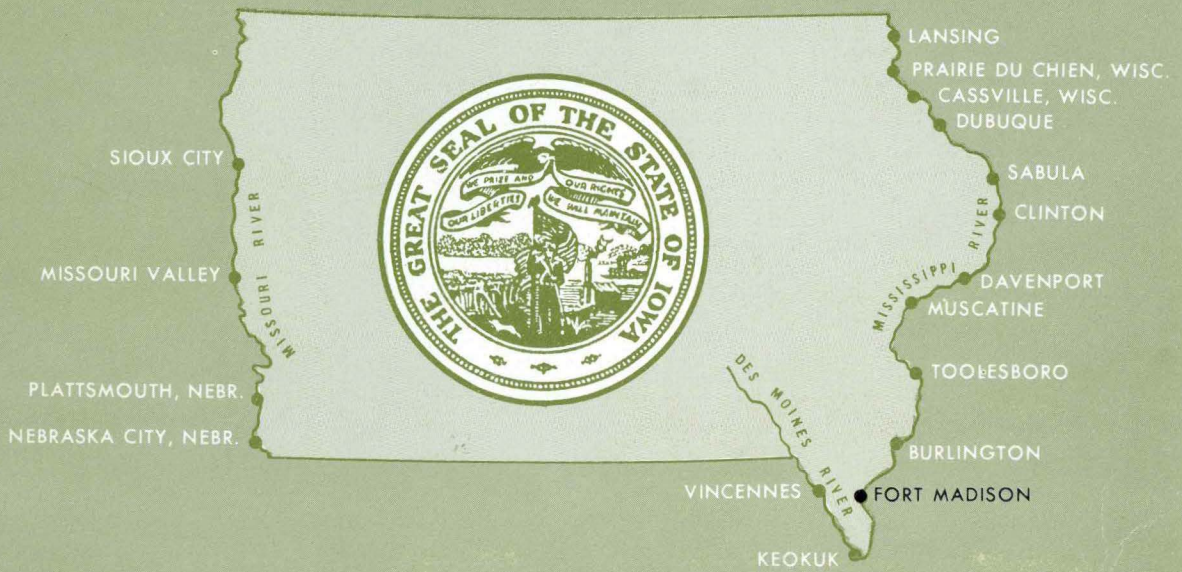
AUGUST 1968

IOWA STATE HIGHWAY COMMISSION



Bridge Location, Revenue and Traffic Studies

AT

FORT MADISON, IOWA

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
S CITY, MO. NEW YORK, N.Y.

WILBUR SMITH & ASSOCIATES
traffic consultants
NEW HAVEN, CONN.

MISSISSIPPI RIVER TOLL BRIDGE

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
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155 WHITNEY AVENUE • P. O. BOX 993
New Haven, Conn. 06510

August 14, 1968

Mr. J. R. Coupal, Jr.
Director of Highways
Iowa State Highway Commission
Ames, Iowa 50010

Dear Mr. Coupal:

We are pleased to submit this preliminary feasibility report for a new Mississippi River bridge at Fort Madison.

The report includes an analysis of alternate bridge locations, preliminary engineering studies, traffic and toll revenue estimates, preliminary project costs and an indication of project feasibility.

The feasibility calculations indicate that substantial subsidies would be required to construct the proposed bridge as a revenue bond issue. Net revenues for the project are considerably below the annual payments necessary to meet amortization of an appropriate bond issue.

We gratefully acknowledge the assistance and cooperation given to us by members of your staff and the numerous other public and private agencies and individuals contacted in the course of our studies.

Respectfully submitted,

HOWARD, NEEDLES, TAMMEN & BERGENDOFF

Paul L. Heineman

Paul L. Heineman

WILBUR SMITH & ASSOCIATES, INC. N.E.

Wilbur S. Smith

Wilbur S. Smith

I hereby certify that this plan, specification or report was prepared by me or under my direct personal supervision and that I am a duly registered Professional Engineer under the laws of the State of Iowa.

Signed ..... Date .....

