrete in 1933-34. (Don Stevens, Mn/DOT.)



1958 removal of the woodplank deck of the High Bridge to replace it with a concrete-filled steel grid covered with bituminous overlay. (Photo: St. Paul Dispatch. Minnesota Historical Society.)

completed. In 1983-84, in-depth inspections were conducted, with the help of newly developed ultrasonic sounding test equipment. This procedure inspected the pin and eyebar connections and determined that they were free of section loss. This was especially important to know because these connections were the critical points in the design of the river spans. However, these tests could not reveal the condition of the material, nor whether stress cracking was occurring in either pins or eyebars.

The 1983-84 structural inspection also revealed severe deterioration in the major members of the truss because of section loss and stress fatigue.* The average section loss of primary truss members recorded in the 1980 inspection ranged from 28% to 38%. In 1984, the section loss ranged from an average of 37% to 48%. This increase indicated that section loss had been advancing at an alarming rate. In stress fatigue, the effects of stresses on the bridge from 95 years of weather and use are cumulative. The result was a gradual weakening of the structure over time. Unfortunately, this loss of structural strength isn't measurable until stress cracks are visible. If fracture occurred due to overstressing, a sudden failure would occur.

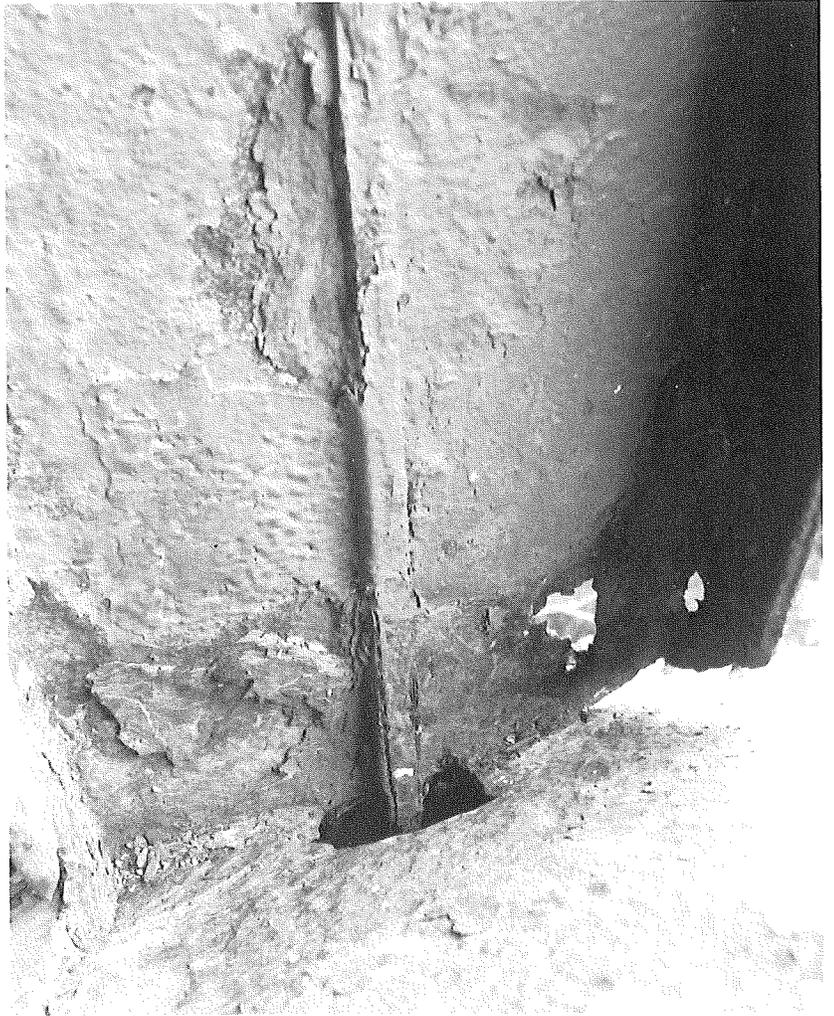
In addition, it was found that the sixteen roller and sliding bearing assemblies which were designed to take up naturally occurring expansion and contraction movement within the truss system had, in effect, "frozen" in place and no longer worked, due to corrosion and the

force of gravity associated with the four percent grade. As a result, the additional stresses created by the lack of properly working bearing assemblies were absorbed by the structural members and ultimately forced tension members (thin, usually flat components designed to hold the truss together) into compression and compression members (thick, beam-like components designed to be load-bearing) into tension. The stresses of modern daily traffic and structural deterioration presented considerable doubt as to whether or not the bridge could reliably withstand these stresses in its already weakened condition, adding to the likelihood of the sudden failure of major spans. The inherent weakness of the long-since outdated pin and eyebar method of construction presented the added concern that the failure of one single pin could mean the sudden collapse of an entire 250-foot span.

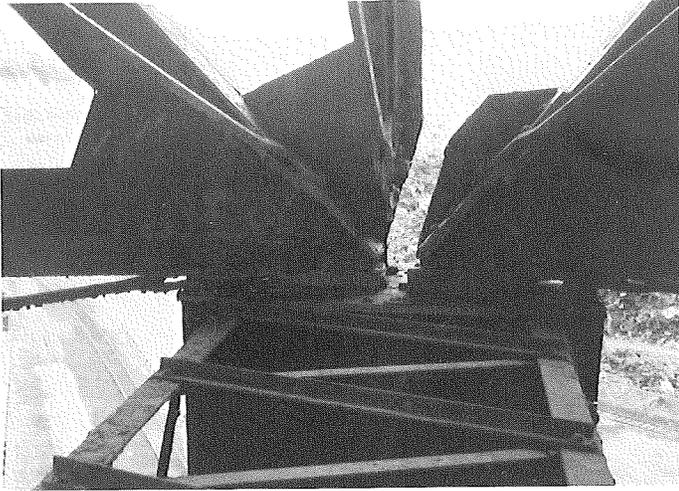
With the results of this last structural evaluation, Mn/DOT officials were forced to conclude that they could no longer guarantee that the bridge could safely serve the motoring public. Too many uncertainties concerning the structural aspects of the bridge were involved. The projected date for the completion of the new bridge was too far away—1987. Unfortunately, Mn/DOT had to close the bridge permanently on Wednesday, July 25, 1984, a year before any construction on the new structure was to begin.

* Stress Fatigue—wearing out of the structural members resulting in fracture and eventual failure.

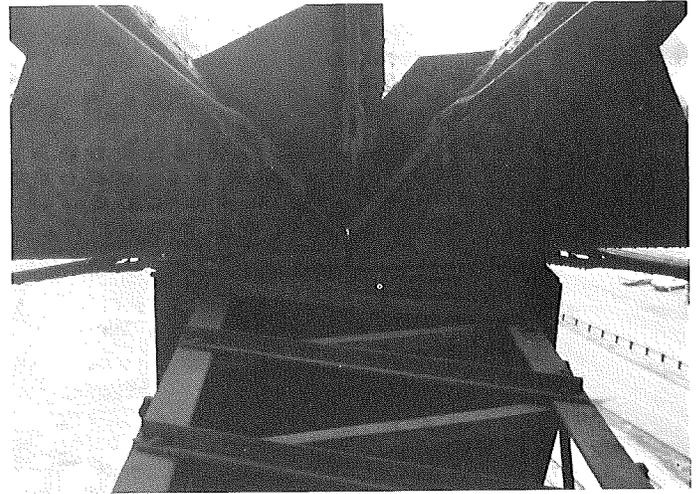
View showing "section loss" in a principal truss member.
100% section loss has occurred where the holes are, and
varying degrees of section loss above and around the holes.
(Don Stevens, Mn/DOT.)



