MHPR No. MW-AUS-101

Original ☒ or Addendum No. __

Historic District Name: _____

Minnesota Historic Property Record
Background Data Form

1. Name of Property

Historic name: Bridge 9177 SHPO inventory no.: MW-AUS-101

Current name: Bridge 9177

2. Location

Street & number, intersection of feature carried and feature crossed, or general property location description: Bridge 9177 carries Minnesota State Aid Street (MSAS) 144 (11th Drive Northeast) over Interstate 90 (I-90), 0.9 miles west of junction with Trunk Highway (TH) 218.

City or township: Austin

County: Mower State: MN Zip code: 55912

Legal description: Township 103N, Range 18W, Section 35

UTM Reference: Zone 15 Easting: 503523.56 Northing: 4835884.4975 NAD 83

3. Description

Four-span prestressed-concrete beam bridge

4. National Register of Historic Places (NRHP) status

NRHP, individually listed ☐ or eligible ☒: Date of designation: July 2013

NRHP, in listed ☐ or eligible ☐ historic district: Date of designation:

National Historic Landmark: Date of designation:

5. Previous Designation or Recordation

Local designation program: Date of designation: Name of program:

Name and location of repository:

Other (e.g. HABS/HAER/HALS): Date of designation: Name of program:

Name and location of repository:

6. Preparer's Information

Federal or State agency: MnDOT **Date MHPR prepared:** February 2016

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Zip code: 55439

Bridge 9177
MHPR No. MW-AUS-101
Narrative

(1) Description

Bridge 9177 carries Municipal State Aid Street (MSAS) 144, also known as 11th Drive Northeast, over Interstate 90 (I-90) in the city of Austin, Mower County, Minnesota. This section of I-90 around the north area of Austin was originally designed as a beltway, then redesigned and incorporated into the new Interstate Highway System in the late 1950s when the Interstate Highway System was first built in Minnesota. The highway design, both as a beltway and as an Interstate highway, followed new expressway standards of limited access and therefore required grade-separated intersections. Bridge 9177 was designed as one of the grade-separation structures. In the original 1957 pre-Interstate plans, I-90 was identified as Trunk Highway (TH) 391 and MSAS 144 was identified as "Connection Road C," usually written as "Conn. C."

The bridge was built by the Minnesota Department of Highways (MHD) and continues to be owned by MnDOT. It was designed by the Twin Cities consulting partnership of Goldberg and Davidson and built by Lysne Construction Company Inc., of Blooming Prairie, Minnesota. The prestressed beams were engineered by Charles C. Zollman and Associates of Newtown Square (Philadelphia), Pennsylvania, and fabricated by Elk River Concrete Products Company, an affiliate of the Cretex Companies, located in Elk River, Minnesota.

The bridge is aligned on a northeast-southwest axis and perpendicular to the I-90 roadway beneath. MSAS 144 is a two-lane local access road. The area immediately northeast of the bridge is a mixture of open land and light industrial and commercial property. The area to the south and west is residential with two exceptions: a strip of light industrial property along a north-south rail corridor and the Hormel plant. The rail line bridges I-90 about 1,000 feet northwest of Bridge 9177, at the termination of the off/on ramps for Bridge 9177. The large Hormel Foods plant is located less than a mile directly west of Bridge 9177. This plant was one of the expressed reasons for the alignment of the original beltway around the north side of Austin, so trucks would have access to the facility. Nevertheless, Bridge 9177 is not the closest I-90 intersection to the Hormel plant.

Bridge 9177 is a four-span prestressed concrete girder bridge with a total structure length of 157.3 feet, including two center spans of 43.667 feet and two side spans of 35 feet. Within the out-to-out deck width of 37.5 feet, the bridge carries a 30-foot, undivided, two-lane, two-way roadway and a 2.4-foot sidewalk on each side. The superstructure is perpendicular to the underlying roadway. The roadway lanes beneath the bridge are superelevated.

The center spans (spans 2 and 3) are each comprised of six precast, prestressed (pretensioned) I-section concrete girders, 42.833 feet long, spaced equally across the deck width. The side spans (spans 1 and 4) are comprised of six precast, prestressed (pretensioned), I-section concrete beams, 34.2 feet long, spaced equally across the deck. According to Zollman's calculations, all prestressed beams are 36 inches deep. The beams for spans 2 and 3 are Type 1; the beams for spans 1 and 4 are Type 2. Each

beam has concrete end-blocks on both ends. According to the plans, the outside spans (1 and 4) have fixed bearings on both ends. The center spans (2 and 3) each have expansion bearings on the north ends and fixed bearings on the south ends. Concrete diaphragms are located between the beams on all four spans. The deck is constructed of cast-in-place concrete, as are the sidewalks.

The substructure is comprised of two reinforced-concrete abutments and three reinforced-concrete piers, all on pilings. The piers are aligned perpendicular to the underlying roadway. Each pier has three square columns separated by angular arched openings. The columns are fluted on the outside (highway) faces, with the recess of the fluting deepening at the top of the column to create a shadow. Concrete crash struts have been added between the pier columns of the outside piers. Tall concrete barriers have been erected along the inside traffic lanes and across both sides of the center pier. The U-form abutments are largely below grade, with only the upper few feet visible. Located in each abutment face wall, between beam seats, are three rectangular openings that were designed for future utilities. Two of the openings appear exactly as drawn in the 1957 plans, in-filled with concrete bricks and unused. The third contains a utility pipe and an electrical conduit. Slope protection made of precast concrete panels extends from the upper roadway face of each abutment to the inside base of the closest pier.

The top of each wingwall extends above the deck to become a stepped concrete endpost for the bridge railing, creating a modernist stylistic feature that blends readily with the two-tube modern aluminum railing on curved aluminum posts located along both sides of the deck. The railings are mounted on raised concrete curbs that have horizontal openings above the deck that extend between each rail post location above. A large Interstate exit sign is mounted on the east face of the bridge deck above the westbound lane. A bridge plate is mounted on the west column of the south pier, and on the east column of the north pier, both on the sides facing the roadways.

(2) History and Context

Introduction

Beginning in the late 1940s and early 1950s the MHD undertook the design of a beltline highway around the city of Austin. The highway was intended to divert through-traffic from downtown Austin and re-route it north where it would also facilitate delivery of livestock and shipping to the George A. Hormel Company (Hormel Foods) plant, the city's largest employer, located one-half-mile northeast of downtown. Disputes over the routing and lawsuits delayed construction of the beltline until the mid-1950s. By then, the long-discussed federal Interstate Highway System had received authorization and funding from U.S. Congress as part of the Federal-Aid Highway Act of 1956, popularly known as the National Interstate and Defense Highways Act. As a consequence, the existing state-funded beltline project was redesigned to conform to federal standards and integrated into the new I-90 program. The Austin section of I-90 commenced in 1958 and was completed in 1961.[1]

[1] "City Beltline Redesigned as Freeway," *Austin Daily Herald*, 8 November 1955; "Freeway Provides Link to Boston and Seattle Through Chicago," *Austin Daily Herald*, 15 March 1963.

Bridge 9177 was an integral element of one of the earliest segments of the Interstate Highway System constructed in Minnesota. The bridge and route on which it was situated incorporated distinctive elements of highway and bridge design that characterized post-World War II American highway design and construction, including grade separations, which allowed a continuous flow of traffic, uninterrupted by traditional at-grade intersections.

Austin Beltway Improvement Project

The MHD initiated planning in the late 1940s for the beltline project that would connect U.S. Highway (US) 16-E and 16-W in the city of Austin. The project would begin on US 16-W near Turtle Creek and terminate at 19th Street NE in the center of the city, and was designated as TH 252.[2] The beltline was designed as an "expressway," with two divided lanes that could later be expanded to four lanes. An expressway is a highway designed with divided traffic lanes, without grade-level crossings, and with limited access via ramps or bridges. These design innovations allowed for a continuous flow of traffic unimpeded by stops and turns.[3]

The Minnesota legislature passed a bill adding the planned beltline to the State Highway System in 1949.[4] Variations between the language in the bill and the preliminary layout of the highway route resulted in challenges to the beltline's proposed location. In addition, a number of condemnation suits stalled progress on the project. In response, the 1956 state legislature passed a bill that rerouted the proposed beltline, thus resolving the location issues. The legal challenges to the beltline held up construction until 1956, by which time federal highway policy and planning significantly altered the original proposal.[5]

I-90 and a Beltline Expressway

The first proposals for an integrated transcontinental highway system were initiated in the 1930s with the passage of the 1938 Federal-Aid Highway Act, which directed the Bureau of Public Roads (BPR) to study the feasibility of a network of intra-continental toll roads. The report advocated the construction of limited-access beltlines in urban areas to separate traffic flow, provide bypass options for traffic to avoid the city, and develop radial expressways surrounding the central business district.[6] The design of the Austin beltline followed this federally advocated model.

Following World War II, which had largely deferred highway planning and construction for six years, there was a renewed effort to undertake the development of an Interstate system. The Federal-Aid Highway

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[2] "Austin Beltline is Part of Federal Network," *Austin Daily Herald*, 9 November 1955.

[3] Mead & Hunt, Inc., *Minnesota Bridges, 1956-1970: Politics, Policies, Technology, and Design* (Minnesota Department of Transportation, May 2008), 17.

[4] "Austin Beltline is Part of Federal Network."

[5] "City Beltline Redesigned as Freeway"; Lindy Davis, "Highway Interstate 90," *Austin Daily Herald*, 9 November 1961.

[6] Richard F. Weingroff, "Federal-Aid Highway Act of 1956: Creating the Interstate System," *Public Roads* 60, no. 1 (Summer 1996): 1.

Act of 1944 authorized a system of Interstate routes to serve national defense efforts. Routes were to be selected in conjunction with state highway departments, but little funding was provided to implement a program. As early as 1947, discussions of the potential Interstate Highway System identified three routes passing through Minnesota. These routes closely corresponded with the eventual alignments of I-35, I-90, and I-94.[7]

When Dwight D. Eisenhower became president in 1953 he placed a high priority on establishing an Interstate Highway System. In 1954 and 1956 he succeeded in getting a Federal-Aid Highway Act passed that provided funding for Interstate Highway construction; fiscal responsibility for the system was shared between the states and federal government.[8] This act spurred development of the Interstate Highway System nationally and in Minnesota, where the MHD focused its attention and resources on the construction of the Interstate network and the associated number of grade-separation structures. In the first decade of Interstate construction, the MHD constructed over 400 bridges and estimated that another 600 would be required by the time Interstate construction was complete on over 900 miles of the system in Minnesota.[9]

The beltline proposal for improvements to US 16 lay within the path of the proposed I-90 route through the southern part of the state. State officials, aware of the policy debates supporting the construction of the Interstate Highway System and of the proposed Interstate routes, did little to move forward on the Austin beltline proposal, despite the settlement of the legal challenges regarding the location of the beltline that had initially delayed construction for several years.[10]

In November 1955 the *Austin Daily Herald* proudly announced that the long anticipated beltline project was being "ambitiously redesigned to give the city the first true freeway in Minnesota." When the Austin City Council approved the preliminary plans for the freeway in November 1955, the road was designated TH 252—the same number that had been assigned to the original beltline project.[11] The project was placed in the MHD programming for 1956, and the beltline plans were modified to conform to the design standards for Interstate Highways established by the American Association of State Highway Officials (AASHO), which included four divided lanes (two in each direction) with fully controlled access.[12]

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[7] "U.S. Highways in Minnesota," http:www.steve-riner.com/mnhighways/ushwys/htm.

[8] Weingroff, 5, 8; Mead & Hunt, Inc., 12. The Interstate Highway through Austin was funded in accordance with the Federal-Aid to Highways Act of 1956 at a 90-10 federal to state dollars ratio.

[9] Mead & Hunt, Inc. 12–13.

[10] "Austin Beltline is Part of Federal Highway Network."

[11] "Austin Beltline is Part of Federal Highway Network." The Interstate Highway was officially designated as I-90 in 1959. I-90 was also referred to as Legislative Route 391 and TH 252.

[12] Weingroff, 4, 10; Minnesota Department of Highways, "Bridge No. 9176, Plan & Drawing Sheets 1-22," Sheet 1. A box on the plan entitled "Design Data" cites the AASHO design specification, 1953. Requirements for four lanes and full access control, with some exceptions, had been in place since 1945.

As part of the Austin beltline's transformation into a segment of I-90, it became one of an early number of highway segments in post-World War II Minnesota to utilize expressway design standards and elements that had been adopted by AASHO in 1953.[13] The Interstate Highway System was significantly different from the Trunk Highways that had preceded it. The underlying concept of the Interstate and of all freeways was to maintain the uninterrupted flow of traffic. To accomplish this goal, the system relied on controlled access and the elimination of conventional intersections through the use of interchanges and grade separations.[14] The redesigned beltline included ramps, cloverleaf and diamond interchanges, and outer drives (likely frontage roads), although the construction of the cloverleaf interchange was deferred to a future time. The Austin portion of I-90 included nine grade separations over a 4.5-mile area, including Bridge 9177.[15]

The first Interstate groundbreaking activities in Minnesota were along I-90 in Austin. On May 9, 1956, work began on a storm sewer near Sutton Park that would provide drainage for railroad underpasses along the Interstate. This work was let earlier than other projects, such as road construction and overpasses, because these structures were expected to take longer to finish. Work on the Interstate in Austin continued through the 1950s and early 1960s, with sections opened to traffic as they were completed.[16] Work was delayed in 1958 due to unanticipated soil conditions, and again in 1959 due to a steel strike.[17]

Although the Interstate project through Austin was widely supported by public officials and extolled as a boon to the community that would promote growth and prosperity, the project was not without its detractors. Prominent among these were the Rose Creek school district and business community whose representatives voiced their objections to the Interstate design that dead-ended County Road (CR) 19 at the freeway and isolated parts of their community.[18] Their request for an overpass was initially denied by the Bureau of Roads in 1959, but reversed following the involvement of U.S. Representative Al Quie and U.S. Senators Eugene McCarthy and Hubert Humphrey.[19]

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[13] The first official segment of the Interstate Highway System in Minnesota was located near Owatonna, which began on August 5, 1957. Mead & Hunt, Inc., 13. The *Austin Daily Herald* placed the beginning of the Austin beltline project in May 1956, when work commenced on a storm sewer to provide drainage for the freeway underpasses. The paper stated that the ground breaking for the sewer was the first soil "moved in Minnesota for construction of a project under the federal Interstate Highway system." Davis.