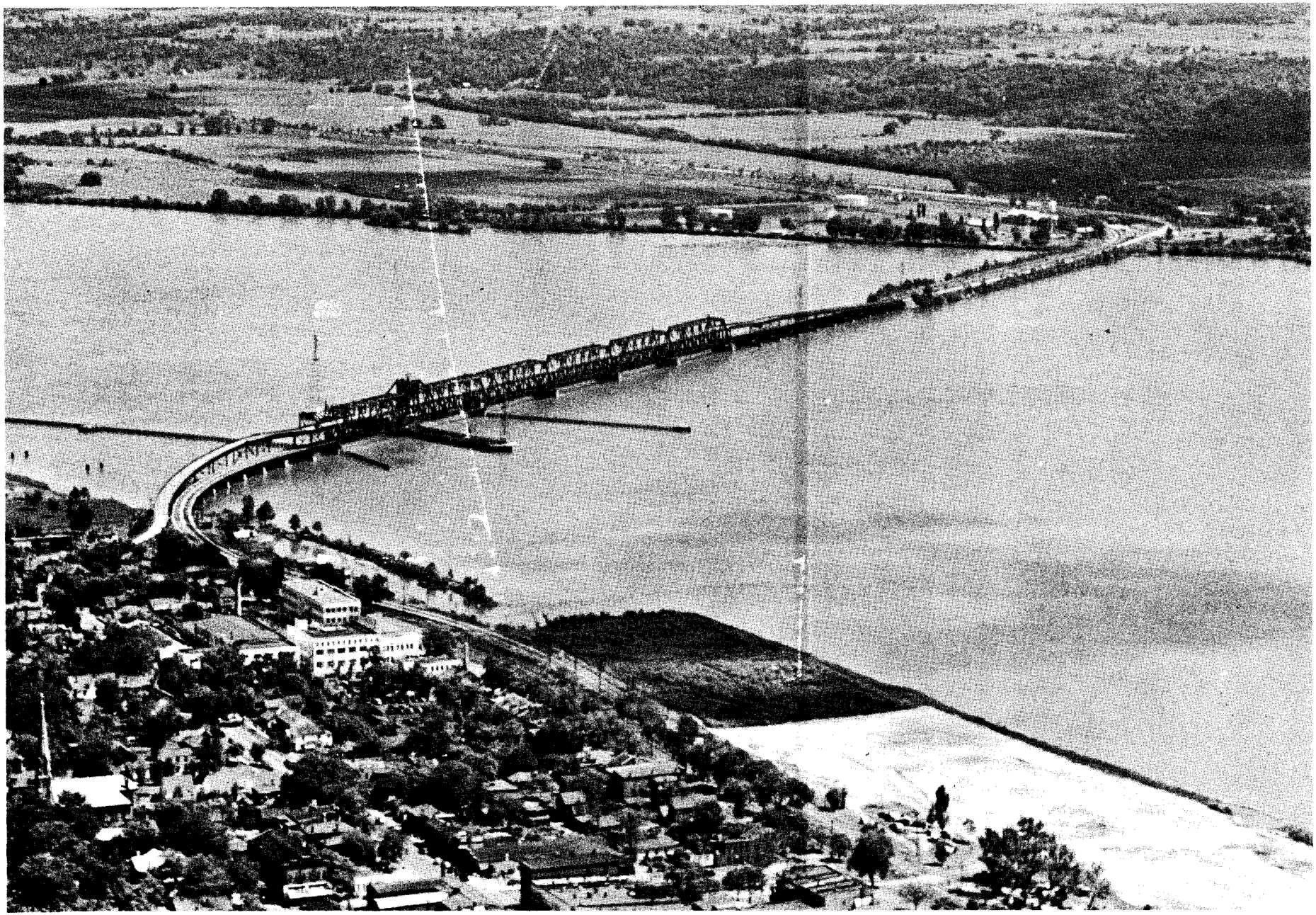
Paul L. Heineman, P.E. Iowa Reg. No. 5156 August 14, 1968

Signed ..... Date .....

Wilbur S. Smith, P.E. Iowa Reg. No. 4007 August 14, 1968

PAUL L. HEINEMAN REGISTERED 5156 IOWA PROFESSIONAL ENGINEER

WILBUR S. SMITH REGISTERED 4007 IOWA PROFESSIONAL ENGINEER



VIEW OF A.T.&S.F.R.R. BRIDGE FROM FORT MADISON, IOWA, LOOKING SOUTHEAST

FORT MADISON, IOWA

MISSISSIPPI RIVER TOLL BRIDGE

AUGUST

1968

PRELIMINARY ENGINEERING REPORT

- LOCATION STUDIES
- PRELIMINARY DESIGN
- COST ESTIMATES
- TRAFFIC AND REVENUE STUDIES

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
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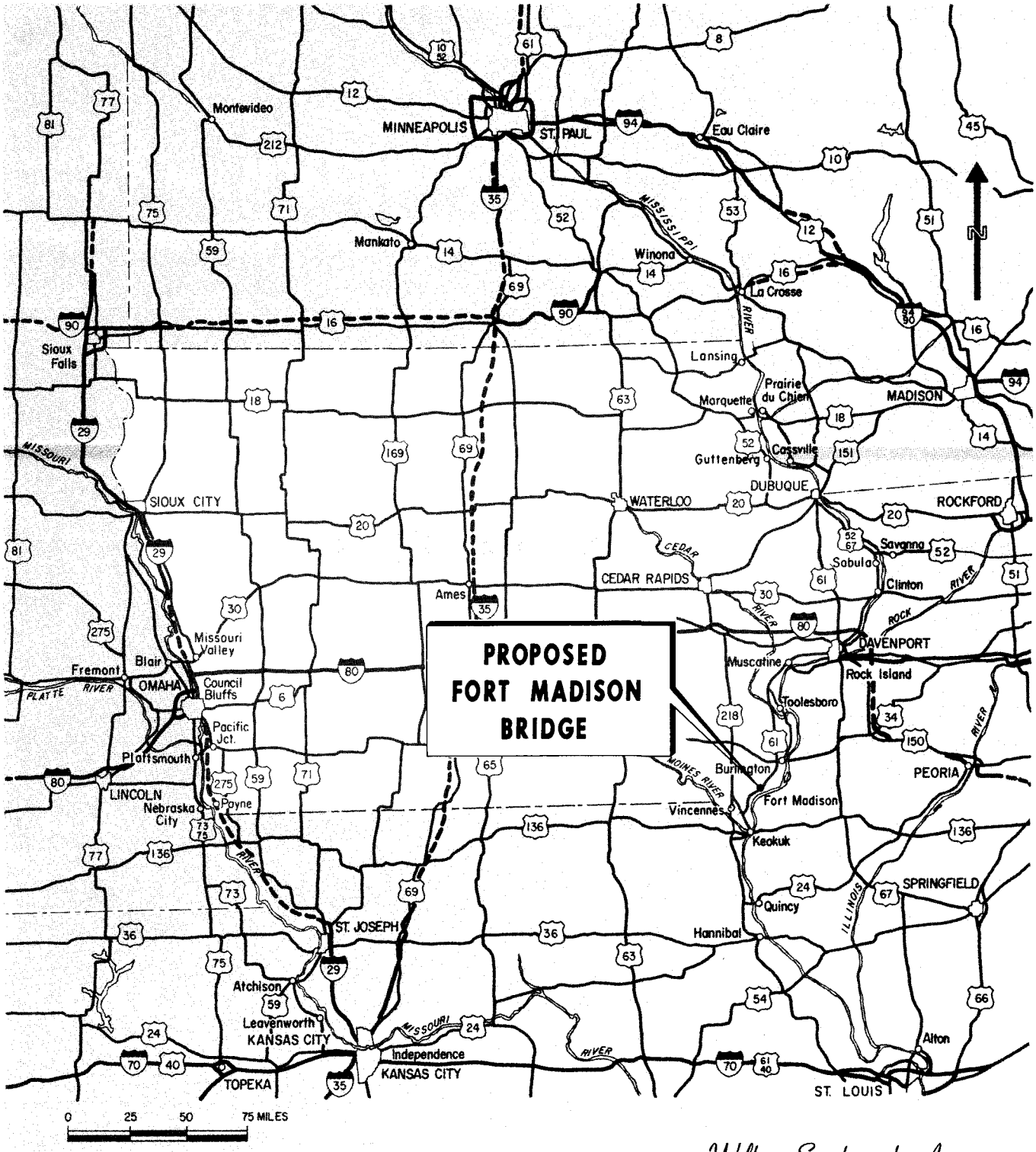