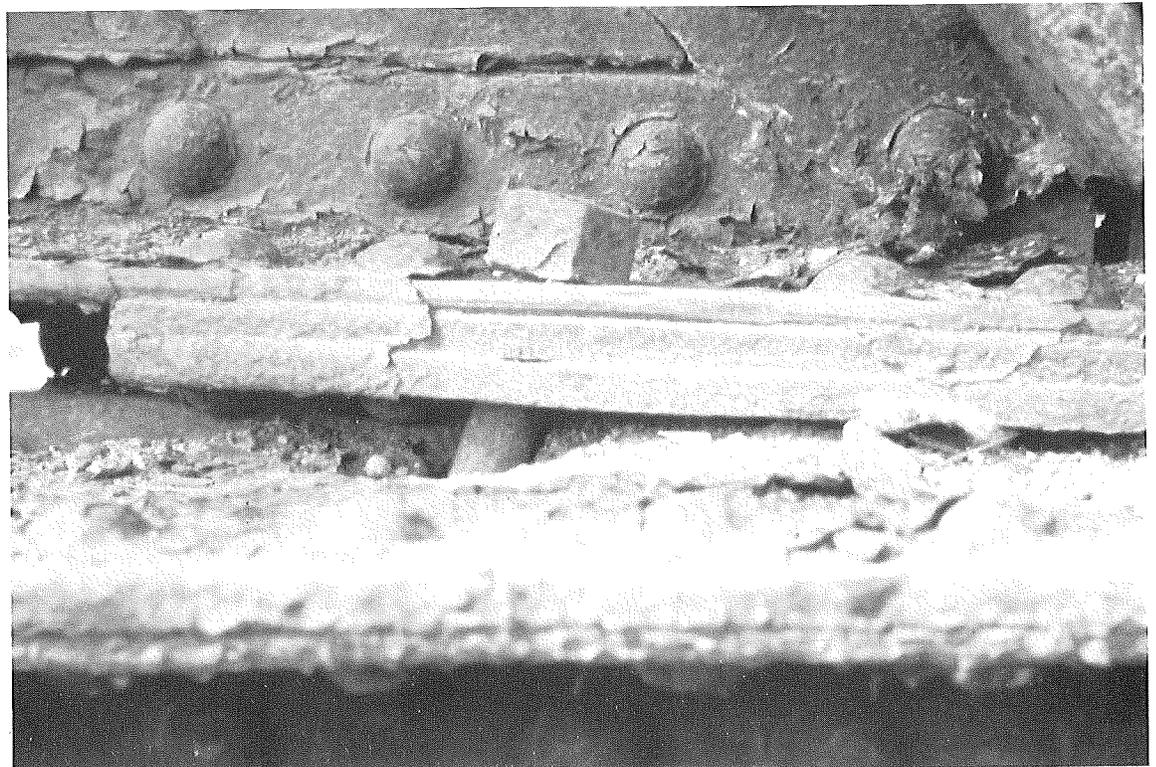
View showing warp of vertical tension
members which were forced into
compression, showing the shift of forces
within the truss system that had
occurred. (David Gonzales for HAER.)



This is how a bearing assembly would look when it was working properly. The open space between assemblies shows the amount of movement necessary to accommodate naturally-occurring contraction and expansion. This assembly was the only one in the entire length of the bridge that worked properly at the time of the bridge's closing. (Don Stevens, Mn/DOT.)



All other bearing assemblies on the High Bridge were "frozen" in place—the gaps between the assemblies were permanently closed and no longer working. This forced the now-rigid structure of the bridge to unnaturally absorb the movement, which created considerable stress on the bridge. (Don Stevens, Mn/DOT.)



This bolt anchored a bearing assembly, but the amount of force that was working on the bridge bent it completely out of place. (Don Stevens, Mn/DOT.)

1897 view of the St. Paul skyline. (Minnesota Historical Society.)



Replacing a St. Paul Landmark

The Smith Avenue High Bridge was closed for six weeks in 1977 for major structural repairs. This repair period made the people who lived near it and who depended on it daily realize that this bridge simply could not serve them safely forever. A public meeting sponsored by the West Side community was held during the repair period to air and discuss the problems the closure had caused each neighborhood, a meeting that attracted over 500 local residents and business operators from both sides of the river. The main problems discussed at the meeting included: increased traffic through local neighborhoods, traffic congestion on the nearby Wabasha and Robert Street bridges, inconvenience and loss of time to drivers, the West Side's loss of a direct link to the United Hospitals and emergency services located on West Seventh Street, and a marked negative impact on West Side local businesses.

Following the reopening of the bridge, Mn/DOT officials began to meet with local officials and citizens concerned with the future of the river crossing. These first meetings revealed some strong local differences of opinion and divergent views of the situation. The West Seventh Street neighborhood's representatives were at first skeptical of any reconstruction proposal, seeing it as perpetuating traffic through their neighborhood with little direct benefit. The West Side's representatives, however, were strongly in favor of maintaining the crossing, it being

vital to the economic life along Smith Avenue and an important transportation route into the downtown St. Paul area. There were also differing opinions surrounding the structure itself—some advocated preservation of the historic bridge through rehabilitation, others supported preservation of sections of the bridge for use in a commemorative park or landmark, and others wanted replacement of the bridge with increased community amenities such as parks and scenic overlooks at each end of the new bridge.

To respond to these concerns and opinions, Mn/DOT suggested that representatives from each neighborhood's planning council form a High Bridge Task Force so that the overall community surrounding the bridge might more effectively become a part of the project's development process and participate in the study of project alternatives. Aided by the Mn/DOT High Bridge project manager, who acted as a technical advisor and information source to the group, the task force studied the options available concerning the feasibility of both rehabilitation and replacement of the bridge. To ascertain the local residents' feelings concerning the bridge, the task force developed a "High Bridge Concerns Survey" to be used as an information source for the task force. The results of this survey identified five major areas of concern to the community: that the bridge be replaced, that the replacement bridge be built adjacent to the existing bridge to reduce

The 14 alternate bridge types first developed by the consultant, Strgar-Roscoe-Fausch, Inc.