[14] Weingroff, 13.

[15] "City Beltline Redesigned as Freeway," n.p.; "Austin Beltline Opening," *Minnesota Highways* (December 1961): 3.

[16] "Austin Beltline is Part of Federal Highway Network: First Dirt Turned Here to Launch Freeway Work," *Austin Daily Herald*, 9 May 1956; "Interstate 90 Dedication Held Today," *Austin Daily Herald*, 21 July 1964. The first official Interstate paving project in Minnesota occurred on August 5, 1957, on I-35 near Owatonna.

[17] Davis.

[18] "Transcript of Public Hearing held in Mower County Courthouse, Austin Minnesota, February 25, 1958," n.p.; Davis, "Highway Interstate 90," n.p.

[19] Davis.

The Austin beltline portion of I-90 opened to traffic August 11, 1961, as final landscape beautification work was being completed.[20] The local paper asserted that the project was "the biggest single public improvement program in the city's history."[21] In the following years, work continued on I-90 east and west of the Austin beltline, and on July 21, 1964, the 42.7-mile section of I-90 between Petran's Corner, west of Austin, to Stewartville, east of Austin and south of Rochester, was officially dedicated.

Planning, Designing, and Constructing Bridge 9177

Bridge 9177 was designed as one of the grade-separation structures in the Austin beltline and eventual I-90 corridor. On February 7, 1957, the firm of Goldberg and Davidson, consulting civil and structural engineers, submitted a proposal to MHD bridge engineer A.E. LaBonte to prepare plans for Bridge 9177 for a fee of $3,600. The partners were Sidney L. Goldberg and Henry A. Davidson, with offices in St. Paul (Goldberg's location) and Hopkins (Davidson's location). According to their proposal letter, signed by Davidson, Bridge 9177 was intended to carry Road "C" over TH 252 (the original designation of the beltway that would become I-90). Road C was identified as a "Shopping Center connection." Preliminary plans were submitted on March 8 and detail plans were completed on May 6, 1957.[22]

The MHD sent a number of plans to the Goldberg and Davidson office to serve as models for the design of the new structure, including Thomas Ellerbe's complete set of drawings for Bridge 9053, the MHD's first prestressed concrete beam bridge, and the unchecked plans for another prestressed beam, Bridge 9232 near Hibbing, which had been developed by the engineering firm V.S. Morehouse and Associates.[23]

In March 1957 Goldberg and Davidson submitted "Criteria for the Design of the Substructure and Superstructure" for Bridge 9177, indicating that the design of prestressed concrete would follow "Criteria for Prestressed Concrete Bridges," published by the BPR in 1954. The Goldberg and Davidson document stated that the "prestressed girders shall be designed for pretensioning or posttensioning [sic]." Like their proposal letter, the criteria report stated that Bridge 9177 would carry "Shopping Center Connecting Road 'C.'" The shopping center reference is found in one other document, a list of bridge projects proposed for the new Interstate Highway System, for which plans could be ready in 1957. The entry for Bridge 9177 identifies its location as "Shopping Road" over TH 252, the future I-90.[24]

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[20] "Austin Belt Line Officially Opens Traffic Today after 4," *Austin Daily Herald*, 11 August 1961, n.p.

[21] "Austin Beltline is Part of Federal Highway Network: First Dirt Turned Here to Launch Freeway Work."

[22] Henry A. Davidson, letter to A.E. LaBonte, Bridge Engineer, Minnesota Highway Department, "Proposal for Bridge 9177 Plans," 7 February 1957), Bridge 9177 Records, MnDOT Bridge Project Records, St. Paul, Minnesota.

[23] Charlene Roise, Hess, Roise and Company, *Advisory Council on Historic Preservation's Program Comment Review of Minnesota Bridges, 1955-1970* (Minnesota Department of Transportation, June 2014), 49.

[24] A.E. LaBonte, Bridge Engineer, MHD, memorandum to J.C. Robbers, Asst. Chief Engineer, MHD, 20 May 1957), Bridge 9177 Records, MnDOT Bridge Project Records, St. Paul, Minnesota; "Bridge Projects in Proposed Construction Program for Which Construction with Bond Issue Funds Could Be Considered" (Minnesota Department of Highways, May 20, 1957), Bridge 9177 Records, MnDOT Bridge Project Records, St. Paul, Minnesota.

Beyond the references in these three documents, the shopping center connection is not found in any subsequent documents, including the final plans, which include the bridge survey sheet and map. Research, including the most recent field survey, has identified no shopping center planned or existing in the vicinity of the bridge or related to Road C. No explanation has been found for the shopping center connection reference in the Goldberg and Davidson documents.[25]

Goldberg and Davidson submitted preliminary plans for Bridge 9177 to the MHD on April 9, 1957. Although submitted by the partnership, the final plans (see sheet 1) were signed on November 6, 1957, by Davidson as the engineer of record. The work of Goldberg and Davidson was considered complete by December 20, 1957, and the plans were approved by the MHD on December 26, 1957.[26] Although their earlier criteria document indicated that the beams would be designed for pretensioning or post-tensioning, only pretensioned beams are included in the final plan set (see table of quantities for superstructure on sheet 5 and beam plans on sheet 6). No explanation has been found for the selection of pretensioning over post-tensioning. The preliminary plans or an earlier plan set may have shown additional or other details, since sheet 6 in the only available plan set is referenced for Elk River Concrete, dated May 1, 1958, and notated "All dimensions and details not given on this sheet are same as original sheet."[27]

The MHD did not distribute a request for construction bids until January 1958, with proposals due at the end of that month. The request for proposals required that the prestressed-concrete beams "be fabricated and installed in accordance with the provisions of Specification No. 405 dated January 2, 1958." Lysne Construction (Lysne) from Blooming Prairie, Minnesota, won the contract with a bid of $87,222.80.[28]

Lysne arranged to have the prestressed beams fabricated by Elk River Concrete Products Company in Elk River, Minnesota, which was affiliated with the Cretex firm that owned several concrete companies. Elk River, in turn, contracted with Charles C. Zollman and Associates for the prestressed-beam calculations required for the fabrication. Zollman provided Cretex with a 17-page set of calculations in March 1958.[29]

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[25] Goldberg and Davidson, *Bridge No. 9177: Criteria for the Design of the Substructure and Superstructure* (Minnesota Highway Department, March 1957), Bridge 9177 Records, MnDOT Bridge Project Records, St. Paul, Minnesota.

[26] A.E. LaBonte, Bridge Engineer, MHD, Memorandum, "Completion of Work on 9177 by Goldberg & Davidson," 20 December 1957), Bridge 9177 Records, MnDOT Bridge Project Records, St. Paul, Minnesota.

[27] Henry A. Davidson, "Bridge 9177 [Plan Set 1957-58]-T.H. 391 Under Conn. Road C in Austin" (Minnesota Highway Department, December 26, 1957).

[28] Charlene Roise, Hess, Roise and Company, *Advisory Council on Historic Preservation's Program Comment Review of Minnesota Bridges, 1955-1970*, 49.

[29] A.H. Bailey, Elk River Concrete Products Company, letter to Mr. Radin, Minnesota Highway Department, "Computations for Beams for Bridge 9177," 8 April 1958), Bridge 9177 Records, MnDOT Bridge Project Records, St. Paul, Minnesota; Charles C. Zollman, *Revised Prestressing-Bridge 9177-Minnesota* (Charles C. Zollman and Associates, Consulting Engineers, March 24, 1958), Bridge 9177 Records, MnDOT Bridge Project Records, St. Paul, Minnesota.

Zollman was a student of the important prestressed-concrete engineer Gustave Magnel at Belgium's University of Ghent, who was active in the 1930s and 1940s. Zollman translated Magnel's influential volume *Le Beton Precontraint (Prestressed Concrete)* into English and promoted Magnel's work in the U.S. He then facilitated Magnel's selection as the designing engineer for the 1950 Walnut Lane Bridge in Philadelphia, the first prestressed-concrete beam bridge built in the U.S. A few years later, Zollman advised Elk River Concrete on the design of its large tensioning beds that were necessary for the fabrication of prestressed concrete bridge beams. The Elk River yard became one of Minnesota's pioneering plants in producing prestressed-concrete bridge beams. Zollman's subsequent involvement with the design of the prestressed beams for Bridge 9177 establishes a direct link between the Minnesota bridge and the beginnings of prestressed-concrete bridge design in the U.S. as well as in Minnesota.[30]

Available documents indicate that Bridge 9177 was completed in 1958. Soon a major issue emerged for the entire Austin segment of I-90 that affected a number of the bridges that had just been built. When AASHO issued design standards for the Interstate Highway System, it established a minimum of 14 feet for vertical clearance (the distance from the Interstate roadway pavement to the bottom of the overpass). It was not until after the Interstate Highway System was under construction that the Department of Defense (DOD) informed the BPR that the 14-foot clearance was not adequate for defense purposes. In 1960 the Secretary of Commerce revised the minimum vertical clearance to 16 feet. The revised standard applied to all Interstates in rural areas and to at least one Interstate route within urban areas.[31] The MHD, like many other state transportation departments, had adopted the earlier AASHO standard. However, by 1959, prior to the Secretary of Commerce's action to raise the federal standard, the MHD was already considering the issue of adequate vertical clearance. A November 4, 1959, memorandum from Commissioner of Highways L.P. Zimmerman refers to the MHD's internal discussion of the DOD's revised clearance requirement, recent state legislative action to establish a 16-foot clearance requirement for all railroad bridges in Minnesota, and policy action to expand that requirement to apply to all highway grade separations. Zimmerman noted that a state study indicated that at least three other states had taken action to adopt a 16-foot clearance requirement.[32]

When the *Austin Daily Herald* reported that five bridges along the Austin beltline did not meet the revised federal vertical clearance standard of 16 feet, it said that the MHD was considering the means to modify the existing bridges. Clayton Swanson, the Rochester District MHD Engineer, stated that steel bridges could be raised using a jack and concrete blocks, but that the prestressed- and reinforced-concrete bridges represented a more difficult problem. At the time, the MHD was considering the most economical

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[30] Robert M. Frame III and Richard E. Mitchell, "Constructing Suburbia: The Hidden Role of Prestressed Concrete," *Minnesota History* 64, no. 4 (Winter 2014): 160–161, 164, 166.

[31] Federal Highway Administration, "Right of Passage: The Controversy over Vertical Clearance on the Interstate System," http://www.fhwa.dot.gov/infrastructure/50vertical.cfm.

[32] L.P. Zimmerman, "State of Minnesota, Office Memorandum: Vertical Clearance for Trunk Highway Bridges," 4 November 1959, n.p.

methods to achieve the minimum vertical clearance requirement, either by raising the superstructure using power jacks or lowering the roadway grade.[33]

The *Austin Daily Herald* article did not identify the individual bridges with inadequate clearance and no other available document has named the bridges. Further research on neighboring I-90 Bridge 9176 identified it as one of the five and further indicated that the solution was to lower the Interstate roadway beneath the spans.[34] While the records for Bridge 9177 do not mention the clearance issue, evidence in the plan set for Bridge 9177 provides a definite indication that it was also one of the bridges that did not meet the revised federal vertical clearance standard. The elevation plan on sheet 1 shows the cross section of the roadway, apparently as built or at least as designed, but added in a dotted line is a new section for both east- and west-bound lanes that is one or 1 and 1.5 feet lower (the image is unclear). With the line is this notation: "Planned grading section. Quantity of class U excavation is estimated with this section as the upper limit." In other words, lines indicating new and lower elevations for the 9177 roadway below the spans were added to the plan sheet with a notation that the excavation was planned and the new lines marked the "upper limit" of the new, lower roadway—it might be even lower. A few new dimensions were added with the new lines. These undated lines and notes, added to the existing 1957 sheet, are evidence that a lowered roadway allowed Bridge 9177 to comply with the revised clearance standard.[35]

At the national level, previously constructed bridges represented a significant problem with the new vertical clearance standards since the cost of correcting vertical clearance could be prohibitively expensive. Following a 1967 survey that revealed that 2,650 bridges within the Interstate Highway System did not meet the revised DOD standard, the Federal Highway Administration, AASHO, and the Military Traffic Management Command decided that a priority network would be established to serve major military installations and only 350 bridges nationwide would be corrected to provide clearance.[36]

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[33] "5 Belt Line Bridges Reported Too Low," *Austin Daily Herald*, 24 November 1959. In an oral history interview conducted by Bob Frame with Louis Anderson, a surveyor who worked on the Austin segment of I-90 in the mid-1950s, Anderson confirmed that there were a number of changes in engineering standards during that period. This was particularly true in regard to bridge elevations. However, Anderson did not recall elevation issues specific to Bridge 9177. Louis Anderson, interview by Bob Frame and Darrell Berry of Mead & Hunt, Inc., transcript, Minnesota Department of Transportation, District 6, June 29, 2009.

[34] Carol Roland et al., *Bridge 9176 (MW-AUS-092)*, Minnesota Historic Property Record, (2009), 5–7.

[35] Henry A. Davidson, "Bridge 9177 [Plan Set 1957-58]-T.H. 391 Under Conn. Road C in Austin," Sheet 1.

[36] Federal Highway Administration, "Right of Passage: The Controversy over Vertical Clearance on the Interstate System."