Wilbur Smith and Associates

Exhibit 1

REGIONAL MAP

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LIST OF ILLUSTRATIONS

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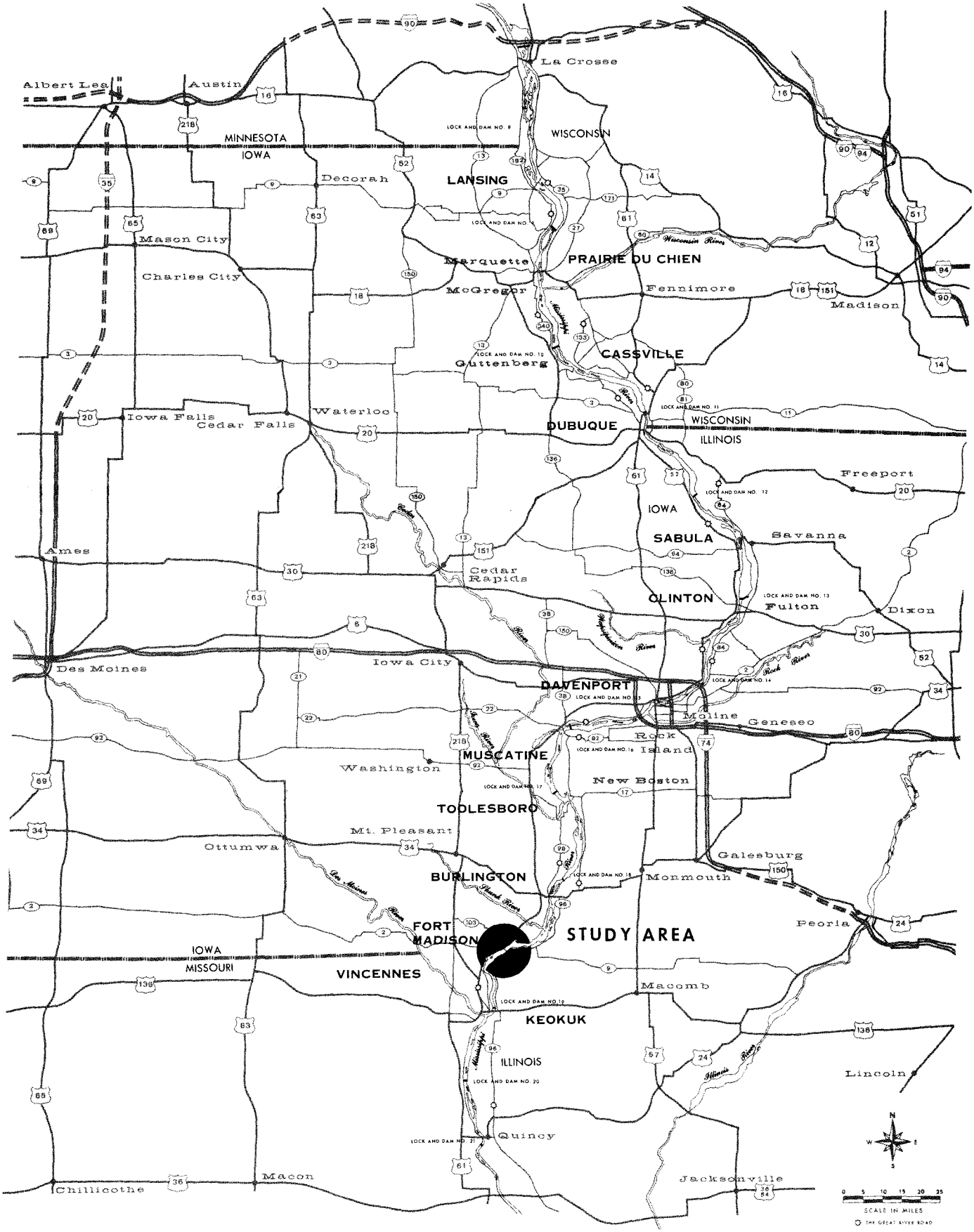


Exhibit 2

VICINITY MAP

SUMMARY OF FINDINGS

While the present combination railroad-highway bridge at Fort Madison provides a reasonable level of traffic service in the Fort Madison area, the crossing does not meet modern roadway design standards and bridge openings for river traffic inconvenience motorists. In 1967, an average of ten openings per day occurred during the peak summer season with each opening interrupting highway traffic for 12 to 15 minutes.

If a new high-level bridge were constructed on a Second Street alignment, a bond issue of about $6,588,000 would be required. Construction of a bridge at Fifteenth Street would require a bond issue of $7,038,000. Estimated net toll revenues at both locations would be about equal — $251,000 at first year levels increasing to an average of $303,000 over the bond term, although the Fifteenth Street alignment would have some slight traffic advantages over the Second Street location.