ID	Type	Description			
		Elevation	Section	Material	Construction
1	Plate Girder	Main Span: 350' to 450' 	65' 	Steel	Composite Deck Transv. PT
2	Box Girder	700' 	65' 	Steel	Orthotropic Deck Box Construction
3	Plate Girder "Y" Piers	600' 	65' 	Steel or Conc.	Composite Deck Transv. PT
4	Deck Truss	600' to 800' 	65' 	Steel	Concrete Deck
5	Deck Arch	600' 	65' 	Steel	Concrete Deck
6	Through Arch	720' 	69'-6" 	Steel	Concrete Deck or Orthotropic Deck
7	Arches	440' 	65' 	Steel	Concrete Deck Multiple Arches
8	Box Girder	500'-600' 	65' 	Conc.	Single cell in-situ Cantilever Constr. Post tensioned
9	Box Girder	300' to 350' 	65' 	Conc.	Single cell Constant Section Post tension
10	Arch	800' 	65' 	Conc.	Deck Stiffened Arch
11	Cable Stayed Girder	875' 	79' 	Steel	Box Section Orthotropic Deck Harped Stays
12	Suspension	1100' 	79' 	Steel	Box Section Orthotropic Deck
13	Cable Stayed Girder	1190' 	85' 	Steel	Box Section Orthotropic Deck Harped Stays
14	Cable Stayed Girder	900' 	85' 	Steel or Conc.	Orthotropic Steel or Concrete Box Fan Stays

closure time during construction, that the cohesiveness between the two neighborhoods be strengthened through the use of pedestrian sidewalks and bicycle access, that the replacement bridge maintain the unique and special image of the existing bridge by being one of "landmark quality" design, and that there be provisions for scenic overlooks at each end of the bridge. Through the results of this survey, considerable discussion, and the help of structural and planning studies provided by Mn/DOT, the task force concluded that not only was rehabilitation not practical—because rehabilitation would be an expensive and temporary measure to extend the life of the bridge but a few years—it was also undesirable, because of the narrowness of the roadway that made

driving difficult. The task force therefore recommended to Mn/DOT that the bridge be replaced. With the aid of a design consultant hired by Mn/DOT for preliminary studies, the task force and Mn/DOT jointly identified 14 possible replacement bridge design alternatives, and then narrowed these alternatives to six. The task force eventually recommended a steel deck-tied arch design that was the least costly of three alternatives that were considered to meet aesthetic and landmark quality criteria. Mn/DOT supported this recommendation.

Even though the public's involvement in these High Bridge studies was encouraged and supported by Mn/DOT, the level of that involvement was far from typical. Because the issues surrounding the High Bridge were

so complex, and because the bridge was so important to the community, a high degree of involvement from the community was necessary. Task force members worked hard at achieving a delicate balance of a complexity of state and federal regulations and policies, funding programs and eligibility requirements, and community needs and concerns. After years of studies, meetings, discussion and compromise, the task force proposed a responsible solution which appropriately met the transportation and community goals that had been defined. In turn, state and federal officials observed that extensive public involvement in decision-making, although challenging, can promote a spirit of cooperation and result in mutually-satisfying conclusions to very difficult problems, and can avoid costly delays which benefit no one.

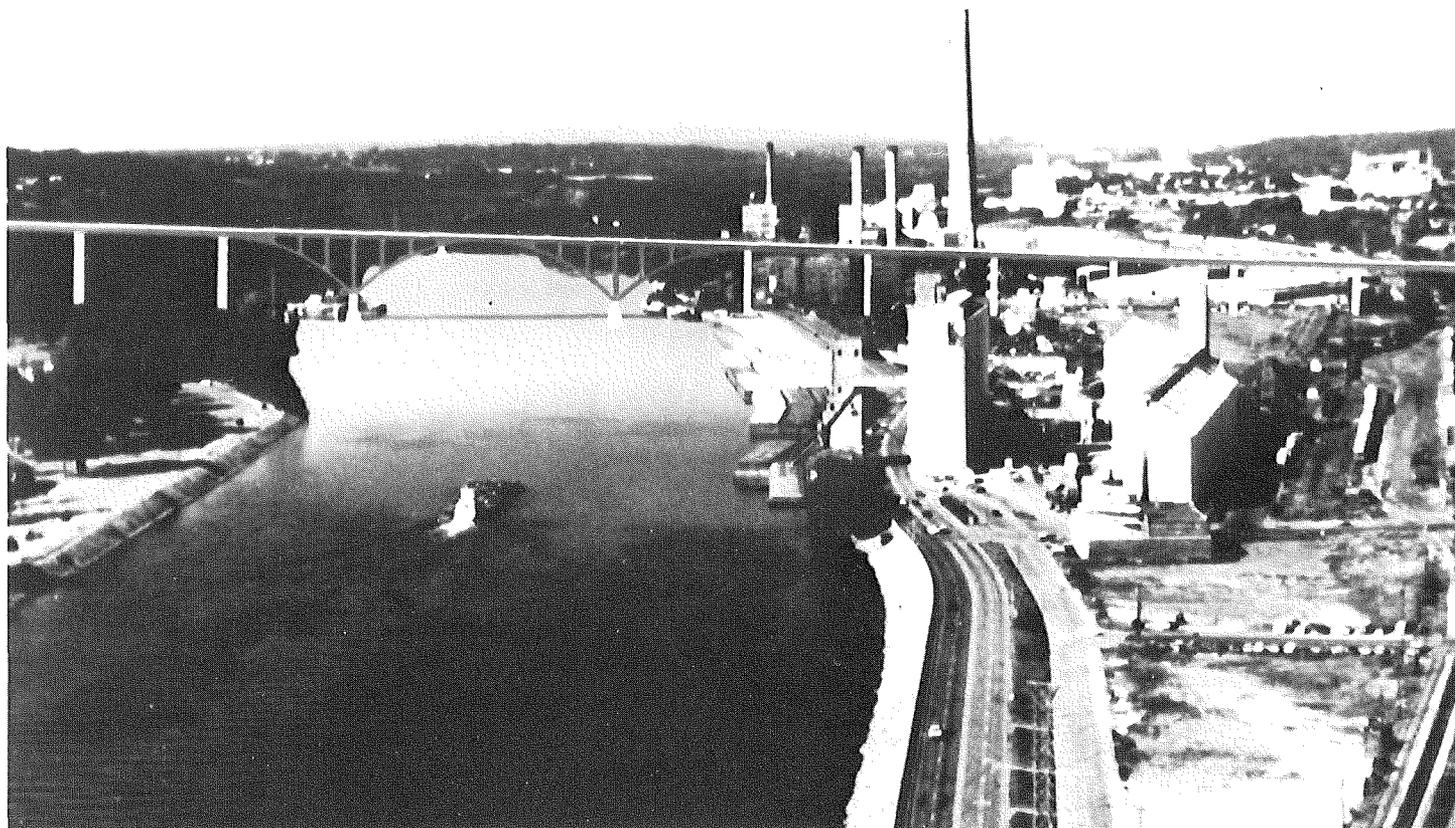
As mentioned earlier, the issues which dictated the course of the High Bridge replacement project were extremely complex. The crossing is of major local and national importance, and the substantial federal cost involved in replacing a bridge of the height and length of the High Bridge turned this seemingly simple task into a very involved project. The magnitude of the project brought together several policies and programs which normally do not coincide on projects of a smaller scale, and so added to the complexity of issues present. The story of these issues and how they were resolved provides a modern-day parallel to the controversy which sur-

rounded the building of the original bridge in 1887, nearly a century ago.

Special funding for the rehabilitation or replacement of the significant number of deteriorating bridges built in the 19th century across the country was created following the collapse of a wrought iron bridge in West Virginia in the late 1960s. This tragedy forced the realization that thousands of these bridges built before the turn of the century were in need of extensive rehabilitation or replacement. It became a national transportation priority to repair or replace as many of these deficient bridges as possible. A part of this special rehabilitation and replacement funding program provided \$200 million nationally in discretionary funding, to be distributed at the discretion of the United States Secretary of Transportation, that was earmarked for use by states with high-cost bridges such as the High Bridge. (Bridges eligible for this discretionary funding are those which cost over \$10 million to replace or rehabilitate, or those which cost more than half of the state's annual apportionment of federal bridge funds.) Nationwide competition for this discretionary funding source has been very intense. The Federal Highway Administration is responsible for administering these funds and has made special efforts to keep project costs to a minimum to enable as many states as possible to benefit from these funds.