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MINNESOTA HISTORIC PROPERTY RECORD

INDEX TO PHOTOGRAPHS

MnDOT BRIDGE 9177 MW-AUS-101
Carrying MSAS 144 (11th Drive Northeast) over I-90
Austin
Mower County
Minnesota

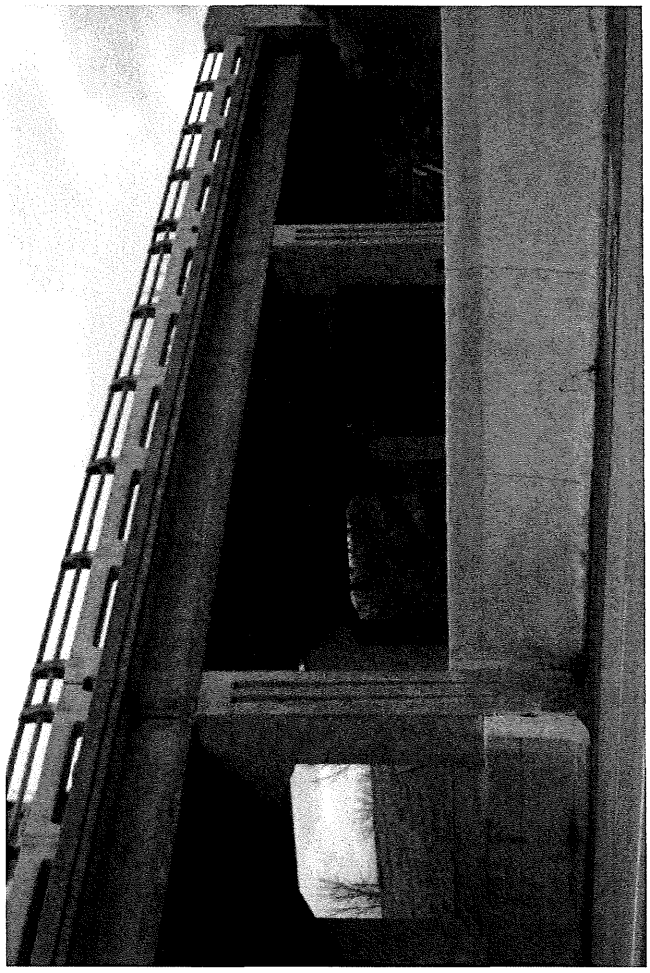
35mm photographs by Richard E. Mitchell, Mead & Hunt., Inc., November 18, 2015

MW-AUS-101-01	OBLIQUE VIEW OF NORTH SPANS AND ABUTMENT OF BRIDGE, LOOKING NORTHWEST.
MW-AUS-101-02	OBLIQUE VIEW OF NORTH SPANS OF BRIDGE, LOOKING NORTHWEST.
MW-AUS-101-03	SOUTH BRIDGE PLATE, LOOKING SOUTHEAST.
MW-AUS-101-04	FACE OF SOUTH ABUTMENT WITH UNUSED UTILITY OPENING WITH BLOCK IN-FILL, LOOKING SOUTH.
MW-AUS-101-05	UNDERSIDE OF SUPERSTRUCTURE, LOOKING NORTHEAST.
MW-AUS-101-06	OBLIQUE VIEW OF BRIDGE, LOOKING NORTHEAST.
MW-AUS-101-07	DECK VIEW OF NORTHEAST END WALL, LOOKING EAST.
MW-AUS-101-08	TRAFFIC SIDE OF EAST RAILING, LOOKING SOUTHEAST.
MW-AUS-101-09	WEST SIDE OF BRIDGE, LOOKING SOUTHEAST.
MW-AUS-101-10	OBLIQUE VIEW OF BRIDGE, LOOKING SOUTHEAST.
MW-AUS-101-11	CENTER PIER, LOOKING WEST-SOUTHWEST.
MW-AUS-101-12	OVERVIEW OF BRIDGE, LOOKING WEST.
MW-AUS-101-13	NORTH BRIDGE PLATE, LOOKING NORTH-NORTHWEST.
MW-AUS-101-14	EAST SIDE OF BRIDGE, LOOKING SOUTHWEST.
MW-AUS-101-15	DECK VIEW, LOOKING SOUTH.

MW-AUS-101-16	1957 PLAN, COVER SHEET, "CONSTRUCTION PLAN FOR BRIDGE NO. 9177."
MW-AUS-101-17	1957 PLAN SHEET 1 OF 9, "GENERAL PLAN AND ELEVATION."
MW-AUS-101-18	1957 PLAN SHEET 2 OF 9, "DECK LAYOUT."
MW-AUS-101-19	1957 PLAN SHEET 3 OF 9, "ABUTMENTS."
MW-AUS-101-20	1957 PLAN SHEET 4 OF 9, "PIER DETAILS."
MW-AUS-101-21	1957 PLAN SHEET 5 OF 9, "DECK PLAN AND DETAILS."
MW-AUS-101-22	1957 (REV. 1958) PLAN SHEET 6 OF 9, "35-43-43-35 PRRESTRESSED GIRDER SPANS."
MW-AUS-101-23	1957 PLAN SHEET 7 ORF9, "RAILING DETAILS."
MW-AUS-101-24	1957 PLAN SHEET 8 OF 9, "BRIDGE DETAILS."
MW-AUS-101-25	1957 (SURVEY MADE 1951) PLAN SHEET 9 OF 9, "BRIDGE SURVEY."

MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-01

MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-02



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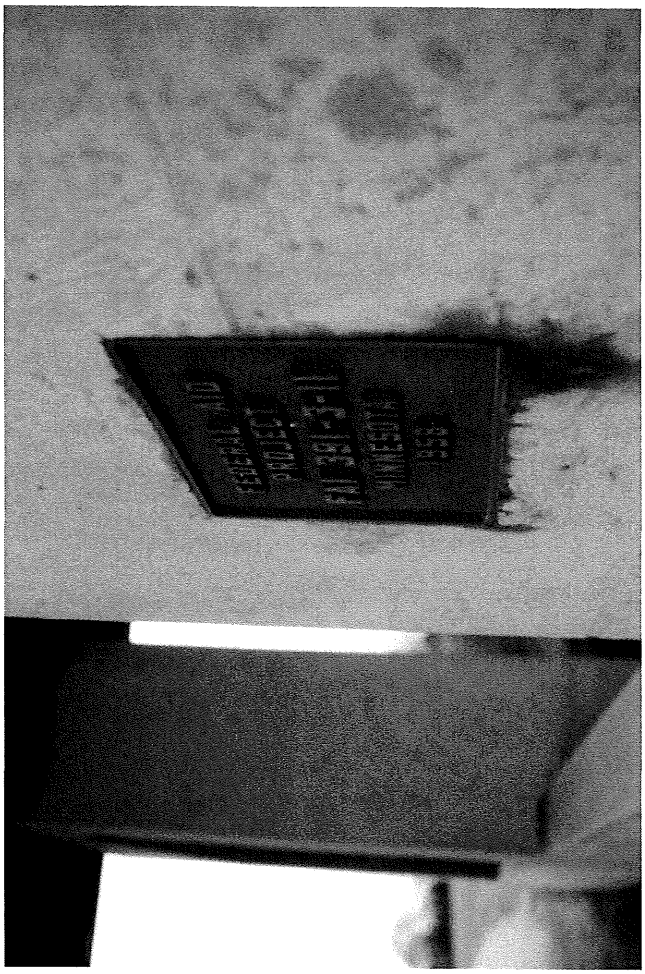
MW-AUS-101-03



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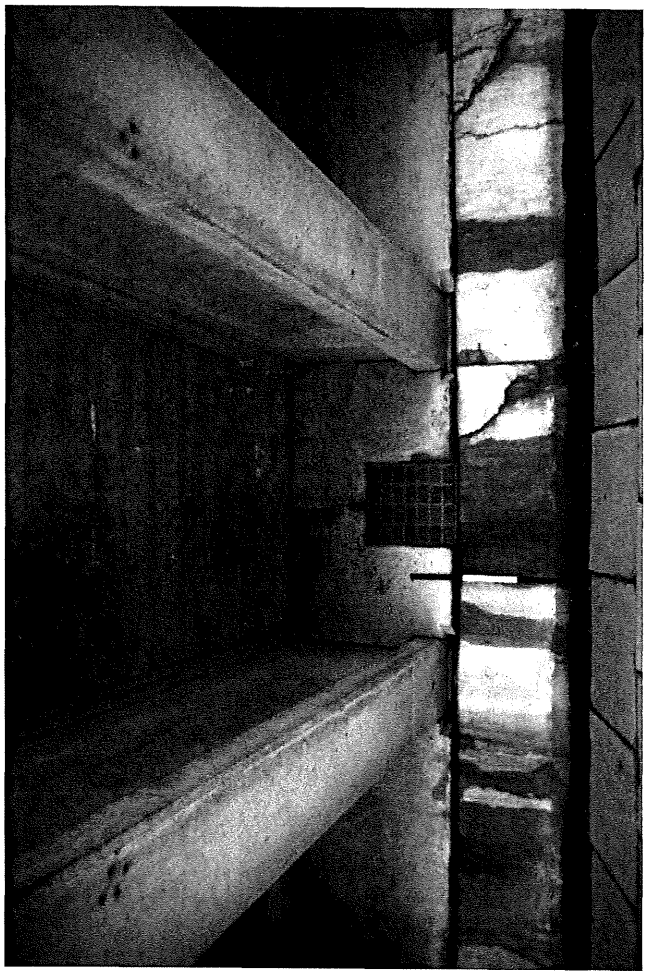


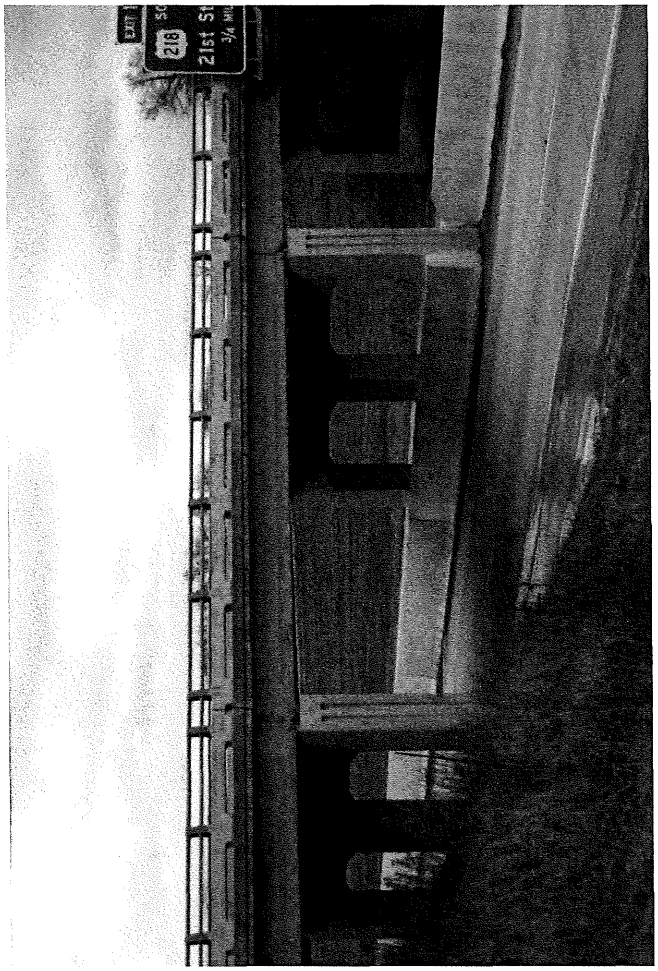
MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-05

MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-06

MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-07

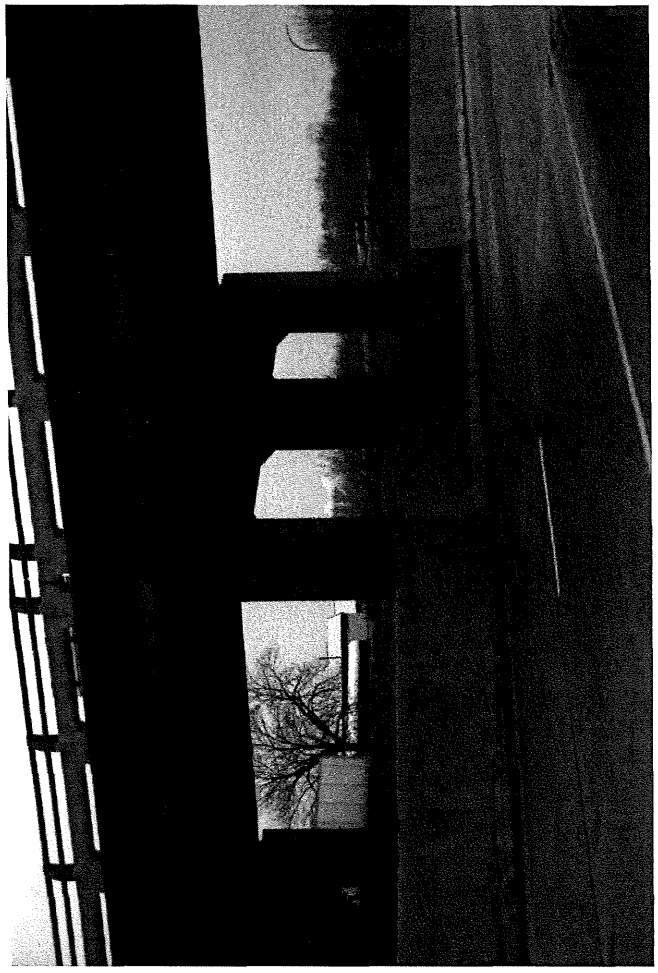
MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-08

MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-09



MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-10

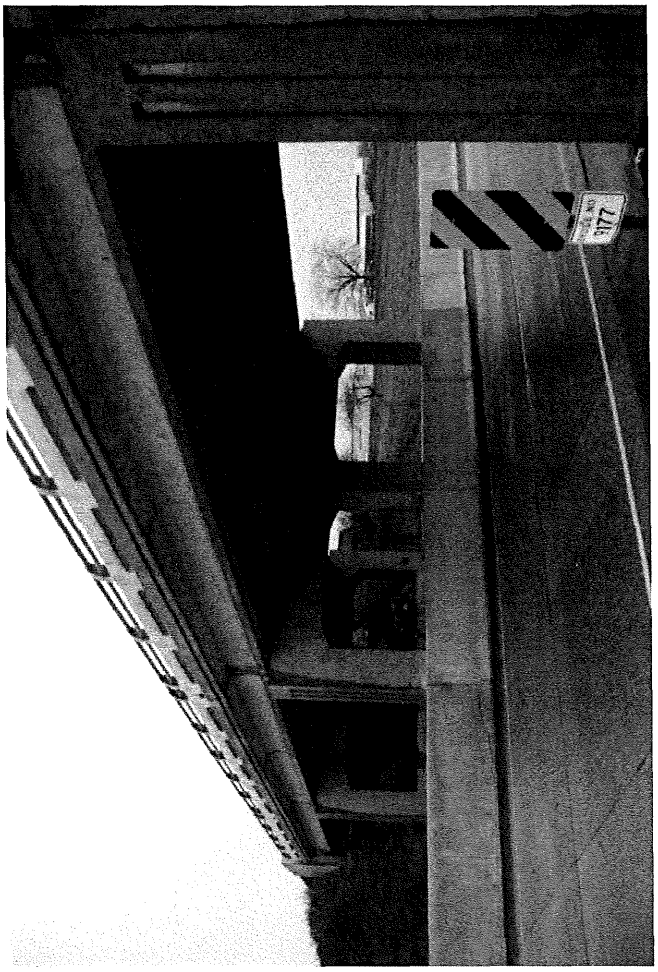
MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-11



MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-12

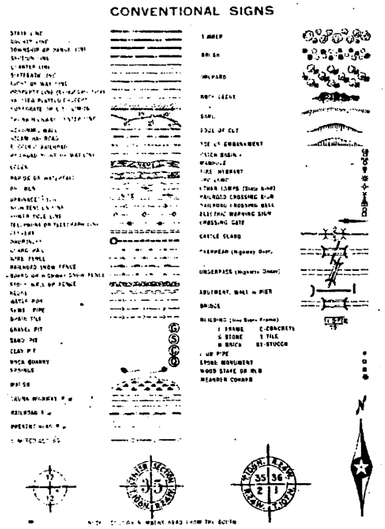
MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-13

MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-14



MINNESOTA HISTORIC PROPERTY RECORD
MnDOT BRIDGE 9177
MW-AUS-101-15

CONVENTIONAL SIGNS



STATE OF MINNESOTA

DEPARTMENT OF HIGHWAYS

CONSTRUCTION PLAN FOR BRIDGE NO. 9177

TRUNK HIGHWAY NO. 391

IN AUSTIN

AT A POINT 17795' WEST AND 6014' NORTH OF THE SOUTHEAST CORNER OF SECTION 35 T103N R18W

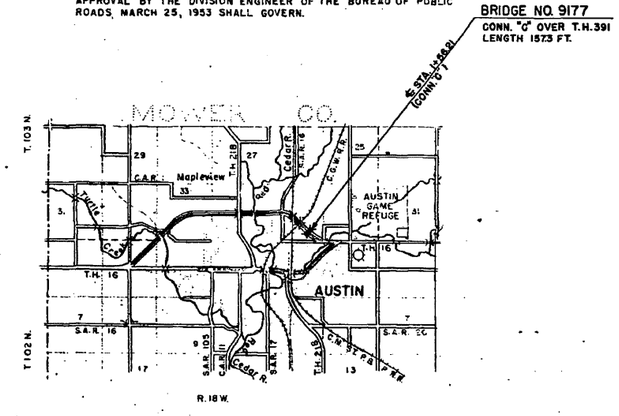
MINNESOTA PROJECT I-391-3(11)			STATE PROJECT NO. 5080-05		
GROSS LENGTH	FEET	MILES	GROSS LENGTH	FEET	MILES
BRIDGES-LENGTH	FEET	MILES	BRIDGES-LENGTH	FEET	MILES
EXCEPTIONS-LENGTH 00.00	FEET 0.00	MILES	EXCEPTIONS-LENGTH 0.00	FEET 0.00	MILES
NET LENGTH	FEET	MILES	NET LENGTH	FEET	MILES

LAYOUT

Scale 1 inch 2280 Feet

SPECIFICATIONS

THE SPECIFICATIONS FOR HIGHWAY CONSTRUCTION DATED JULY 1, 1947 AND SUBMITTED FOR APPROVAL BY THE DIVISION ENGINEER OF THE BUREAU OF PUBLIC ROADS OCTOBER 15, 1947, AS MODIFIED BY SUPPLEMENT 1 THERETO DATED APRIL 15, 1953 AND SUBMITTED FOR APPROVAL BY THE DIVISION ENGINEER OF THE BUREAU OF PUBLIC ROADS, MARCH 25, 1953 SHALL GOVERN.



Right of Way Approved: [signature] CHIEF ENGINEER OF LANDS AND RIGHT OF WAY 12-27, 1957.

Recommended for Approval: [signature] BRIDGE ENGINEER 12-26, 57.

Recommended for Approval: _____ DISTRICT ENGINEER ____, 19__.

Recommended for Approval: S.T. Burns ENGINEER OF PLANS AND SURVEYS 12/26, 1957

Approved: 12/26/57 [signature] CHIEF ENGINEER

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

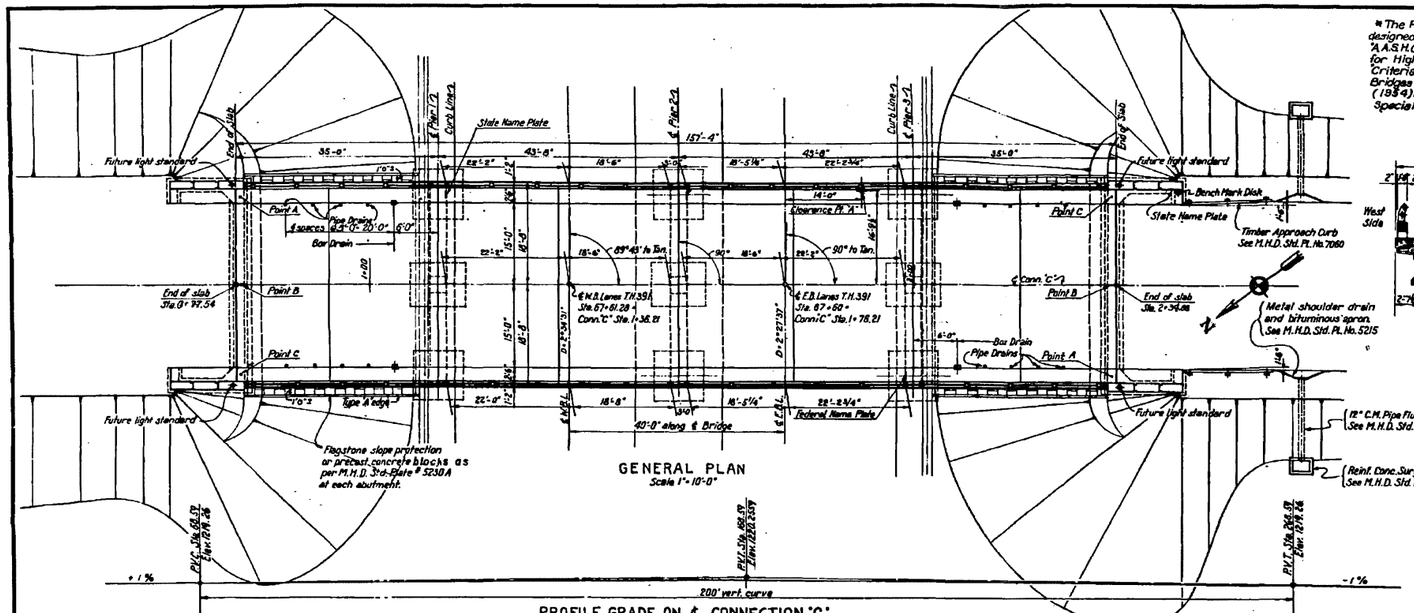
APPROVED:

DISTRICT ENGINEER DATE

MICRO-FILMED

MINN. PROJ. I-391-3(11) State Proj. No 5080-05

County G 9177



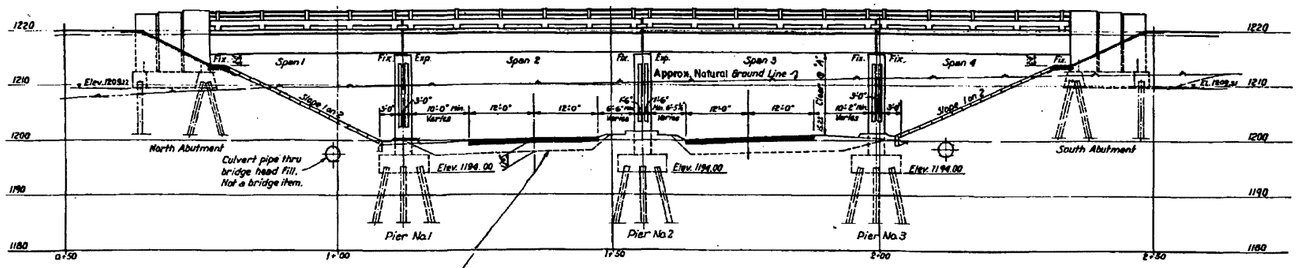
* The Prestressed Girders are designed in accordance with "A.A.S.H.O. Standard Specifications for Highway Bridges" (1953) and Criteria for Prestressed Concrete Bridges U.S. Bureau of Public Roads' (1953-4) except as modified by Special Revisions.

DESIGN DATA *
1953 AASHO DESIGN SPECIFICATIONS
LIVE LOAD : H 20-S16 (44)
f_s = 1200 n = 10 f_s = 20,000 INTERM. GRADE REF.
f_s = 18000 CARBON STEEL M.H.D. 3305

Top ½" of floor slab not considered in structural action, but as wearing course only.

Index of Sheets:

Sheet No. 1 :	General Plan and Elevations
2 :	Deck Layout
3 :	Abutments
4 :	Pier Details
5 :	Deck Plan and Details
6 :	Prestr. Concrete Girder Details
7 :	Railing Details
8 :	Bridge Details
9 :	Bridge Survey



Approach fills to be constructed by others in advance of bridge construction.

Planned grading section. Quantity of class U excavation is estimated with this section as the upper limit.

ELEVATION
At right angle to tangent to Curve of E.B.L. Trunk Hwy. No. 391.
Scale 1" = 10'

The Minnesota Specifications for Highway Construction dated July 1, 1947 and submitted for approval by the Division Engineer of the Bureau of Public Roads on October 15, 1947, as modified by "Supplement No. 1" thereto dated April 15, 1953 and submitted for approval by the Division Engineer of the Bureau of Public Roads on March 25, 1953, shall govern.

All reinforcement shall be intermediate grade bars deformed.

Sidewalk and curb shall be placed after the entire roadway slab has been placed.

Sidewalk at abutments shall be poured after complete bridge sidewalk has been poured.

Structural steel shall conform to M.H.D. 3305 except as noted.

Edge of concrete on all exposed construction or expansion joints to be formed with ½" V-strips unless otherwise noted.

Bench Mark Elev. 1209.71
M.S.L. 1929 Adj.
Spike in 12" Oak
8' Lt. Sta. 'P' 68+30.

I hereby certify that this plan was prepared under my direct supervision and that I am a duly registered professional engineer under the laws of Minnesota.
Date Nov. 6, 1957 Howard A. Davidson Reg. No. 2889

GOLDBERG AND DAVIDSON
CIVIL AND STRUCTURAL ENGINEERS
ST. PAUL HOPKINS

TRUNK HIGHWAY NO 391
STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS

BRIDGE NO. 9177
T.H. 391 UNDER CONN. ROAD C
IN AUSTIN
GENERAL PLAN AND ELEVATIONS
SPANS 2-35'CTR. OF PIER TO BACK OF ABUT.
2-43'-8" CTR. TO CTR. PIERS
30' ROADWAY
SEC 35 TWP 103 N RGE W
LARKIN TWP MOWER COUNTY

APPROVED DEC. 26, 1957
BRIDGE ENGINEER CHIEF ENGINEER

2461.501 Concrete Grade Y Mix No. 3Y6 Cu. Yd. 10.6

SUMMARY OF QUANTITIES FOR ENTIRE BRIDGE

ITEM NO.	2401.525	2401.501	2401.501	2401.541	2402.521	2402.577	2452.509	2452..510	2402.583	2402.507	2481.501	806551	806555	2432.501	2534.501	2402.505	2514.501	2515..626	2515.322	2515.507	*452.560	+2401.523	*452.560	*452.560	*452.560	*452.560
ITEM	Class U Excavation	Concrete Mix No. 3Y6	Concrete Mix No. 1A6	Reinforcement Bars	Structural Steel	Standard Name Plates	Steel Piling Delivered	Steel Piling Driven	Ornamental Metal Railing	Sheet Copper	3-Ply Joint Waterproofing	Prestressed Conc. Girder Type I	Prestressed Conc. Girder Type II	Conduit System	Timber Approach Curb	Wrought Bronze	Flagstone Slope Protection	F.E.I. Metal Shoulder Drains	F.E.I. Metal Pipe Flume 12"	Conc. Erosion Control Structures	Steel Test Piles in Place 60 ft. long	Class DR Excavation	Steel Test Piles in Place 50 ft. long	Steel Test Piles in Place 30 ft. long	Steel Test Piles in Place 25 ft. long	Steel Test Piles in Place 20 ft. long
UNIT	Cu. Yd.	Cu. Yd.	Cu. Yd.	Lb.	Lb.	Unit	Lb.	Lin. Ft.	Lin. ft.	Lb.	Lin. ft.	Girder	Girder	System	Curb	Lb.	Sq. Yd.	Drain	Lin. Ft.	Cu. Yd.	Pile	Cu. Yd.	Pile	Pile	Pile	Pile
QUANTITY	490	335.9	124.7	62,960	11300	3	95,150 10" BP @ 42 ⅘	2161	308.7	105	88	12	12	One	2	384	300	2	40	0.74	One	110	2	8	12	8

* See Special Provisions.
+ The Provisions of MHD 1404 do not apply to this Item.