Preliminary feasibility calculations indicate that net toll revenues would provide a 0.69 coverage of level debt service for the Second Street alignment and 0.61 for the Fifteenth Street location. Both coverage levels are considerably below those normally considered indicative of financial feasibility. A total subsidy of $4,584,000 would be required to achieve a balance between net revenues and level debt service for the Second Street alignment; the total subsidy for the Fifteenth Street project is estimated at $5,452,000.

INTRODUCTION

At present, river-crossing traffic in the Fort Madison, Iowa area is served by the combination railroad-highway bridge owned and operated by the Atchison, Topeka and Santa Fe Railway Company. Bridge traffic is somewhat impeded by a swing-span which opens to permit river navigation. The bridge is operated as a toll crossing, no vehicle load limitations are in effect.

As shown in Exhibit 1, Fort Madison is located near the extreme southeastern corner of Iowa, along the Mississippi River about midway between Keokuk and Burlington. The nearest river crossings to the south and north are the bridges at Keokuk and Burlington, respectively.

Authority and Purpose of Report

In December, 1967, the Iowa State Highway Commission authorized preparation of a preliminary feasibility report for a proposed new toll bridge at Fort Madison. This report is one of several comparable bridge studies to be conducted as part of the Iowa Toll Bridge Program, in accordance with legislation enacted by the Iowa General Assembly. The various locations along the Mississippi River to be studied under this program are shown in Exhibit 2.

A copy of the Federal legislation which permitted the construction and operation of the present bridge at Fort Madison is included in the Appendix. Chapter CCXIII, 2nd Session, 42nd Congress, permits the collection of tolls for an indefinite period. The General Bridge Act of 1946, the current Federal law providing for the construction of bridges over navigable waters of the United States, is also included in the Appendix. If a new bridge were constructed at Fort Madison, the period of time during which it could be operated as a toll facility is limited by this Act to 30 years. The Iowa Legislation, which establishes the precepts of the current Toll Bridges Program, is also presented in the Appendix.

Scope of Services

This report summarizes preliminary engineering, traffic and revenues and feasibility studies for a proposed new Fort Madison Bridge. These studies included:

1. An analysis of the physical limitations imposed by navigational requirements, terrain, existing levees, railroads, real property values, and the present street and highway network.

2. A comparison of alternative bridge and approach road locations based on estimates of project cost and annual maintenance and operating expenses.

3. An analysis of the adequacy of present trans-river traffic service in the vicinity of the proposed bridge, as measured against present travel demands and anticipated future growth.

4. Development of preliminary traffic estimates for the various alternative alignments and estimates of annual traffic and revenues for the recommended bridge location, assuming operation as a toll facility.

5. A determination of the preliminary feasibility of the project, based on the relationship of anticipated project cost and estimated toll revenues.

The engineering, location and cost studies relating to the proposed bridge were prepared by Howard, Needles, Tammen & Bergendoff and are discussed in Part I of this report.

Part II, prepared by Wilbur Smith and Associates, discusses the preliminary traffic and revenue potential of the crossing and project feasibility calculations.

Present Highway System

Iowa Route 2 serves east-west oriented traffic in the Fort Madison area and is linked with Illinois Route 9, by the present bridge. North-south traffic passes through Fort Madison on U. S. Route 61, which is designated as the Iowa Great River Road through the study area. Iowa Routes 88 and 103 serve to link northwestern portions of Lee County with Fort Madison. The Illinois Great River Road is carried north through Hancock County on Illinois Route 96, to a junction with Illinois Route 9 at the present Illinois bridgehead. The Illinois Great River Road then proceeds northward from Dallas City along the alignment of county roads near the river bank. Illinois Route 9 follows an easterly alignment out of the study area.

Planned Highway Improvements

Relocation is programmed for a six-mile section of U. S. Route 61 through the City of Fort Madison. Right-of-way acquisition is to proceed in 1971 and 1972, with construction to follow. By 1972, right-of-way acquisition is scheduled for improvement of a section of Iowa Route 2 between U. S. Routes 61 and 218. This is part of a continuing program to up-grade and improve Iowa Route 2. At Burlington, the program for relocation and reconstruction of Iowa Route 34 will result in increased attractiveness of the Burlington crossing to certain trans-river trips through the study area. Illinois also plans resurfacing of portions of Illinois Route 9 in western Hancock County and eastern and central McDonough County.

In summary, no improvements are scheduled which are expected to radically change present trans-river travel patterns in the Fort Madison area.

Present Fort Madison Bridge

Iowa Route 2 is linked with Illinois Route 9 by a highway crossing located on the upper level of the combined railroad-highway, swing-span bridge at Fort Madison. Several views of the bridge and approaches are

shown in Exhibit 3. The present bridge, constructed in 1926, was built by the Atchison, Topeka and Santa Fe Railway Company and includes a double track railroad and two lanes for vehicular traffic. The highway level carries a minimum roadway width of 20 feet and has a bituminous surface on a portland cement concrete slab.

The maximum vertical roadway clearance to low bridge steel is 14.5 feet. The roadway design load is an H-20 equivalent live load with a 32,000-pound single axle. Special overweight permits, when required, may be issued by the railroad.

Elevated approach spans carry the roadway parallel to the tracks on both the Iowa and Illinois banks. The first girder span at each end of the truss spans is skewed so as to shift the roadway directly over the centerline of the tracks as the roadway enters the truss spans, resulting in an abrupt discontinuity in roadway alignment. A double-deck configuration is maintained throughout the length of the truss spans.