Downtown St. Paul
through the bridge
railing. (Don Stevens,
Mn/DOT.)



Artist's conception of the chosen bridge type, the steel deck-tied arch. (Strgar-Roscoe-Fausch, Inc.)

Not only is there a national objective to replace or rehabilitate as many of these deficient bridges as possible, but there are national environmental, historical and aesthetic objectives which also influenced the High Bridge replacement project. There are several parklands adjacent to the bridge, which are protected by the National Environmental Policy Act from negative impacts that new construction could cause. This Act also serves to protect the visual environment. In 1981, the original bridge was placed on the National Register of Historic Places. This designation recognized the significance of the High Bridge's engineering and transportation characteristics and also created another level of review of the decision to replace the bridge as well as the design of the replacement structure to assure that it appropriately replaced the historic landmark which was lost. Also, two programs that place an additional emphasis on the aesthetics of the river

and all its sights are the Great River Road program, which stretches the length of the entire Mississippi River; and the Mississippi River Valley Critical Area plan, which includes the St. Paul area.

There is an inherent conflict between these national economic and environmental priorities, and this conflict came to bear on the High Bridge replacement project. Concern for constructing the lowest-cost replacement bridge came face-to-face with concern for good environmental design and appropriate mitigation of the loss of this important historic structure.

While the efforts of the High Bridge Task Force were successful in identifying a replacement bridge type, a steel deck-tied arch, which presented an acceptable compromise of cost, aesthetics and landmark quality design, one more policy hurdle remained—the federal Alternate Bridge Design Policy. This policy, which is intended to

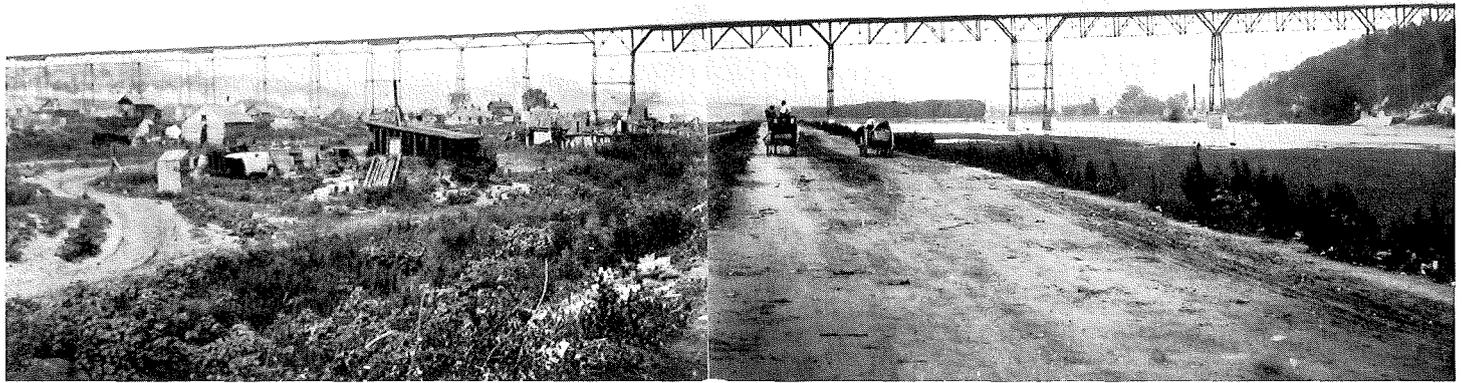
save money by maintaining a high level of competition between bridge builders and/or the concrete and steel industries, requires that *two* bridges be designed and prepared for bidding on major projects. In order to comply with this policy, the task force attempted to identify another acceptable bridge design. However, only the steel deck-tied arch design adequately met all of the project criteria. Although preliminary cost estimates on the steel and concrete versions of the deck-tied arch suggested that the steel alternative would cost significantly less, Mn/DOT began to design both versions in order to meet the policy's requirements, anticipating that steel would, in fact, be bid lower than concrete. The only alternative that both the community and Mn/DOT now had was to wait for the results of the bidding process, taking the chance that the lowest bid would be in steel.

While the steel bridge bid was expected to be lowest, thus satisfying the community consensus on the choice of the bridge material achieved by the task force, the results of this gamble taken by the community will never be known. The premature and permanent closing of the High Bridge in July of 1984 mandated an opening of the new bridge as soon as possible. The impacts of the closing felt by the local communities were dramatic, and particularly affected the businesses on the upper West Side. The delays that could be caused by designing two bridges for

bidding now became unacceptable. If only one bridge had to be designed, then the design process of this bridge could be staged so that construction on the replacement bridge could begin several months sooner. With one bridge design, the possibility also existed that the completed bridge could be opened to traffic up to a year earlier.

The community, seeing no alternative to this dilemma, approached Minnesota Senator David Durenburger after the closing, and requested that he sponsor legislation which would grant an exception to the Alternate Bridge Design Policy for the High Bridge project. On October 11, 1984, an exception to the policy was included in an amendment to the 1984 Federal-aid Highway Act.

It can be seen that the significance of the original High Bridge was irrevocably connected to the fate of the replacement bridge due to its designation as an historic site and the "landmark" status it acquired throughout its life. Nothing short of another landmark structure seemed appropriate for the replacement. The project combined community involvement, negotiation and compromise on a local, state and federal level, that should result in a new bridge that is a credit to all who were associated with the project.



1889 photo of the newly constructed High Bridge and the upper levee flats. (N.W. Photo Co., St. Paul, Minnesota Historical Society.)

Romanticizing the High Bridge

Ever since the idea of building a bridge connecting the upper landing river bluffs to provide access to the sparsely settled Cherokee Heights was first conceived in 1885, the High Bridge had been the subject of great controversy and emotion. Even before construction was completed, journalists were singing the praises of the bridge far and wide, and gave it the name that endured for 95 years. For example, in 1888, the *Pioneer Press* said this about the bridge:

“The High Bridge will in some respects be one of the most remarkable specimens of bridge architecture in the world. It will not only be a very high bridge, but also a very long one, and with one exception—the famous Poughkeepsie Bridge over the Hudson River—there is no bridge in the world with equal or greater elevation that has such a length as this.”

As the construction of the bridge was nearly completed and the bridge’s last spans were about to be put in place to reach the high bluff near the south end, speculation and excitement about the fine new structure grew. Viewing the progress of the work from the south end became a popular activity, according to this account in the *St. Paul Daily Globe*:

“A large number of people interested in the completion of the uptown bridge repaired to the south end of the structure yesterday afternoon to examine the progress made on the work. Some thought it too narrow, others

too high, and still others found it just perfect. The consensus of opinion was evidently in favor of the bridge as it is, as many an airy vision of summer drives across the new ‘outlook’ were indulged in by the fair sex.”

However, not all news was positive concerning the bridge, and its construction held high expectations for those living and owning property on the West Side, along with some doubts.

“As the completion of the high bridge draws near, there is increased anxiety among the residents on the hills of West St. Paul that the grading of Smith Avenue be at once proceeded with, such grading being absolutely necessary before the opening of the new structure. The new bridge will be a bonanza for would-be suicides, unless protected in some manner more effective than the ordinary rail.” (*St. Paul Daily Globe*)

The grading of Smith Avenue was begun just after this plea was made. The *Daily Globe* reported on May 23 that the opening of the bridge, plus the grading of Smith Avenue, then in progress, would have a marked influence on the value of property on the West Side.