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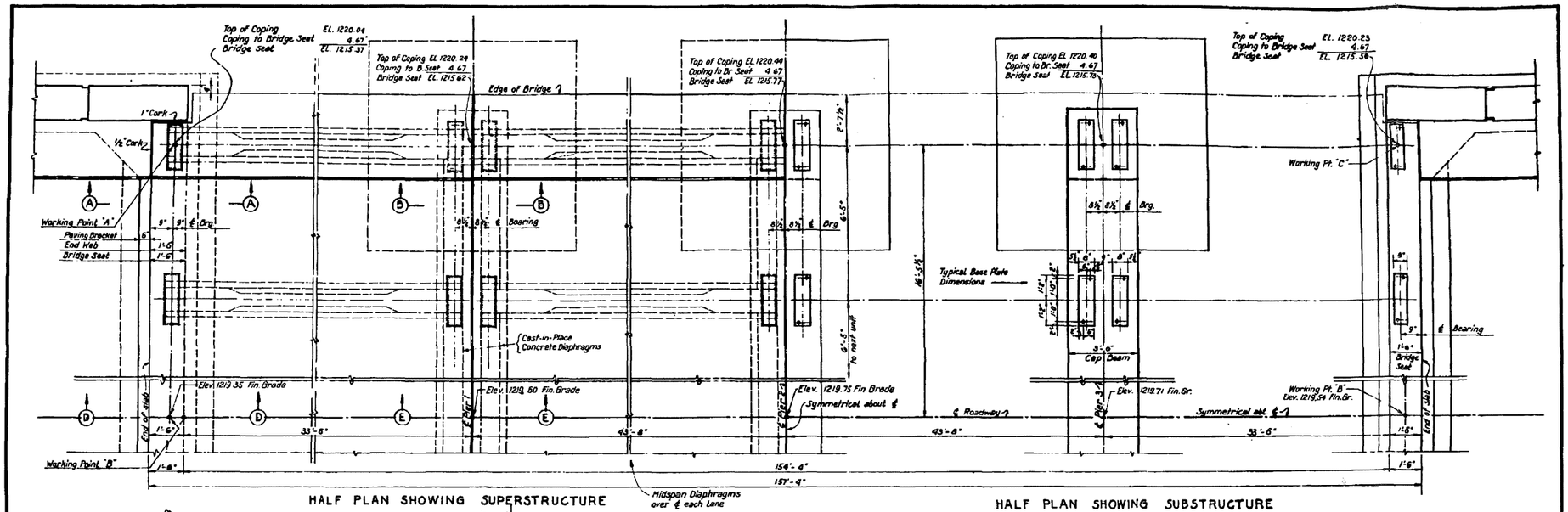
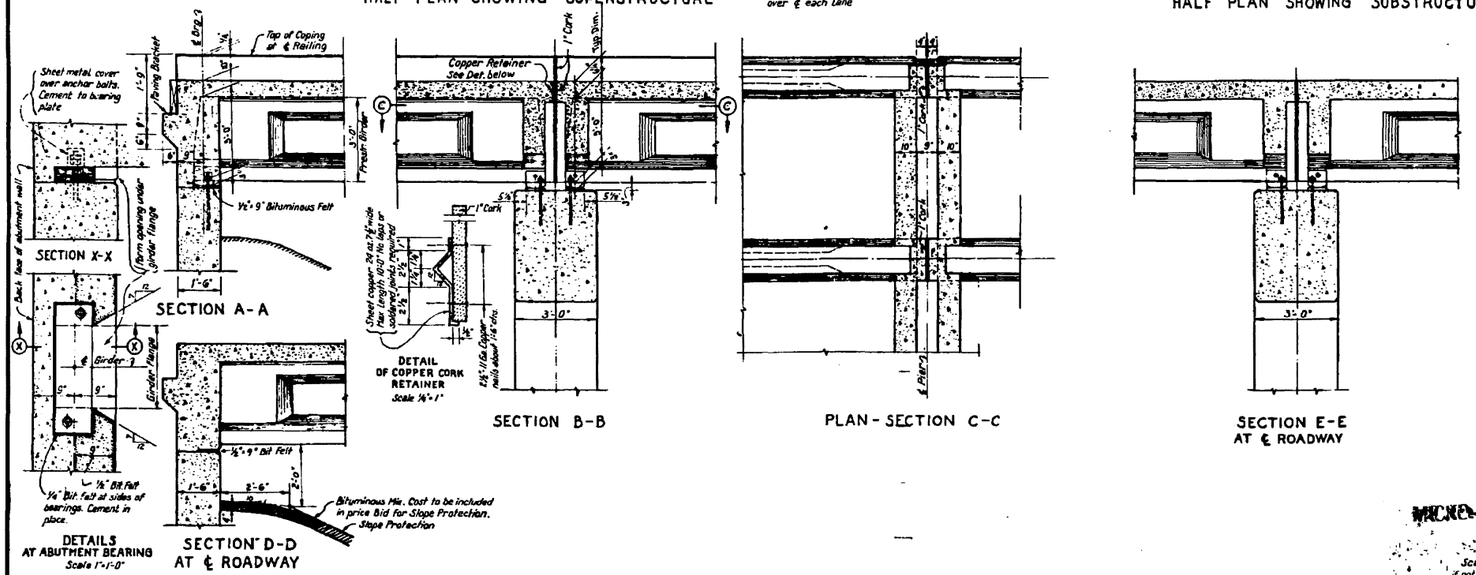




SOLBERG AND DAVIDSON
CIVIL AND STRUCTURAL ENGINEERS
ST. PAUL HOPKINS

TRUNK HIGHWAY NO 391
STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS

BRIDGE NO. 9177

DECK LAYOUT

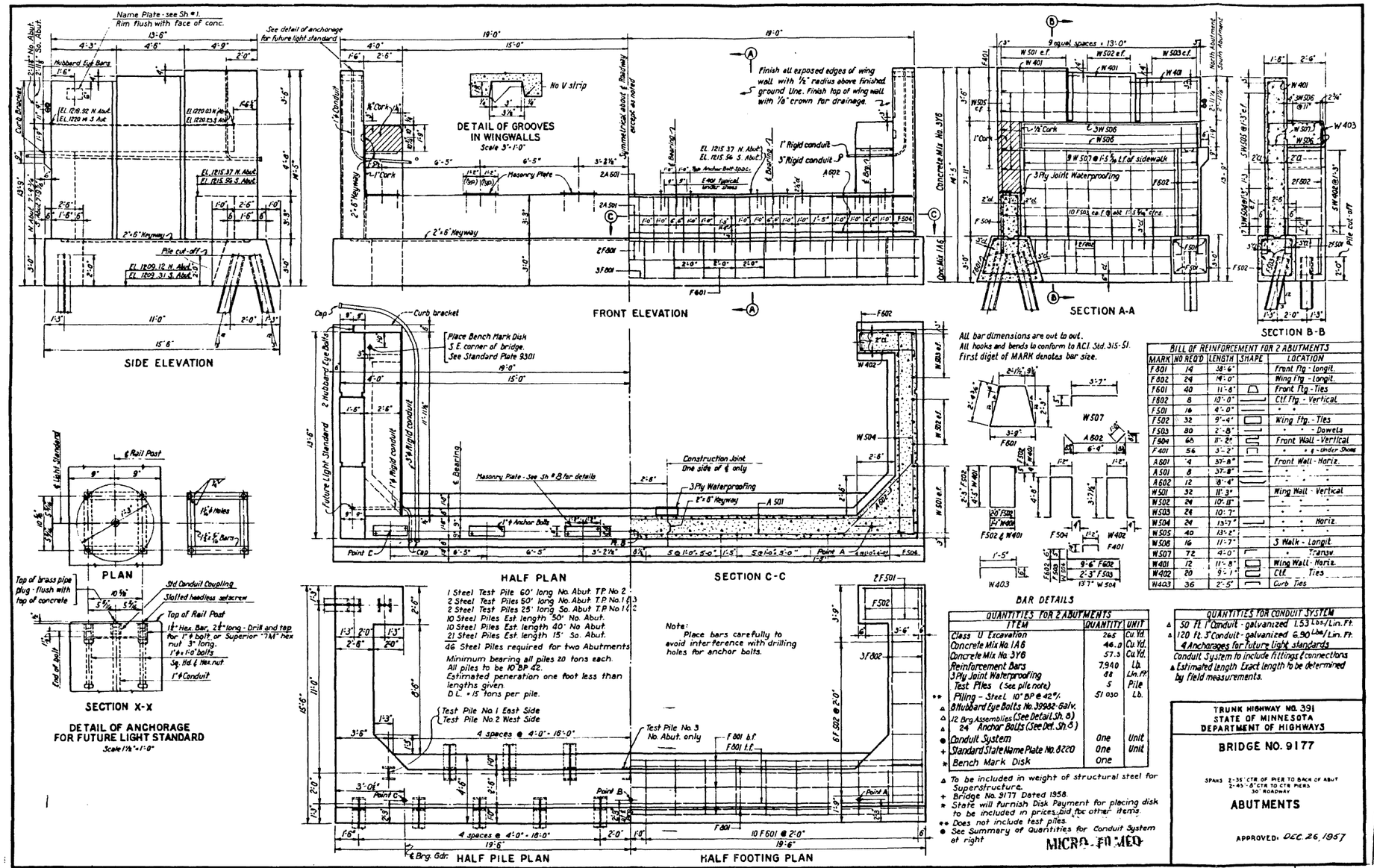
SPANS 2-35'CTR OF PIER TO BACK OF ABUT
2-43'-8"CTR TO CTR PIERS
30' ROADWAY

APPROVED: Dec. 26, 1957

MICRO-FILMED

Scale ½"=1'-0" if not otherwise noted

SHEET NO. 2 OF 9 SHEETS 9177



BILL OF REINFORCEMENT FOR 2 ABUTMENTS				
MARK	NO REQ'D	LENGTH	SHAPE	LOCATION
F 801	14	38'-6"		Front Ftg - Longit.
F 802	24	19'-0"		Wing Ftg - Longit.
F 601	40	11'-8"		Front Ftg - Ties
F 802	8	10'-0"		Ctf. Ftg - Vertical
F 501	16	4'-0"		" "
F 502	32	9'-4"		Wing Ftg. - Ties
F 503	80	2'-8"		" " - Dowels
F 504	65	11'-2"		Front Wall - Vertical
F 401	56	3'-2"		" " & Under Shoes
A 601	4	37'-8"		Front Wall - Horiz.
A 501	8	37'-8"		" " "
A 602	12	8'-4"		" " "
W 501	32	11'-3"		Wing Wall - Vertical
W 502	24	10'-11"		" " "
W 503	24	10'-7"		" " "
W 504	24	13'-7"		" " Horiz.
W 505	40	13'-2"		" " "
W 506	16	11'-7"		S Walk - Longit.
W 507	72	4'-0"		" Transv.
W 401	12	11'-8"		Wing Wall - Horiz.
W 402	20	9'-1"		Ctf. " Ties
W 403	36	2'-5"		Curb Ties

QUANTITIES FOR 2 ABUTMENTS		
ITEM	QUANTITY	UNIT
Class "U" Excavation	265	Cu. Yd.
Concrete Mix No. 1A6	46.0	Cu. Yd.
Concrete Mix No. 3Y6	57.5	Cu. Yd.
Reinforcement Bars	7,940	Lb.
3 Ply Joint Waterproofing	88	Lin. Ft.
Test Piles (See pile note)	5	Pile
** Piling - Steel 10" BP @ 42#/ft.	51,030	Lb.
△ Bluebard Eye Bolts No. 39982-Galv.		
△ 12 Brg. Assemblies (See Detail Sh. 8)		
△ 24 Anchor Bolts (See Det. Sh. 8)		
● Conduit System	One	Unit
+ Standard State Name Plate No. 8220	One	Unit
* Bench Mark Disk	One	Unit

△ To be included in weight of structural steel for Superstructure.
+ Bridge No. 9177 Dated 1958.
* State will furnish Disk Payment for placing disk to be included in prices bid for other items.
** Does not include test piles.
● See Summary of Quantities for Conduit System at right

MICRO-FILMED

QUANTITIES FOR CONDUIT SYSTEM
△ 50 Lf. 1" Conduit - galvanized 1.53 Lbs./Lin. Ft.
△ 120 ft. 3" Conduit - galvanized 6.90 Lbs./Lin. Ft.
4 Anchorages for future light standards

Conduit System to include fittings & connections
△ Estimated length. Exact length to be determined by field measurements.

TRUNK HIGHWAY NO. 391
STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS

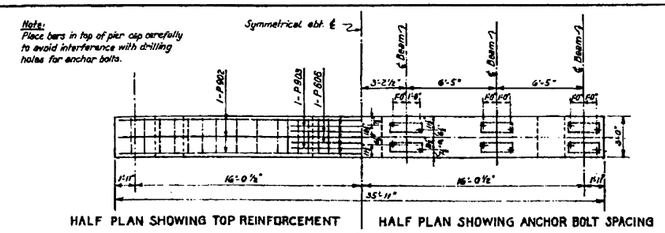
BRIDGE NO. 9177

SPANS 2-35' CTR. OF PIER TO BACK OF ABUT
2-45'-6" CTR. TO CTR. PIERS
30' ROADWAY

ABUTMENTS

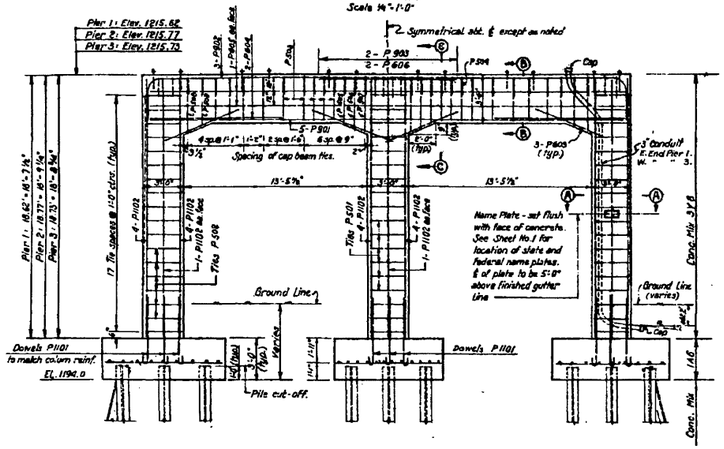
APPROVED: DEC. 26, 1957

SHEET NO. 3 OF 9 SHEETS | 9177

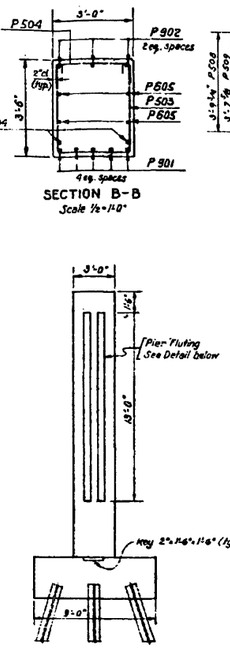


HALF PLAN SHOWING TOP REINFORCEMENT HALF PLAN SHOWING ANCHOR BOLT SPACING

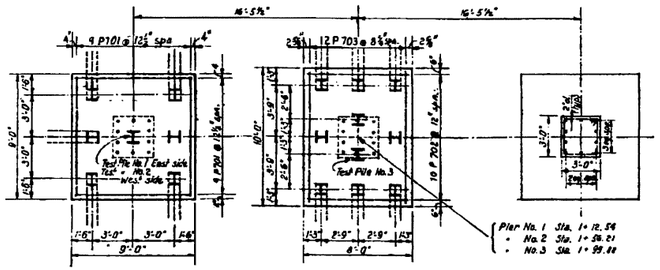
CAP BEAM
Scale ¾"=1'-0"



SIDE ELEVATION
Scale ¼"=1'-0"



END ELEVATION
Scale ¼"=1'-0"

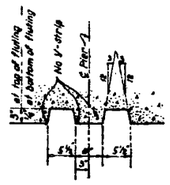


TYPICAL EXTERIOR COLUMN FOOTING PLAN

INTERIOR COLUMN FOOTING PLAN

SECTION A-A (TYP.)