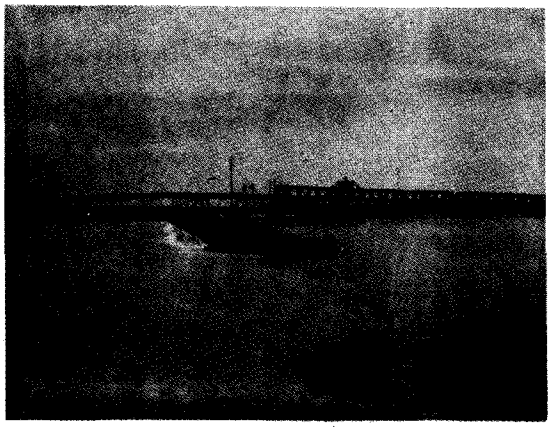
At the Iowa bridgehead, the approach roadway is awkward, due to a steeply rising grade and reverse-curve alignment. The Illinois approach roadway is relatively straight and rises on a more gentle grade.

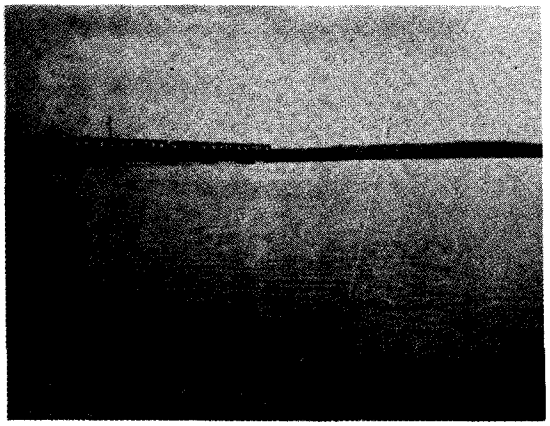
Mississippi River navigation shows considerable seasonal variation, although observers report that activity has been tending to continue later into the winter season each year. A total of 2,690 bridge openings were recorded in 1967, including 26 test openings, averaging about 224 per month. Total openings in 1967 increased 3.7 per cent over 1966. Monthly bridge openings for navigation in 1967 ranged from a low of 6 in January to a high of 339 during July. Each opening cycle takes approximately 15 minutes, creating a significant traffic delay.

The present toll structure on the Fort Madison Bridge is based on a rate of $0.25 for a passenger car with driver. As shown in Table 1, each additional passenger is assessed $0.05; trucks pay a toll based on vehicle weight. For example, a truck having a gross weight of 40,000 pounds would be charged $4.80.

IOWA APPROACH

BRIDGE PROFILE





VIEW TOWARD ILLINOIS

PRESENT FORT MADISON BRIDGE

TABLE 1

PRESENT TOLL SCHEDULE

Fort Madison Bridge

TOLL CLASS	TOLL
Pedestrian	$0.05
Motorcycle	0.15
Passenger car and driver Each additional passenger $0.05	0.25
Bus, including driver and not exceeding 35 passengers	1.00
Trucks	
Weight 4,000 lbs. or less	0.25
Weight 4,000 lbs. to 5,000 lbs.	0.35
Weight 5,000 lbs. to 6,000 lbs.	0.40
Weight 6,000 lbs. to 7,000 lbs.	0.45
Weight 7,000 lbs. to 10,000 lbs. Charge will be $1.00 plus an additional $0.20 for each 2,000 lbs. or fraction thereof in excess of 10,000 lbs.	0.80
Special classifications	Special rates

Note: Passenger car round trip with 3 passengers $0.50.

SOURCE: Atchison, Topeka and Santa Fe Railway Company.

Alternate River Crossings

The closest alternative river crossing to the north is the MacArthur Bridge, about 20 miles away, at Burlington. The bridge is a high-level structure with a cantilever truss for the main river span. It has a 22-foot roadway of open steel mesh construction. Although the bridge was opened to traffic in

1917, the roadway and deck structure were rebuilt and strengthened in 1953 to accommodate modern traffic loadings. The tolls charged for use of the facility are based on a rate of $0.25 for passenger cars. Larger vehicles are assessed proportionally higher tolls, as detailed in Table 2.

TABLE 2

PRESENT TOLL SCHEDULE

MacArthur Bridge

TOLL CLASS	TOLL
Pedestrians	$0.05 (1)
Motorcycle-Motor Bike	0.15 (1)
Automobile	0.25 (1)
Pickup and Panel Truck	0.25
Trucks under 8,600 lbs.	0.80
Trucks 8,600 lbs. and under 16,500 lbs.	1.00
Trucks 16,500 lbs. and under 18,500 lbs.	1.25
Trucks 18,500 lbs. and under 20,500 lbs.	1.50
Trucks 20,500 lbs. and under 22,500 lbs.	1.75
Trucks 22,500 lbs. and under 24,500 lbs.	2.00
Trucks 24,500 lbs. and under 25,500 lbs.	2.25
Each additional thousand pounds	0.25
Mobile home 26 feet and under	0.25
Mobile home over 26 feet	0.75
Small farm tractor	0.50
Large farm tractor	1.00
U-haul and camp trailers under 500 lbs.	0.10
U-haul and camp trailers over 500 lbs.	0.25

(1) Receipt can be turned in the same day for free return passage.

SOURCE: City of Burlington.

The nearest river crossing to the south is the Keokuk Municipal Bridge, about 24 miles downstream. The Keokuk bridge is a low-level, combination railroad-highway facility with a swing-span. The vehicular roadway is carried on an elevated deck over the railroad. Originally built in 1871, the superstructure was replaced in 1915 and the deck in 1956. While no weight limitations are in effect on the bridge, trans-river traffic service is interrupted when the swing-span is opened for river traffic. Opening frequency is very similar to that recorded at Fort Madison. The toll schedule, shown in Table 3, is based on a rate of $0.10 for a passenger car, with trucks charged higher fees.