Finally, the bridge reached its long-anticipated opening. But even this was not without flaw.

“The new High Bridge across the Mississippi River, which was very recently opened to foot passengers, was thronged with curious sightseers throughout the day yesterday and at no place in the city did more people gather. At any hour during the afternoon over a thou-

sand people could be found there viewing the beautiful scenery surrounding and inhaling the unpleasant odor from the Bohemian Flats.” (*St. Paul Daily Globe*)

But even unpleasant odors from the Flats were not enough to dissuade the romantic-hearted from waxing poetic about this new lofty structure. In this article, entitled “The Lovers’ Promenade. High Bridge, the resort of the Loved and Forlorn Alike,” the attraction seems clear.

“ ‘The Lovers’ Promenade.’ Thus the new High Bridge has been fitly designated by those whose business calls them that way ‘twixt dusk and dark... There is something strangely attractive about the High Bridge—either the altitude—for Love loves to dwell in high places—the weirdness of the surrounding shadows with their apparently fathomless depths, or, looking back, the twinkling lights of the city spread out in grand panoramic display for the especial benefit of lovers.’” (*St. Paul Daily Globe*)

By 1892 the bridge was still enough of an issue to cause quite a stir in the city elections of that year, the first held after the completion of the bridge. Republicans charged that the expensive bridge was hardly used, except as a suicide bridge, and that the angle of the bridge conve-

niently pointed it toward property owned on the West Side by “the gang” of Democrats on the City Council which had approved the bonds for its funding. Democrats, on the other hand, charged that the bridge was the first site Republicans proudly took their visitors from the East to see, but then criticized it otherwise. Mayor Smith, a Democrat “of the old school” was not returned to the mayor’s office that fall, thus losing an election for the only time in his active political career. Some attributed this defeat to the controversy about the “extravagant cost” of the “remote” bridge, stirred up by campaigning Republicans. Despite that, Smith regained the Mayor’s office in 1894.

Strong feelings about the bridge did not wane throughout its 95 years, and evidence of this was brought to light when the bridge was closed for the last time in July of 1984. The people who lived near it and used it daily let it be known that the bridge had been an integral part of their lives by conducting a funeral for it at its closing, complete with hearse, dirge and flowers. A small memorial to the bridge was written by two of its long-time neighbors,

St. Paul skyline from the High Bridge. (Don Stevens, Mn/DOT.)





West Side residents conducted a mock funeral procession at the closing of the bridge to symbolize their feelings about losing such an important transportation route. (St. Paul Pioneer Press and Dispatch.)

relating the feelings of those involved with it for so long.

“Unlike most impersonal bridges that are merely links serving utilitarian purposes, the High Bridge was in the midst of us. It literally touched the core—the very lives of those who walked it, drove it, jogged it, and generally

claimed it as an extension of our communities. For 95 years.

To romanticize an enduring relationship with an inanimate object, a bridge, may seem odd. But there will never be another one like ours.”



The Josiah B. Snelling and Jonathan Padelford paddleboats saluted the bridge, and procession participants tossed flowers into the Mississippi River. (St. Paul Pioneer Press and Dispatch.)

The bare skeleton of the bridge stood ready for demolition. (David Gonzales, Mn/DOT.)



The history of the 96-year old High Bridge completed its final chapter at 3:55 p.m. on Sunday, February 24, 1985. As many as 25,000 spectators gathered around dozens of vantage points up and down the river. Four hours after the expected detonation time at 12 noon, demolition crews completed the precise task of setting and wiring the explosives and made safety checks, and the High Bridge's four river spans came tumbling down in a spectacular 3½ seconds. 76 pounds of plastic explosives were placed where the spans were joined together, and also at the bases of the bents and towers. When detonated, these charges actually "cut" into the metal, (as opposed to blowing it apart) forcing the spans to drop straight into the water. The bents and towers fell upstream.

The contractor was given 96 hours to clear the main navigation channel of debris from the bridge before the shipping traffic on the river was allowed to resume. It was

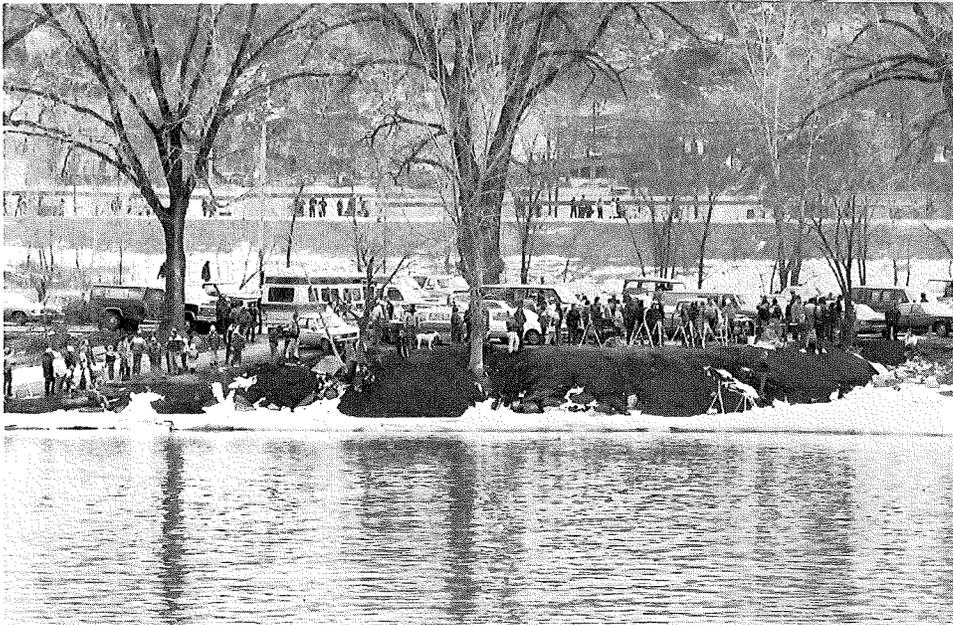
necessary to enact the demolition at the end of February when the river traffic is lowest to accommodate the shipping industry so vitally important to the area. The demolition general contractor was D. H. Blattner and Sons from Avon, Minnesota. The demolition subcontractor was Controlled Demolition, Inc. from Phoenix, Maryland.