Scale ¼"=1'-0"

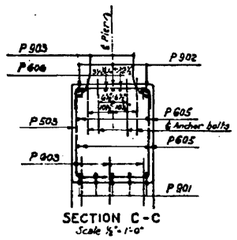


PIER FLUTING DETAILS
Scale 1"=1'-0"

SECTION B-B
Scale ½"=1'-0"

Note: All bar dimensions out to out of bars.

BAR DETAILS



SECTION C-C
Scale ½"=1'-0"

BILL OF REINFORCEMENT FOR THREE PIERS

BAR	NO.	SIZE	LENGTH	SHAPE	LOCATION
P 101	108	# 7	9'-6"	Str.	Footings
P 102	30	# 7	7'-5"	"	"
P 103	36	# 7	9'-6"	"	"
P 1101	90	# 11	8'-0"	1 Hook	Footing Dowels
P 1102	90	# 11	18'-3"	Str.	Columns, vertical
P 501	58	# 5	11'-6"	Bent	" , Ties
P 901	15	# 8	35'-0"	Str.	Cap, long., bottom
P 604	12	# 10	10'-9"	"	" " "
P 605	12	# 6	35'-0"	"	" " center
P 902	9	# 9	40'-7"	Bent	" " top
P 606	6	# 6	10'-0"	Str.	" " "
P 903	6	# 8	10'-0"	"	" " "
P 502	108	# 5	11'-0"	Bent	Columns (ext.), Ties
P 503	58	# 5	10'-3"	"	Cap, ties
P 504	114	# 5	3'-8"	"	" " (typ)
P 603	36	# 6	6'-0"	Str.	Haunches
P 505	6	# 5	10'-6"	Bent	Cap, ties at haunches
P 506	6	# 5	11'-1"	"	" " " "
P 507	6	# 5	11'-8"	"	" " " "
P 508	6	# 5	11'-7"	"	" " " "
P 509	6	# 5	11'-2	"	" " " "

COLUMN REINFORCEMENT BARS SHALL NOT BE ORDERED UNTIL FOOTING ELEVATIONS HAVE BEEN VERIFIED IN THE FIELD.

SUMMARY OF QUANTITIES FOR 3 PIERS

Class D.R Excavation	110 Cu. yds
Class U Excavation	225 Cu. yds
Concrete Mix. No. 1A8	60.7 Cu. yds.
Concrete Mix. No. 3Y8	88.6 Cu. yds.
Reinforcing Steel	23,640 lbs
* 76 Anchor Bolts (Detail on Sheet # 8)	
* 36 Bearing Assemblies (Detail on Sheet # 8)	
1 - Standard Name Plate No. 8220 for Bridge 9177 dated 1958	
1 - Federal Name Plate No. 8223 (Bronze) dated 1958	
** Steel Piles - 10" BP @ 42# per Ft.	44,100 Lbs.
⊙ Conduit included in Conduit System	

* Included in weight for structural steel for superstructure
** Does not include test piles.
● See Sh. 3 for conduit system quantities.

PILE NOTES:

1 Steel Test Pile 30 Ft. Long Pier No. 1 T.P.1
2 " " Piles 20 " " " 1 T.P. 2 & 3
3 " " " 20 " " " 2
3 " " " 20 " " " 3
21 Steel Piles estimated length 20 Ft. Pier No. 1
42 " " " " 15 " " 2 & 3
72 " " required for 3 piers.

Minimum Bearing on all piles 20 tons each.
Piles marked thus ▱ to be battered 2 in 12 in direction as shown.
All piles to be 10 BP 42.
Computed Dead Load 15 tons per pile.
Computed Dead Load plus Live Load 20 tons per pile.
Estimated penetration are ft. less than lengths given.

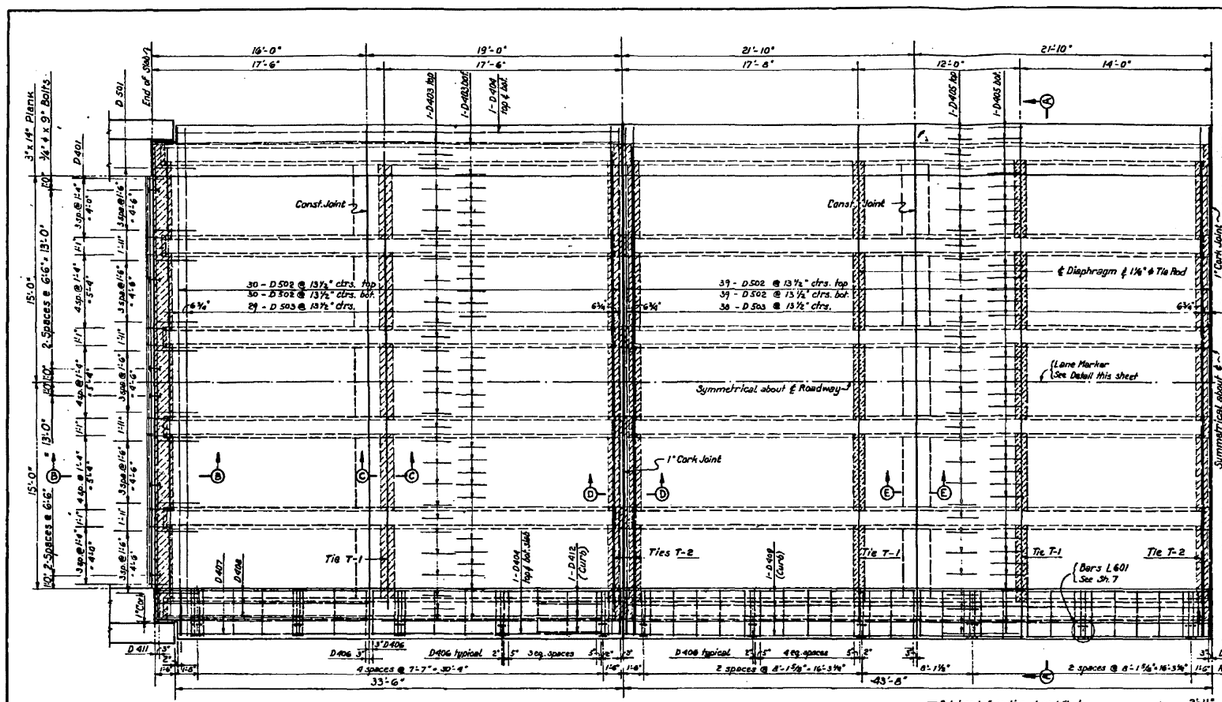
TRUNK HIGHWAY NO. 391
STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS

BRIDGE NO. 9177

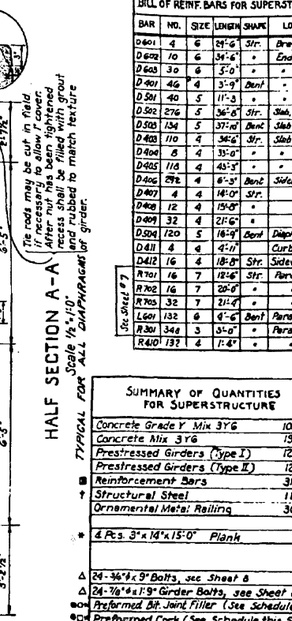
30 FT. ROADWAY 2 - 2'-6" SIDEWALKS
SPANS: 2-35' CTR. OF PIER TO BACK OF ABUT.
2-43'-6" CTR. TO CTR. PIERS

PIER DETAILS

APPROVED: DEC. 26, 1957



HALF PROFILE OF FINISHED FLOOR SURFACE



HALF SECTION A-A

TYPICAL FOR ALL DIAPHRAGMS

Scale ½"=1'-0"

The rods may be cut in field if necessary to allow ½" cover. After nut has been tightened recess shall be filled with grout and rubbed to match texture of girder.

BILL OF REINF. BARS FOR SUPERSTRUCTURE

BAR	NO.	SIZE	LENGTH	SHAPE	LOCATION
D401	4	6	24'-6"	Str.	Bracket
D402	10	6	34'-6"	"	End Web
D403	30	6	5'-0"	"	" "
D-901	46	4	3'-9"	Bent	" "
D 501	40	5	11'-3	"	" "
D 502	276	5	36'-6"	Str.	Slab, top & bot.
D 503	134	5	37'-11	Bent	Slab
D 405	110	4	34'-6"	Str.	Slab / top & bot.
D 504	8	4	33'-0"	"	" " "
D 505	118	4	43'-3"	"	" " "
D 506	296	4	6'-3"	Bent	Sidewalk slab
D 407	4	4	141'-0"	Str.	"
D 408	12	4	154'-8"	"	"
D 409	32	4	21'-6"	"	"
D 504	120	5	18'-9"	Bent	Diaphragms
D 411	8	4	4'-11"		Curb ends
D 412	16	4	181'-8"	Str.	Sidewlk. longit.
R 701	16	7	181'-6"	Str.	Parapet
R 702	16	7	20'-0"	"	"
R 703	32	7	21'-0"	"	"
L 601	132	6	9'-6"	Bent	Parapet Posts
R 301	348	3	3'-0"	"	Parapet
R 410	192	4	1'-8"	"	"

(Sh. Sheet #7)

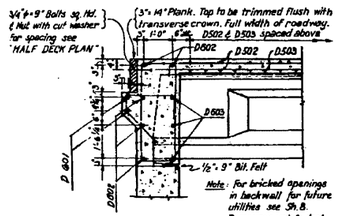
SUMMARY OF QUANTITIES FOR SUPERSTRUCTURE

Concrete Grade Y Mix 3Y6	10.6 Cu Yds
Concrete Mix 3Y6	190 Cu Yds
Prestressed Girders (Type I)	12 Beams
Prestressed Girders (Type II)	12 Beams
Reinforcement Bars	31480 Lbs.
† Structural Steel	11300 Lbs.
Ornamental Metal Railing	308.7 Lin Ft
* 4 Pcs. 3" x 14" x 15'-0" Plank	
△ 24-⅜"ϕ x 9" Bolts, see Sheet 8	
△ 24-⅞"ϕ x 1'-9" Girder Bolts, see Sheet 8	
○ Preformed Bit. Joint Filler (See Schedule)	
● Preformed Cork (See Schedule this Sheet)	
111 Lin Ft Sheet Copper 24 oz., 24" wide, 105 Lbs.	
△ 12 Tie Rod Assemblies	
Wrought Bronze	384 lbs

* Weight of Structural Steel includes Miscellaneous Steel listed in Abutment and Pier Quantities.
* To be included in Price Bid for other items.
△ Included in Weight of Structural Steel.
○ Preformed Bituminous Joint Filler as per AASHO Spec. M-33 (See Joint Filler Note on bot. of page).
● Preformed Cork Joint Filler as per AASHO Spec. 15.3 Type I.
⊗ Trim Joint Filler in field as required. Fasten all joint filler with 2½" long 11 Ga. Copper Nails. (To be included in Price Bid for other items.)
■ Weight of Crash Rail Reinforcement included in Weight of Superstructure Reinforcement.

HALF DECK PLAN

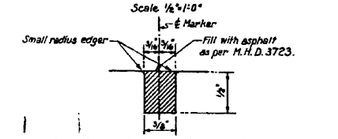
Scale ¼"=1'-0"



Note: For bricked openings in backwall for future utilities see Sh. 8. Rearrange reinf. steel where necessary.

SECTION B-B

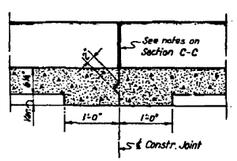
Scale 1½"=1'-0"



As an alternate, Contractor will be permitted to saw in dummy joint after concrete is cured, as directed by Engineer.

LANE MARKER DETAIL

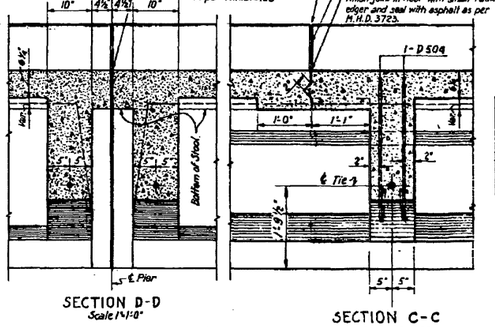
Scale 1½"=1'-0"



SECTION E-E

Scale 1"=1'-0"

Preformed Bituminous Joint Material.	
6 Pcs. 9" x 1½" x 4'-11"	
4 " 1'-6" x ½" x 7'-1½"	
12 " 3" x ¼" x 2'-9"	
24 " 3" x ¼" x 0'-8½"	
24 " 3" x ½" x 0'-5"	
Preformed Bituminous Joint Filler shall conform to A.A.S.H.O. Spec. M 33.	