TABLE 3

PRESENT TOLL SCHEDULE

Keokuk Municipal Bridge

TOLL CLASS	TOLL
Passenger Cars	$0.10
Trucks:	
Pickups	0.10
Two-axle	0.25
Tandem-axle	1.50
Semi-trailers	1.50
Full trailers	1.50
House Trailers (plus towing unit)	0.25
Buses	0.25
Tractors	0.25
Farm Machinery	0.50

SOURCE: Keokuk Bridge Commission.

Previous Studies

All available pertinent data and reports relating to this project were assembled and reviewed. This material included information obtained from the Iowa and Illinois Highway Commissions, other state agencies and numerous county, municipal and other contacts.

PART I

LOCATION AND COST STUDIES

BASIC DATA

Considerable information regarding existing conditions and proposed improvements must be procured and analyzed in conjunction with the preparation of bridge studies for a project of this magnitude. General features of the study area are shown on Exhibit I-1. The following are items of data pertinent to a Mississippi River crossing at Fort Madison.

Geology

The study area lies within the Dissected Till Plains Section of the Central Lowland Physiographic Province. The area was covered by Kansan and Illinoian glaciation during the Pleistocene Epoch. In the west bank bluffs along the Mississippi River, 30 feet of loess and 60 feet of glacial drift are exposed.

Well logs in the city of Fort Madison indicate the alluvial silt, sand and gravel may be as deep as 190 feet in the old pre-glacial channel of the Mississippi River. Bedrock is principally the Lower Burlington limestone and shale of the Augusta stage of the Carboniferous System. Bedrock dips to the south at approximately 10 feet per mile.

Substructure units for the proposed bridge should be founded on bearing piles driven through the alluvium and/or caissons taken to bedrock or other suitable material. Prior to final design, foundation borings and laboratory soil tests will be required for evaluation of the proper foundation type and any special treatments required for embankment-foundation stability and settlement at the approaches.

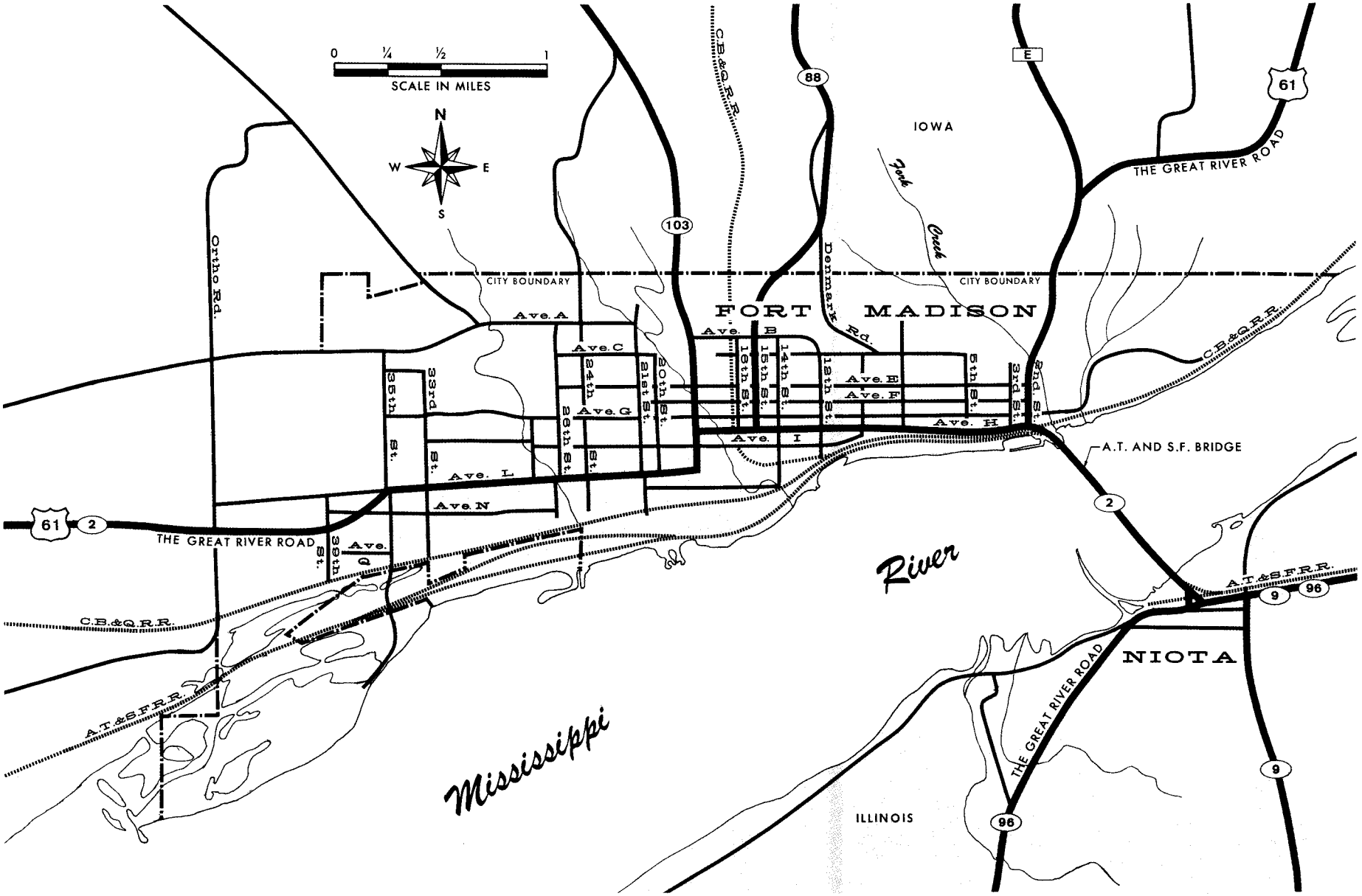


Exhibit I-1

FORT MADISON STUDY AREA

River Conditions

The navigation channel of the Mississippi River enters the Fort Madison area on tangent and follows this alignment through the navigation openings provided by the existing combined railroad-highway swing bridge. One mile downstream of the bridge the channel courses through a 30 minute curve and then continues downstream on tangent.