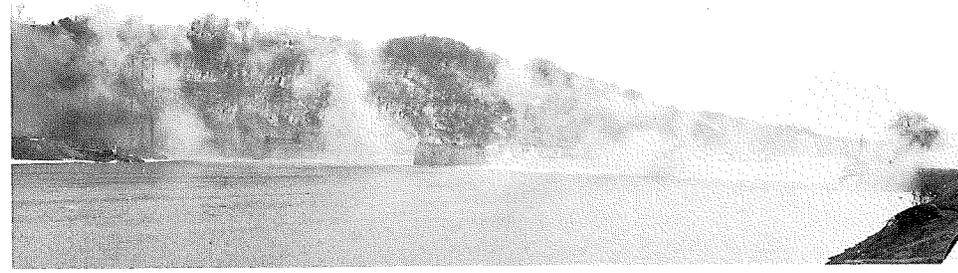
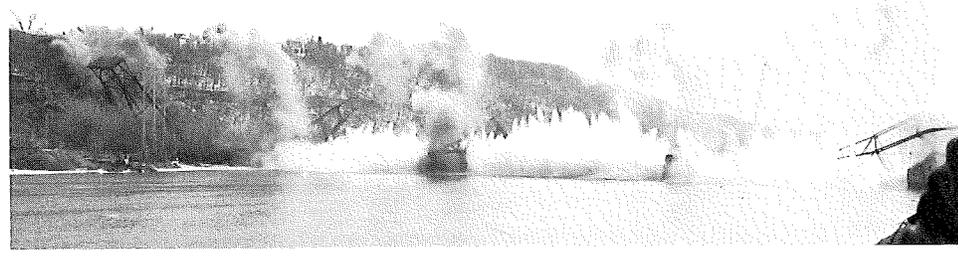
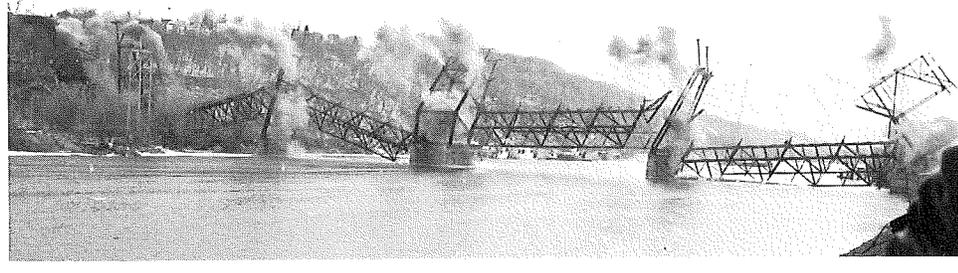
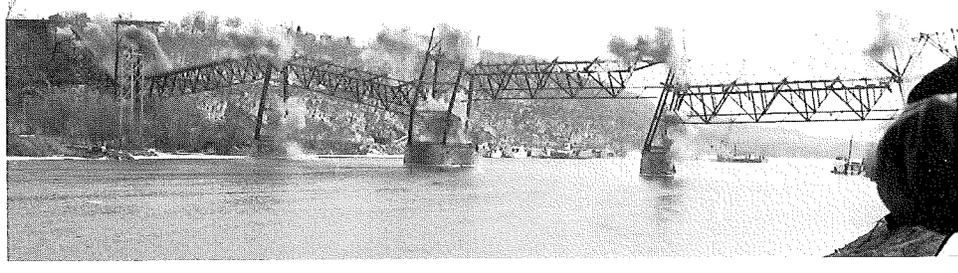
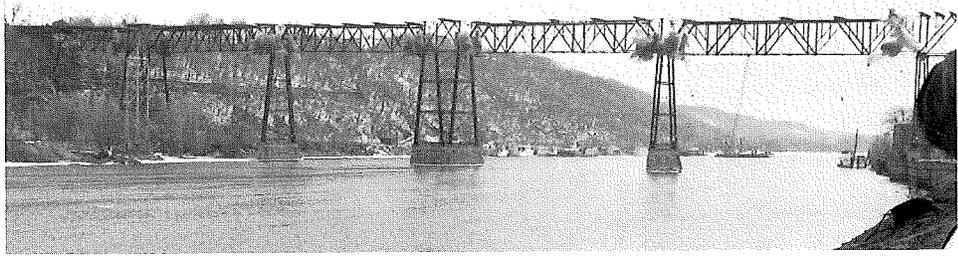
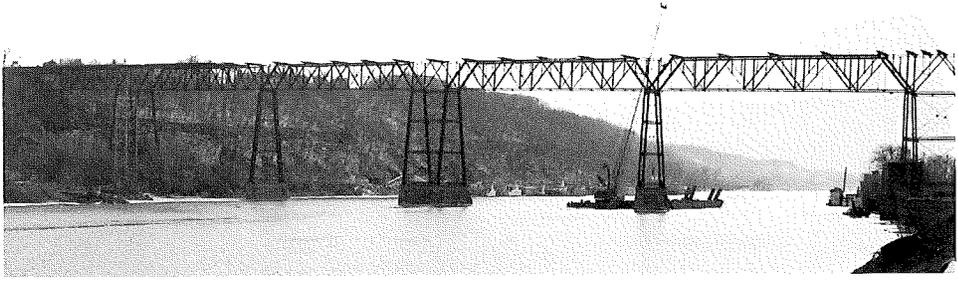
Before the demolition, the contractor had been working for approximately one month to remove the heavy deck from the structure's river spans. One week before the demolition, Span 18 over Shepard Road was removed by crane so that the north half of the bridge would not be pulled down with the river spans. Span 1 to Span 17 were taken down by cranes, piece by piece. That process was completed in the spring of 1985. Construction on the bridge began in the summer of 1985 with the two river piers. The projected opening date of the new Smith Avenue High Bridge is November, 1987, at a cost of \$19.6 million.



After removing the deck from the High Bridge, the demolition contractor removed this span over Shepard Road so that the demolition of the river spans would not affect the rest of the bridge. (Doug Wilke.)

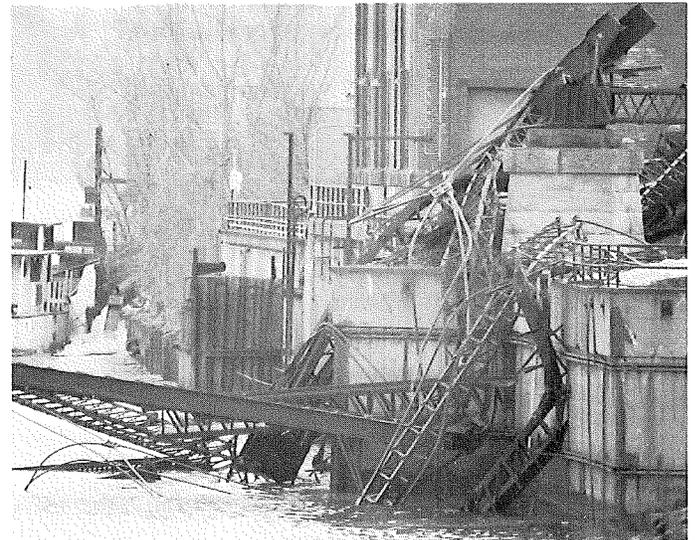
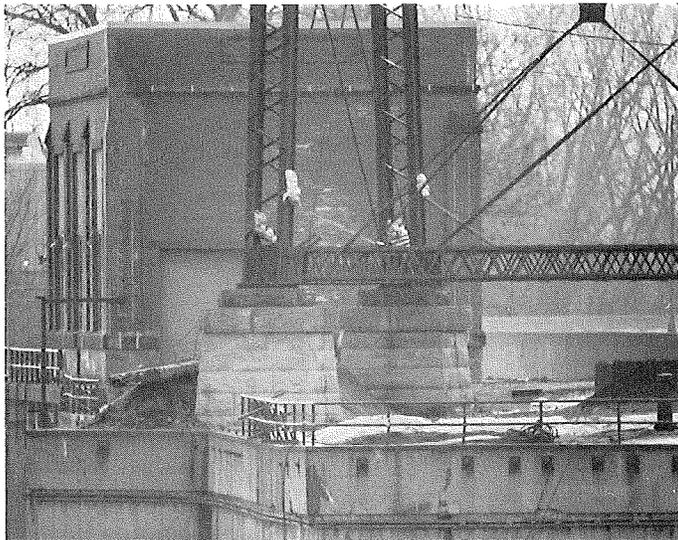
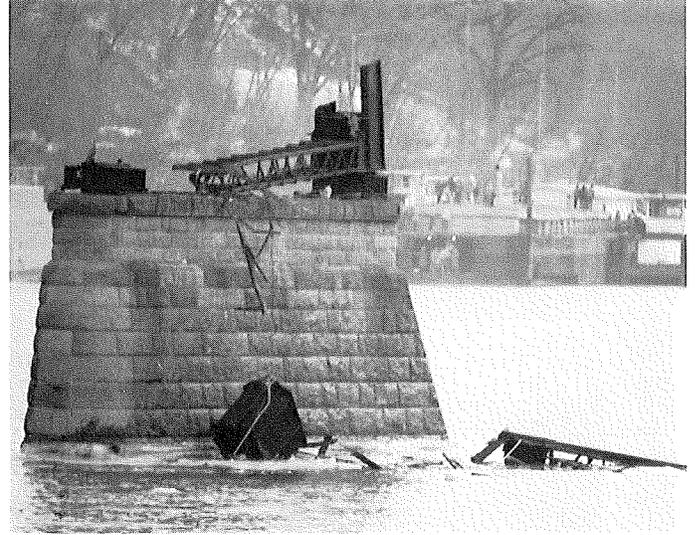
Demolition spectators on Shepard Road, Wabasha Street Bridge, and Harriet Island. (David Gonzales, Mn/DOT.)