SECTION D-D

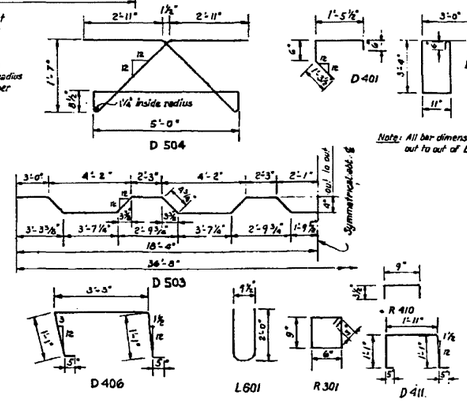
Scale 1"=1'-0"

Preformed Cork Joint Filler			
4 Pcs. 1'-8" x 1" x 4'-8½"	6 Pcs. 1" x 1" x 0'-9"	Preformed Cork Joint Filler as per A.A.S.H.O. Spec. M 153. Type I	
15 " 6⅜" x 1" x 6'-5"	6 " 10¼" x 1" x 3'-8"		
6 " 2⅜" x 1" x 1'-6"	12 " 1'-6" x 1" x 2'-11"		
6 " 2" x 1" x 1'-6"	6 " 9" x 1" x 1'-6"		
6 " 6⅜" x 1" x 2'-7½"	6 " 1'-3" x 1" x 2'-2"		

Note: The lists of joint filler are for the Contractor's convenience only. Any additional sq. ft. filler material required as shown on the plans shall be furnished by the Contractor with no additional compensation. Trim joint filler material as required in the field.

SECTION C-C

Scale 1"=1'-0"



REINFORCING BAR DIAGRAMS

Not to Scale.

MICRO-FILMED

TRUNK HIGHWAY NO. 391
STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS

BRIDGE NO. 9177

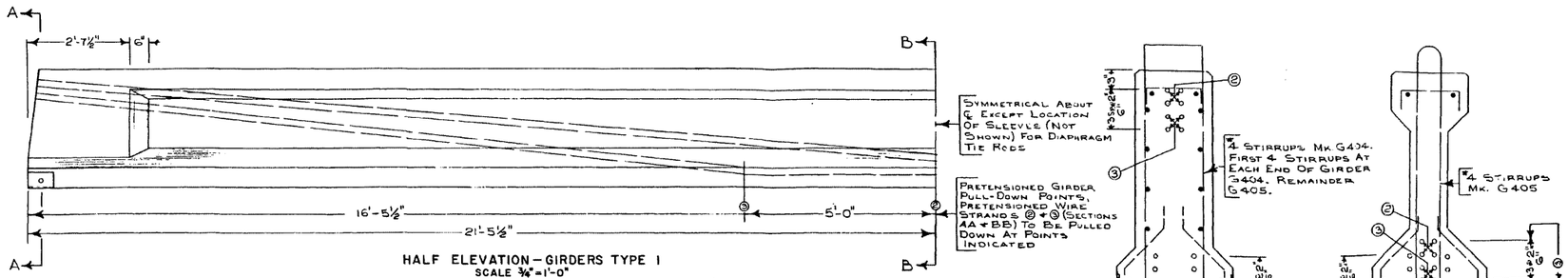
SPANS: 2-35' CTR. OF PIER TO BACK OF ABUT.
5-45'-6" CTR. TO CTR. PIERS.

DECK PLAN AND DETAILS

APPROVED: DEC. 26, 1957

SHEET NO. 5 OF 9 SHEETS

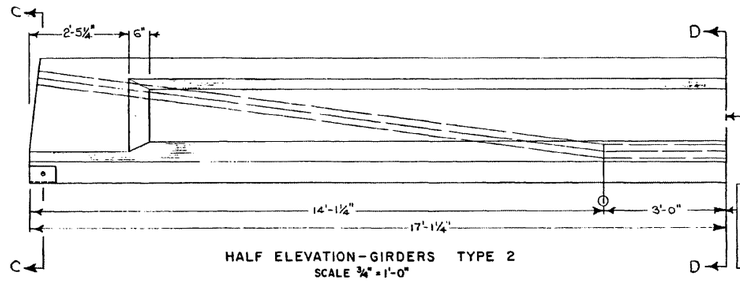
9177



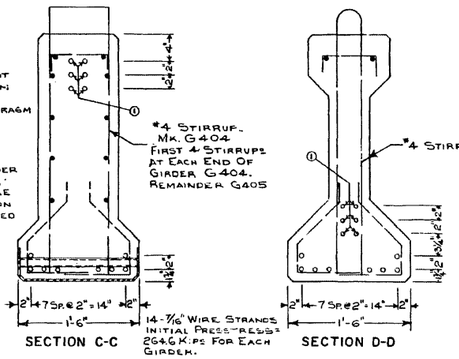
HALF ELEVATION – GIRDERS TYPE I
SCALE ¾"=1'-0"

SECTION A-A

SECTION B-B



HALF ELEVATION – GIRDERS TYPE 2
SCALE ¾"=1'-0"



SECTION C-C

SECTION D-D

PRETENSIONED GIRDER SECTIONS
SCALE: 1½"=1'-0"

NOTE:
BAR G401 REVISED TO BAR G404 AND G405. OTHER BARS SAME AS ORIGINAL DESIGN.
ALL BAR DIMENSIONS ARE OUT TO OUT.

BARS G405 BARS G404

NOTE:
ALL DIMENSIONS AND DETAILS NOT GIVEN ON THIS SHEET ARE SAME AS ORIGINAL SHEET.

ELK RIVER CONCRETE PRODUCTS CO.
ELK RIVER, MINNESOTA

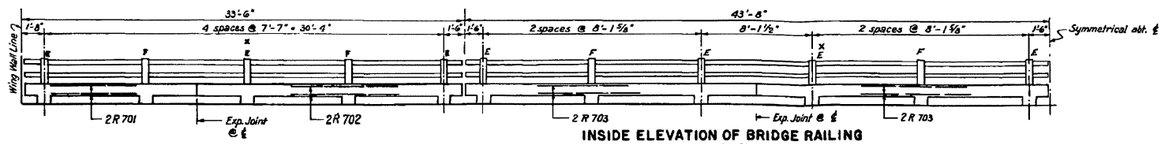
TRUNK HIGHWAY NO. 391
STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS

BRIDGE NO. 9177

30 FT. ROADWAY
35-43-43-35 PRESTRESSED GIRDER SPANS

APPROVED: MAY 1, 1958

STRAND GROUPS ② + ③



INSIDE ELEVATION OF BRIDGE RAILING
Scale 1/4"=1'-0"

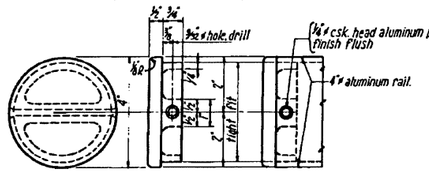
RAIL POST ALTERNATE:
STD. ALUMINUM POST
M.H.D. NO. BRP 57-1
SEE M.H.D. STD. PLT. NO. B 25

Length of railing for payment to be measured face to face of concrete wingwalls.

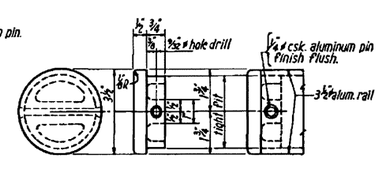
Concrete posts and concrete base to be Grade Y Mix No. 3Y6

See Special Provisions.

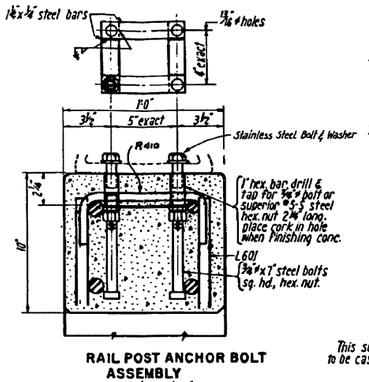
All pipes, rail posts, anchor bolt & shear dowel assemblies, screws, shims, bolts, end caps, pins and compound to be included in price bid for ornamental metal railing.
All rail posts to be set normal to grade.



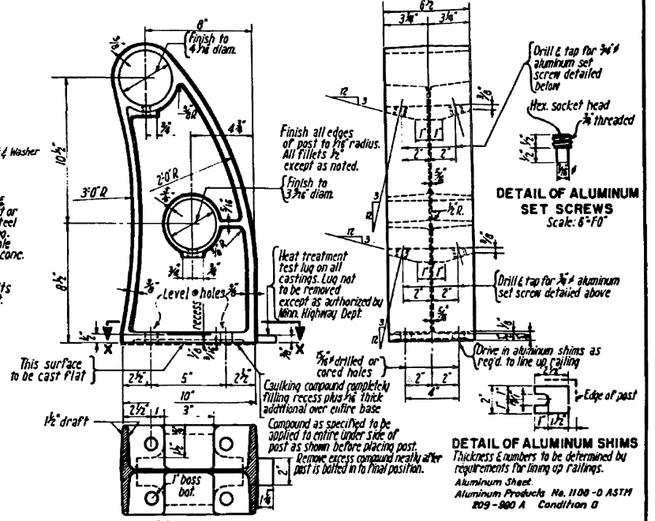
CAST ALUMINUM END CAP FOR 4" RAIL
16 required
Scale: 6"=F0"
M.H.D. Std. Pl. B 25



CAST ALUMINUM END CAP FOR 3½" RAIL
16 required
Scale: 6"=F0"
M.H.D. Std. Pl. B 25



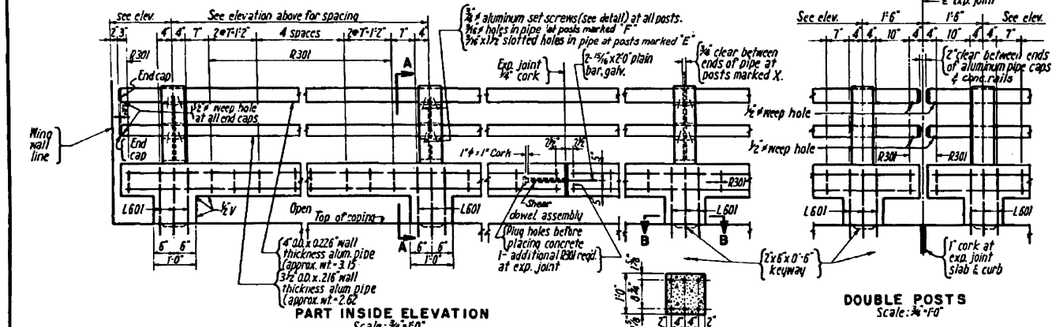
RAIL POST ANCHOR BOLT ASSEMBLY
No paint required
Scale 3"=1'-0"
M.H.D. Std. Pl. B 105.



SECTION X-X

DETAIL OF ALUMINUM SET SCREWS
Scale: 6"=F0"

DETAIL OF ALUMINUM SHIMS
Thickness & numbers to be determined by requirements for lining up railings.
Aluminum Sheet
Aluminum Products No. 1100-0 ASTM B 209-990 A Condition O

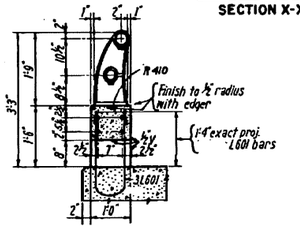


PART INSIDE ELEVATION
Scale: ¾"=F0"

DOUBLE POSTS
Scale: ¾"=F0"

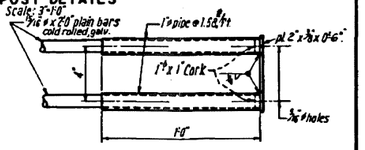
SECTION B-B
Scale: ¾"=F0"

PART PLAN
ALUMINUM RAILING NOT SHOWN
Scale: ¾"=F0"



SECTION A-A
Scale: ¾"=F0"

RAIL POST DETAILS
Scale: 3"=F0"



SHEAR DOWEL ASSEMBLY (STEEL)
GALV. AS PER M.H.D. 3394
8 required
Scale: 3"=F0"
See M.H.D. Std. Plate No. B 100.

BILL OF REINFORCEMENT FOR RAILING

MARK	NO.	LENGTH	SHAPE	LOCATION
R 701	16	12'-6"		Horiz. end spans
R 702	16	20'-0"		Horiz. end spans
R 703	32	21'-4"		Horiz. center spans
R 301	348	3'-0"	□	Rail ties
R 410	132	1'-4"	⌐	At posts
L 601	132	4'-6"	⊔	At posts

Note: Railing reinforcement included in superstructure quantities.

TRUNK HIGHWAY NO. 391
STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS

BRIDGE NO. 9177

SPANS: 2-35' CTR. OF PIER TO BACK OF ABUT.
2-43'-8" CTR. TO CTR. PIERS
30' ROADWAY

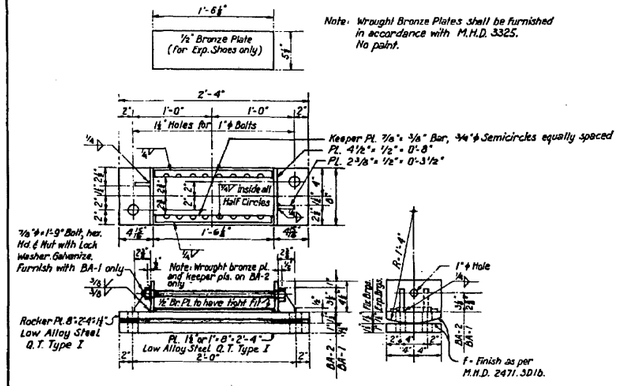
RAILING DETAILS

APPROVED: DEC. 26, 1957

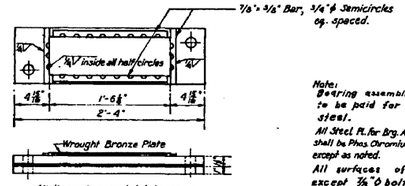
SHEET 7 OF 9 SHEETS

9177

2



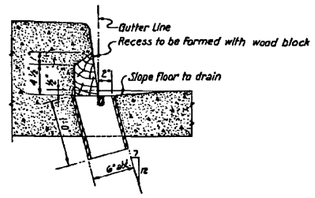
BEARING ASSEMBLY.
Scale ½"=1"
BA-1 : 24 req'd for Girders G_2 and G_4 at Fixed end.
BA-2 : 6 req'd for Girders G_4 at expansion end.