Normal pool elevation at this location is 518.2 Mean Sea Level with a record flood elevation of 525.1 Mean Sea Level recorded in 1965. This flood inundated tracks of the Atchison, Topeka and Santa Fe Railway Company along the river front of Fort Madison. The tracks have since been raised to an elevation of 527.0 to forestall future flooding. No other flooding of railroad or highway arteries in the area on either bank of the river has been experienced.

Only a short reach of the river, from the existing bridge downstream for approximately one mile, is favorable for alternate bridge sites. Site limitations are imposed by bluffs on either side of the river which rise sharply to an elevation of 700 upstream on the Iowa bank and an elevation of 650 downstream on the Illinois side.

Existing Railroads

The city is served by two railroads; the Atchison, Topeka and Santa Fe and the Chicago, Burlington & Quincy. Tracks for both are confined primarily to the river front throughout the length of Fort Madison. The Chicago, Burlington & Quincy Railroad is carried through the city on a single track along the bank of the Mississippi River with another single track generally following French Creek to the north.

The Atchison, Topeka and Santa Fe Railway Company maintains a large shop and car storage yard along the Fort Madison river front from 19th Street to 39th Street. A pair of tracks enter the city from the west, cross the river via the swing span bridge to Niota, Illinois, and continue eastward.

Navigation Clearances

Criteria for navigation clearances have been tentatively established by the Rock Island District of the U. S. Army Corps of Engineers.

Upon establishment of the Department of Transportation under the Act of 15 October 1966, PL 89-670, the Secretary of Transportation was given responsibility for certain functions, powers, and duties previously vested in the Secretary of the Army and other offices of the Department of the Army, including those with respect to drawbridge operating regulations (Section 5 of the Act of 18 August 1894 as amended), obstructive bridges (the Act of 21 June 1940 as amended), and location and clearances of bridges and causeways in navigable waters (Section 9 of the Act of 3 March 1879, the Act of 23 March 1906 as amended, and the General Bridge Act of 1946 as amended, except Section 503).

The criteria cited herein is in conformance with the requirements and past practices of the U. S. Army Corps of Engineers. The assumption has been made, for this exploratory report, that the criteria to be established by the U. S. Coast Guard, the agency delegated by the Secretary of Transportation to assume the responsibility for the functions listed above, will be similar to those of the Corps of Engineers.

Contact with the Coast Guard has confirmed the validity of this assumption for an exploratory study of alternative locations. It should be noted, however, that the particular river conditions existing at each site should be reviewed with the Coast Guard prior to the preparation of a definite project report to establish the navigation requirements.

Although the minimum permissible navigation channel on the Mississippi River is 400 feet, a horizontal clearance of 450 feet is proposed for a new highway bridge at this site. The 400 foot minimum clearance is permitted only when the alignment of the river channel is straight. The opening must be greater where the alignment of the channel is curved under or upstream from the bridge.

Final approval of clearances can be determined only after formal application has been filed and public hearings conducted.

The minimum vertical clearance for a bridge structure is 52 feet above the 2 per cent waterline elevation, or 60 feet above flat pool, whichever is higher. The 2 per cent waterline is that elevation of the river which will be exceeded only 2 per cent of the time. In the Fort Madison area, low steel elevation required by the flat pool waterline elevation specification is 578.2 Mean Sea Level, which exceeds Elevation 573.2 Mean Sea Level required by the 2 per cent specification.

ALTERNATE LOCATIONS

General

Four possible locations were analyzed and evaluated for a new highway bridge over the Mississippi River at Fort Madison. Two locations, Alternate A at Second Street, and Alternate B at Fifteenth Street, were studied in detail for inclusion in this report. Exhibit I-2 shows all alternative locations studied and Exhibit I-3 shows the Iowa approach configurations for Alternate A. The principal features and relative merits of each location are summarized in the following paragraphs.

Second Street Alternate A

This alignment provides a connection between Second Street in Fort Madison and the old Fort Madison Bridge embankment which extends 2,000 feet from the Illinois bank of the Mississippi River. Any of the approach configurations shown on Exhibit I-3 may be incorporated with this alignment. The Illinois approach terminates in Niota at the intersection of Illinois Routes 9 and 96.

The first Iowa approach configuration, A, is parallel and immediately adjacent to Second Street (U.S. Route 61) with a termination at Avenue F. The grade of Second Street would be raised between Avenues E and H to reduce the bridge approach grade to 4 per cent. At the same time, Avenue F must be raised and adjusted to provide a better grade from the approach terminal into Fort Madison. Modest intersection modifications at Avenues E, G and H are also included.

Traffic on U.S. Route 61 is split; westbound vehicles would follow their present course and eastbound vehicles would travel a loop around the opposite side of the bridge, joining the existing U.S. Route 61 alignment between Avenues E and F. The proximity of railroad tracks to Avenue H and the city's one-way traffic on Avenues F and G precludes a direct bridge connection to these streets. The loop, therefore, also provides connections to the bridge from the city's existing street system.