(David Gonzales, Mn/DOT.)

Pier 21, before and after demolition. Where the bent has been diagonally and neatly sheared off is where workers had strategically weakened the wrought iron to aid the "cutting" force of the charges. (David Gonzales, Mn/DOT.)



Braced tower at piers 19 and 20, before and after demolition. The white packs on the base of the tower contained the plastic charges. (David Gonzales, Mn/DOT.)

The remaining half of the High Bridge after the river spans had been demolished. (Doug Wilke.)



Demolition worker cutting apart the wreckage at the south end. (Doug Wilke.)



Where the High Bridge was. Only span 1 (on right) remained after the rest of the bridge was removed. (Terry Zoller.)



(Photo: C. P. Gibson, 1915. Minnesota Historical Society.)

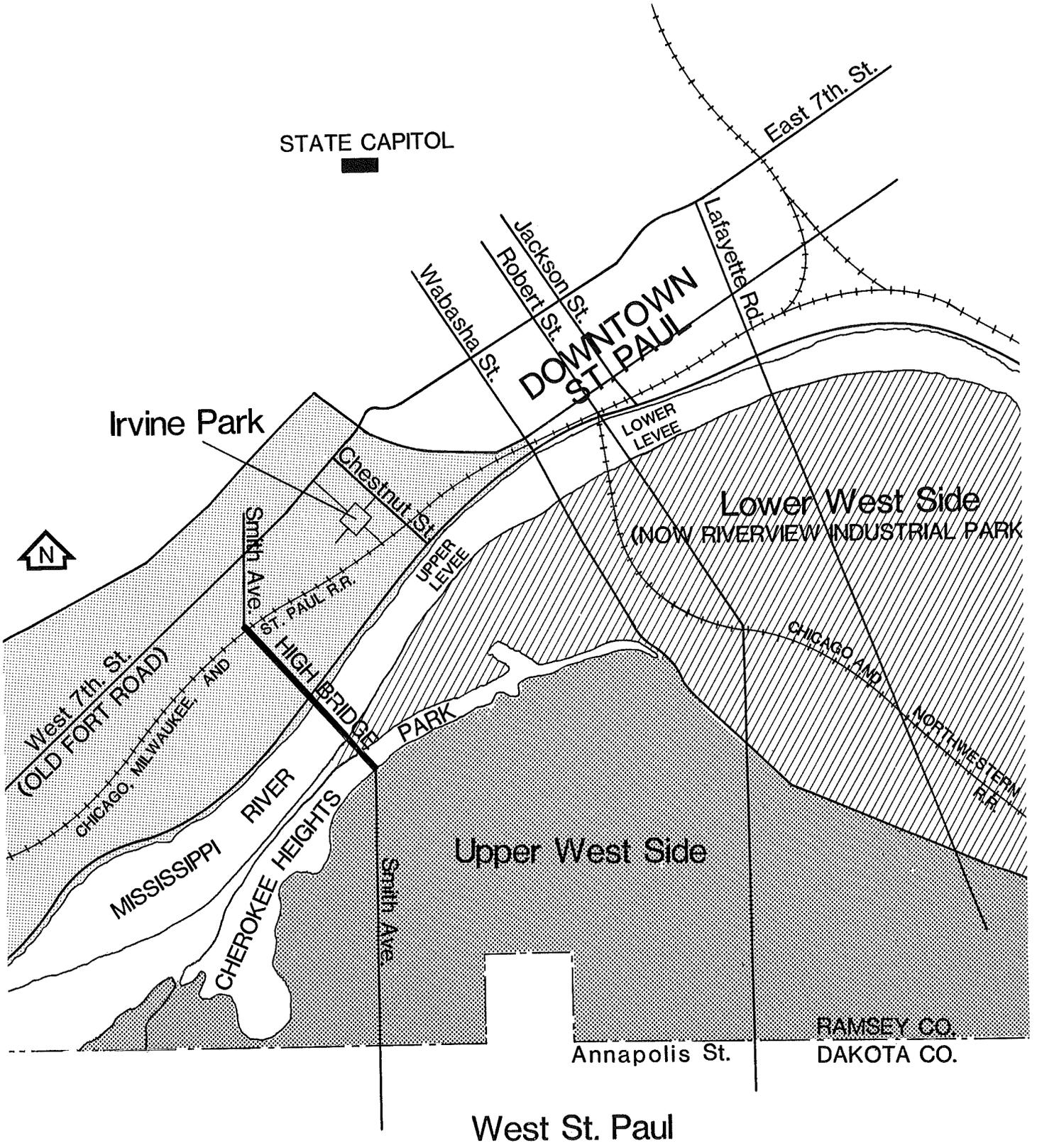
The history of the life of the High Bridge wasn't really the history of the structure itself, although that was certainly a part of it. Its history included its city, the people who built the city and also the bridge, the people who used it, those who admired it and those who condemned it, and those whose well-being depended on it. Through the story of the High Bridge one heard the story of St. Paul, whose development set the stage for the building of the bridge. The structure itself literally represented the expansion and growth of St. Paul. Its daily users throughout its 95 years were the people who with their families, came to this city by way of the river it spanned, to work and who then permanently settled near it. These people flavored the High Bridge's life with their ethnic traditions, and

cared for it as the one structure that was collectively so much a part of their lives.

The importance the High Bridge held is reflected in the intense concern its neighborhoods have had in what replaced it. Their involvement with the process since the earliest discussions of replacing it was a valued component in the entire project, unique to that extent for construction projects, as a rule. But the effect this particular bridge had on so many lives was not allowed to be considered lightly, and the local neighborhoods let their feelings be known. The result is a new landmark that captures the significance of the old, yet at the same time is a product of today.