All dimensions and details same as for Bearing Assemblies BA-1 & BA-2 except as noted.

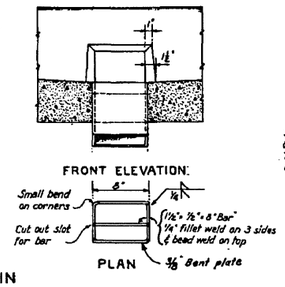
BEARING ASSEMBLY
Scale ½"=1"
BA-3 : 16 req'd for Girders G_1 and G_3

Note: Bearing assemblies except bronze to be paid for as structural steel.
All Steel Pl. for Brg. Assemblies shall be Phos. Chromium Steel M.H.D. 3309 except as noted.
All surfaces of bearing assemblies, except ⅞" ϕ bolts and bronze plates, to be metallized after fabrication. See special provisions.

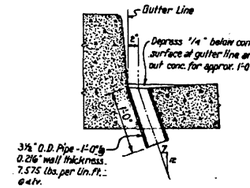


SECTION THRU CURB AND DRAIN.

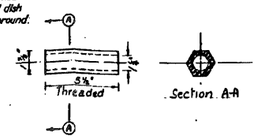
Drain Note : Box & pipe drains to be hot dipped galv. after fabrication as per M.H.D. 3394. No paint. Drains to be meas. and paid for as Structural Steel.



DETAIL OF BOX DRAIN
Scale 1½"=1'-0"
4 required thus.
Estimated weight 38 lb. each.

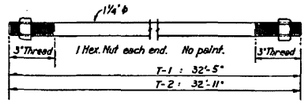


DETAIL OF PIPE DRAIN
Scale 1½"=1'-0"
16 required thus.



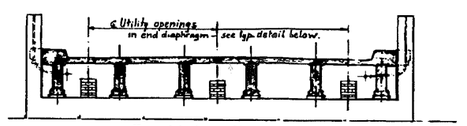
COUPLING DETAILS
Scale 3"=1'-0"
12 required thus
Unit Weight 2.82 Lb each.

Note: Weight of couplings included in weight of Structural Steel for Superstructure.

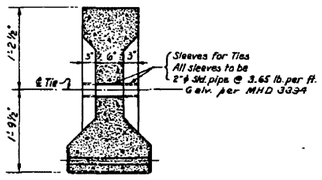


TIE ROD DETAILS
No Scale
6 required thus T-1
6 " " T-2
} included in wt. of Structural Steel.

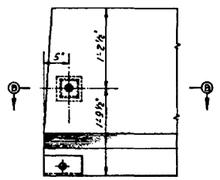
Tie Rod Note:
Overall lengths of tie rods are shown. Tie rods may be spliced as necessary. All field splices must be made by use of threaded coupling (See Detail). Shop splices may be either welded or threaded coupling. Threaded couplings to be placed between girders.



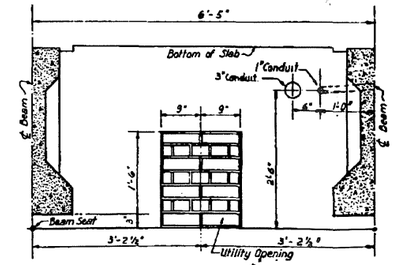
Typical Abutment Elevation.



INTERIOR GIRDER SECTION
Scale 1"=1'-0"

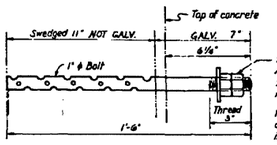


EXT. GIRDER ELEVATION AT END



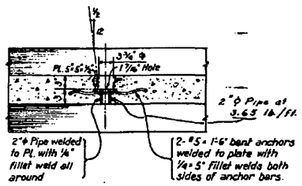
TYP. DETAIL OF CONDUIT OUTLET AND UTILITY OPENING

Utility openings to be closed with cement brick. Payment to be included in 3Y6 Concrete.

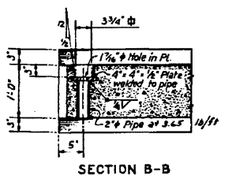


ANCHOR BOLT DETAIL
Scale ½"=1"
96 required thus
Included in weight of structural steel.

Note: Anchor bolt holes shall be drilled and anchor bolts grouted in place after girders have been erected.



END SLEEVE FOR TIE T-1 —
HORIZONTAL SECTION
Scale 1"=1'-0"
Galv. after fabrication per MHD 3394



END SLEEVE FOR TIE T-2
Scale 1"=1'-0.
Galv. after fabrication per MHD 3394

GENERAL NOTES

All welds shall be continuous unless otherwise noted. (For welding Low Alloy Steel see Special Provisions).
All steel shall be Structural Grade M.H.D. 3305 unless otherwise noted.

TRUNK HIGHWAY NO. 391
STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS

BRIDGE NO. 9177

SPANS: 2-36' CTR. OF PIER TO BACK OF ABUT.
2-43'-8" CTR. TO CTR. PIERS

BRIDGE DETAILS

APPROVED: DEC. 26, 1957

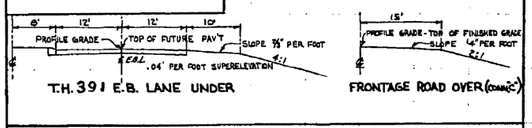
FILMED

SHEET NO. 8 OF 9 SHEETS

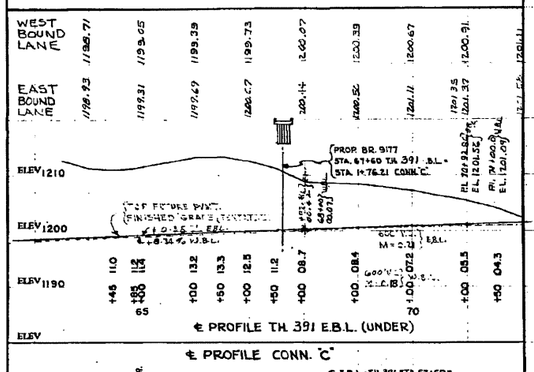
9177

CONTRACTED PROFILE
SCALE: HOR. 1" = 100'. VER. 1" = 10'

TYPICAL HALF SECTIONS ADJACENT TO BRIDGE

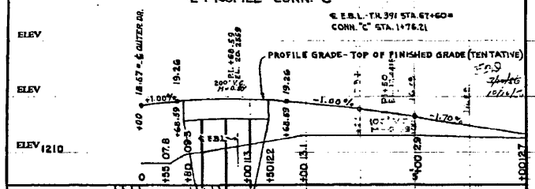


T.H. 391 E.B. LANE UNDER — FRONTAGE ROAD OVER (CONN. "C")

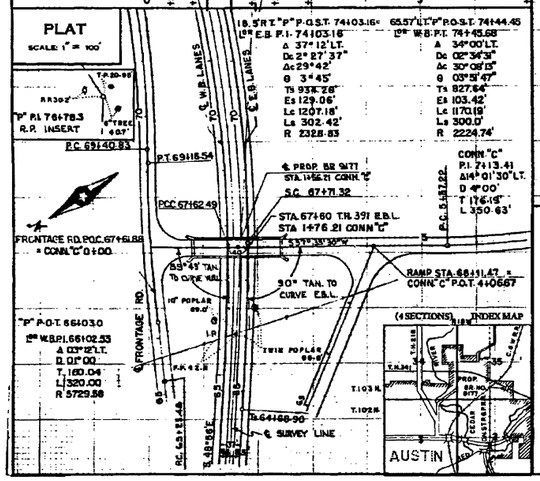


℄ PROFILE TH. 391 E.B.L. (UNDER)

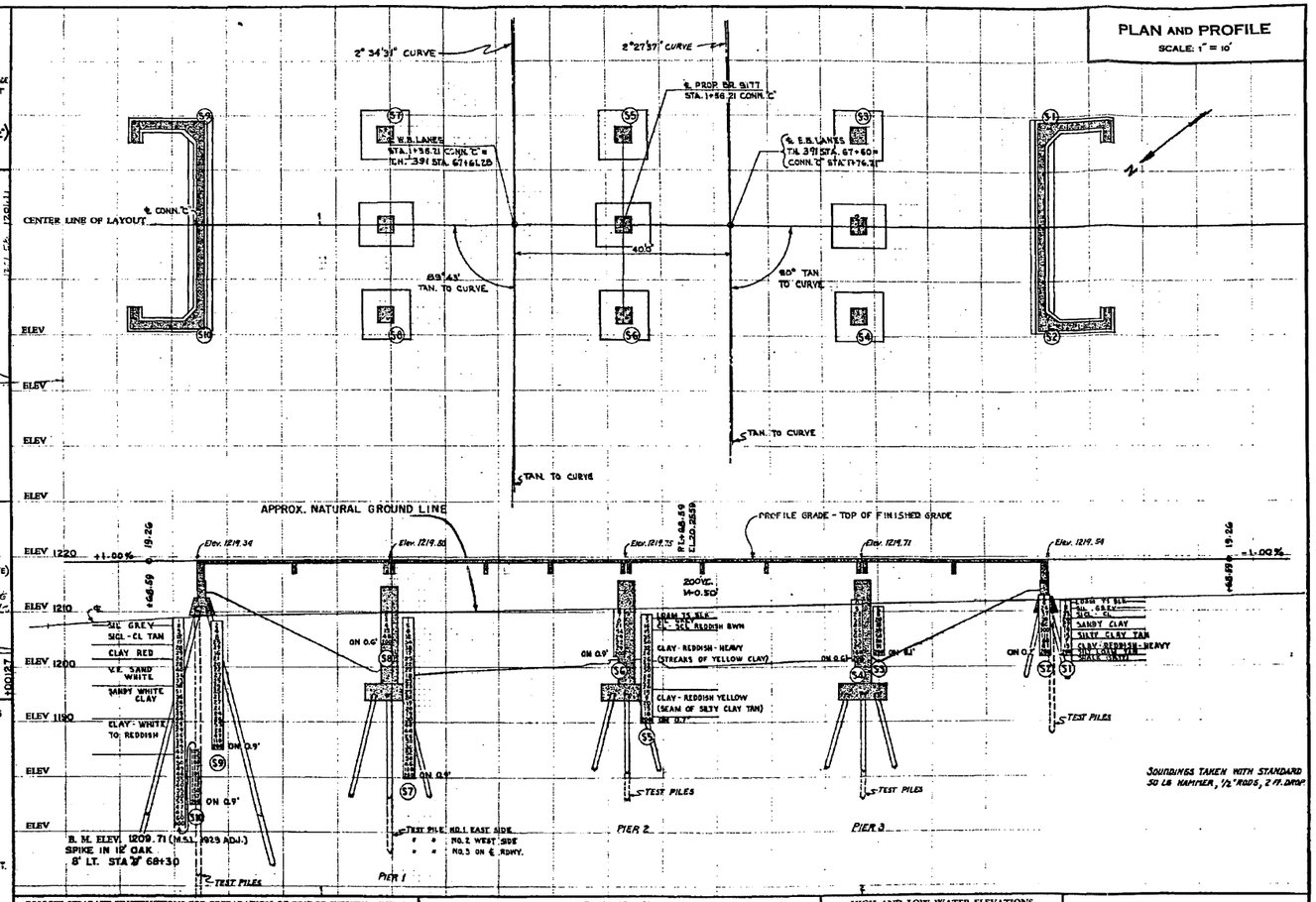
℄ PROFILE CONN. "C"



PLAT
SCALE: 1" = 100'



PLAN AND PROFILE
SCALE: 1" = 10'



FOLLOW SEPARATE "INSTRUCTIONS FOR PREPARATION OF BRIDGE SURVEYS" WHEN MAKING BRIDGE SURVEYS.

DATA

1. Preliminary recommendations of Engineer in charge of Bridge Survey:
   - a. Net span length and type of bridge.....
   - b. Width of roadway on bridge.....
   - c. Number and width of sidewalks, if any.....
   - d. Locate center of bridge at station.....
   - e. If a skew bridge is recommended, the angle of skew should be.....
   - f. Is piling required?.....
2. Special features: Waterfalls, dams, exceptional floods, ice, driftwood, sliding banks, logging, etc.
3. Changes: In height or length from that of old bridge, and reasons why.....

DATA (Contd.)

4. Other bridges in vicinity:
   - a. Over same stream (particularly structures which carry high water without overflow of roadway); give location, length, height above water, net cross-sectional area at high water stage and estimated age.....
   - b. Over or under same highway or railroad; give location, length, horizontal and vertical clearances and estimated age.....
   - c. Reason why these bridges are, or are not, fair indications of what length the proposed bridge should be.....
5. If structure is over a drainage ditch, is ditch gradient liable to be altered?.....
6. Navigation clearances required, if any.....
7. Information and evidence in regard to high water stages was obtained as follows.....
8. Must contractor provide for traffic during construction of proposed bridge?.....
   If so, by what means?.....

HIGH AND LOW WATER ELEVATIONS

Data obtained from.....
reflects highest water elevation in the area of this construction to be.....and the lowest water elevation to be.....The above figures are for informational purposes only. The state neither warrants nor represents that these figures for high water and low water are in any way indicative of the high water or low water to be expected or encountered during this construction.

SHIPPING POINT

Proposed Bridge is.....miles.....rd
of IN AUSTIN.....which is the nearest Railroad shipping point.
*(Give name of town, station or siding)

Date.....Project or County Engineer

Date.....District Engineer

STATE OF MINNESOTA
DEPARTMENT OF HIGHWAYS

BRIDGE SURVEY

FOR

PROPOSED BRIDGE LOCATED NEAR IN XOF
AUSTIN (TOWN OR CITY) ON T.H. 391 (T.H., S.A.H. OR C.A.R. NUMBER)
SEC. 35 TWP. 103N R. 18W
TOWNSHIP LANSING COUNTY MOWER
DRAWN IN CO. BY M.J. KRISTESEN SURVEY LINES DURING MONTH OF JULY 1958
SURVEY MADE BY PEHRSON 1951 LEVORSON 1951

MICRO-FILMED
BRIDGE No. 9177
SURVEY / D.L.C.

MINN. PROJ. No. I 391-3 (11) State Proj. No. 5080-05 (T.H. 391) Sheet No. 9 of 9 Sheets