Appendix

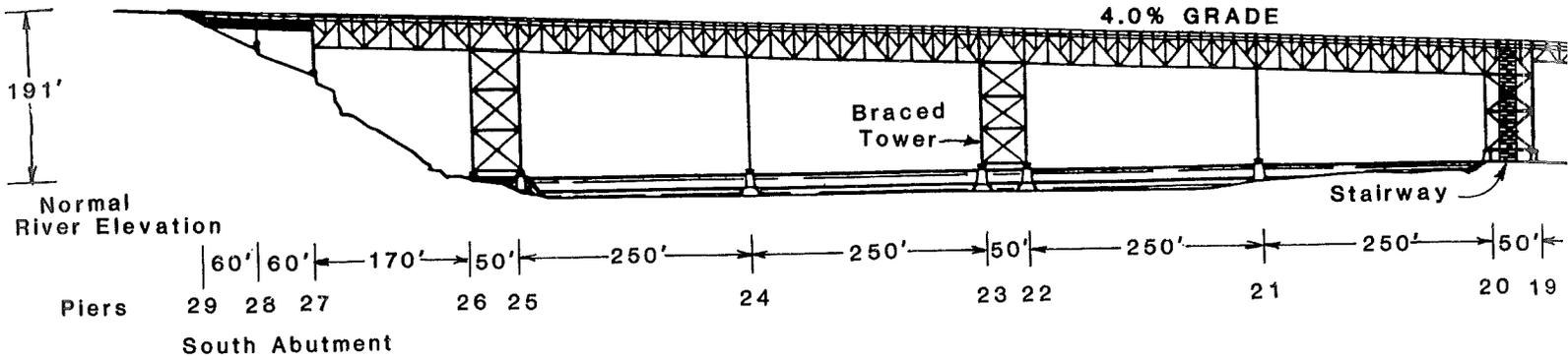
The High Bridge Neighborhood. (Steve Anderson, Mn/DOT.)
Profiles of the High Bridges. (Mn/DOT, District Nine.)



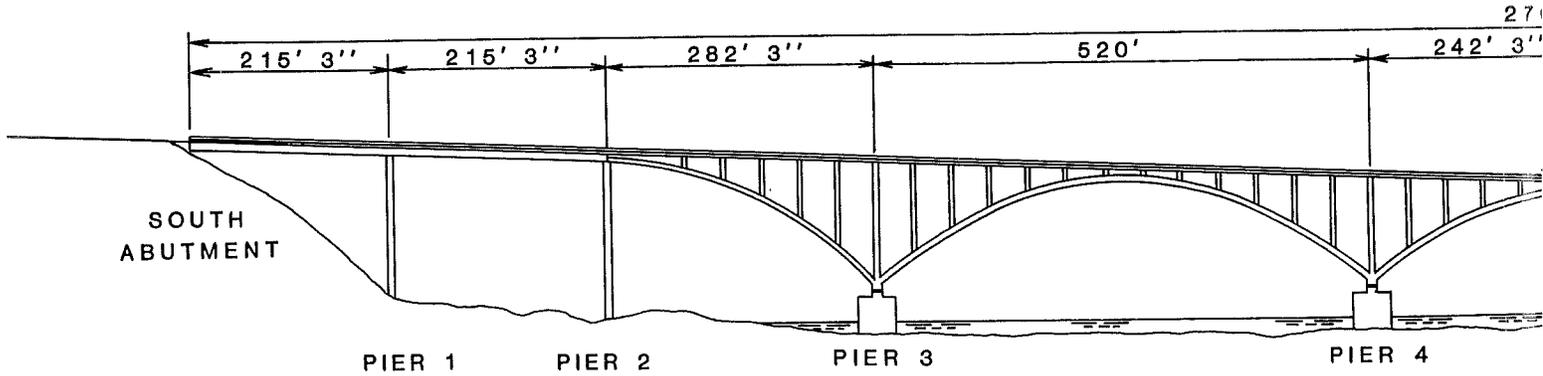
SMITH AVENUE HIGHWAY BRIDGE

(ORIGINAL)

WARREN DECK TRUSS



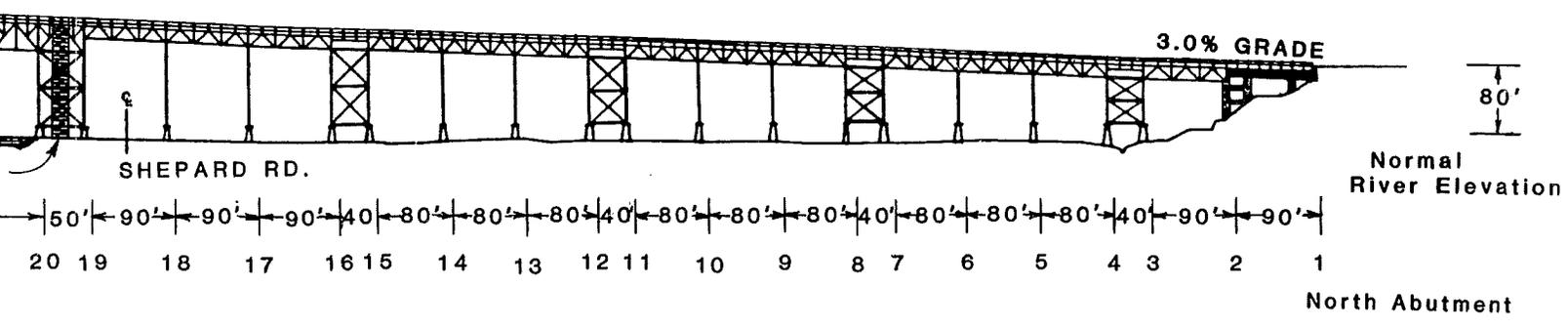
(REPLACEMENT)



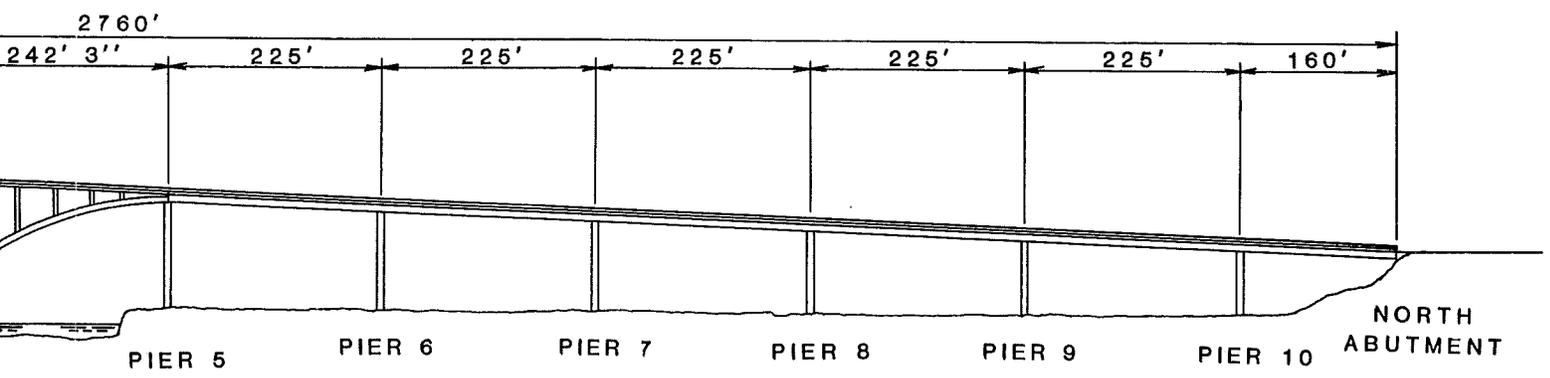
SCALE: 0' 100'

HIGH BRIDGE

IAL)



EMENT)



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