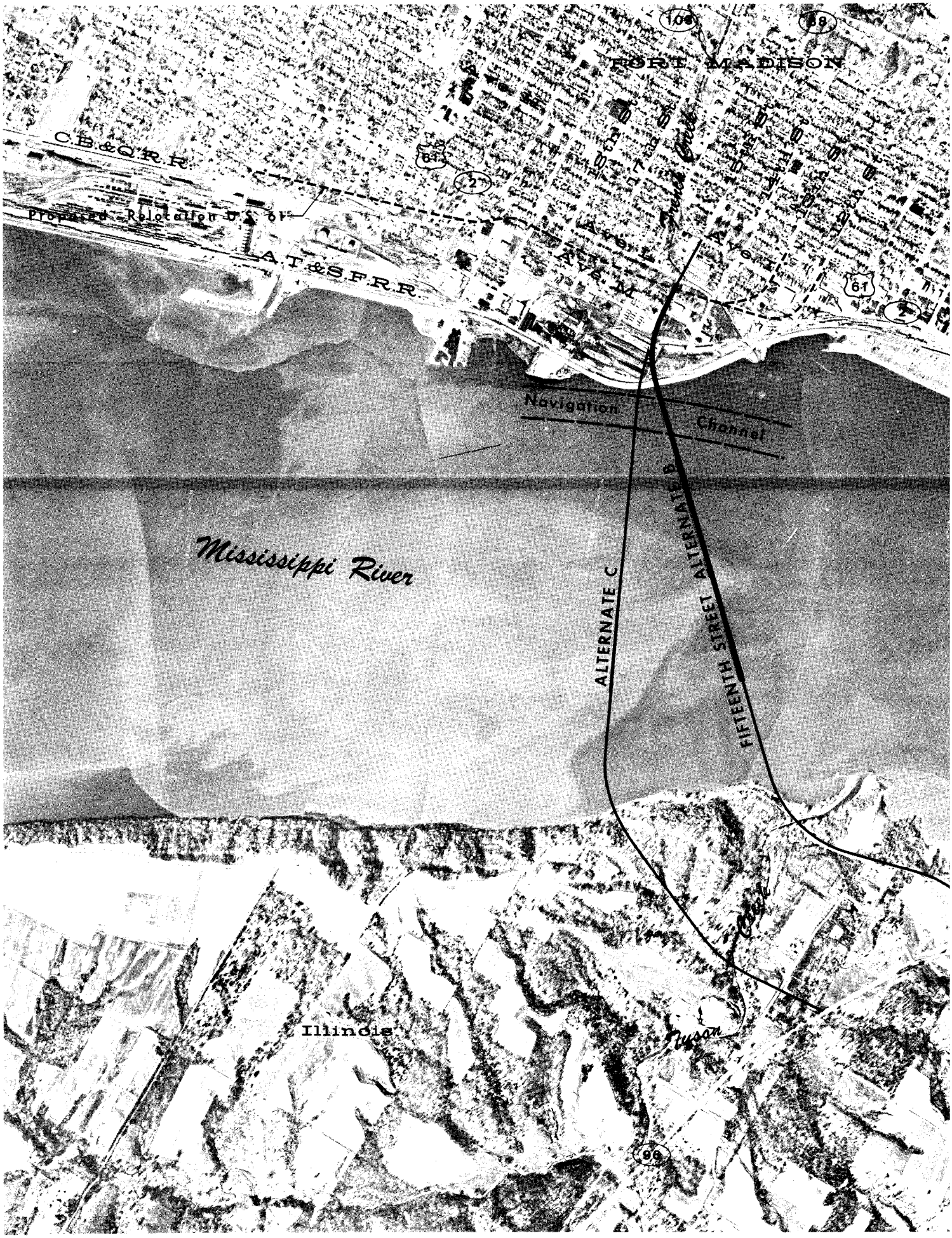
Right-of-way along Second Street and east of Fork Creek is required by this approach design, and two auxiliary roadway structures are necessary where the loop passes over Fork Creek. Minimum toll plaza facilities may be provided on the approach between Avenue F and the bridge abutment.

The second Iowa approach configuration, A-1, generally parallels Second Street along a line immediately east of Fork Creek and ties directly into Avenue F at Second Street. This configuration has the advantage of simplicity while requiring a minimum of auxiliary construction. Second Street and Avenue F are altered to provide acceptable roadway grades, but U.S. Route 61 and existing city traffic routings are not affected.

A major disadvantage of this configuration is the lack of a suitable toll plaza site on the Iowa approach. The sharp alignment curve and short stretch of flat grade necessitates consideration of a toll plaza on the Illinois approach.

The third Iowa approach configuration, A-2, is a modified half cloverleaf interchange tying directly to Avenue F with ramps connecting to U.S. Route 61 on Second Street and Avenue H. The approach spans follow an alignment which generally parallels Second Street to the east of Fork Creek, turns and passes over Second Street, and comes to ground midway between Second and Third Streets on Avenue F. At this point, circular ramps connect the bridge with southbound U.S. 61 traffic. Access to the bridge by northbound U. S. 61 traffic is attained by means of a ramp from Avenue H over the tracks of the C.B. & Q. and A.T. & S.F. railroads at Second Street. Another ramp ties directly to Second Street at Avenue E to serve bridge traffic northbound on U. S. Route 61.

Disadvantages of this approach design include substantial right-of-way requirements, deep cut slopes for one circular ramp, and constriction of U. S. Route 61 along Avenue H. Required right-of-way includes the two city blocks bounded by Second and Third Streets and Avenues E and G, the area to the east of Second Street along Fork Creek, and a length of property along Avenue H adjacent to the C.B. & Q. tracks. Cuts up to 17 feet deep, and averaging 14 feet deep, are necessary for the circular


FORT MADISON
C.B.&Q.R.R.
Proposed Relocation U.S. 61
A.T.&S.F.R.R.
Navigation Channel
Mississippi River
ALTERNATE C
FIFTEENTH STREET ALTERNATE B
Illinois
Tyson
61
2
99

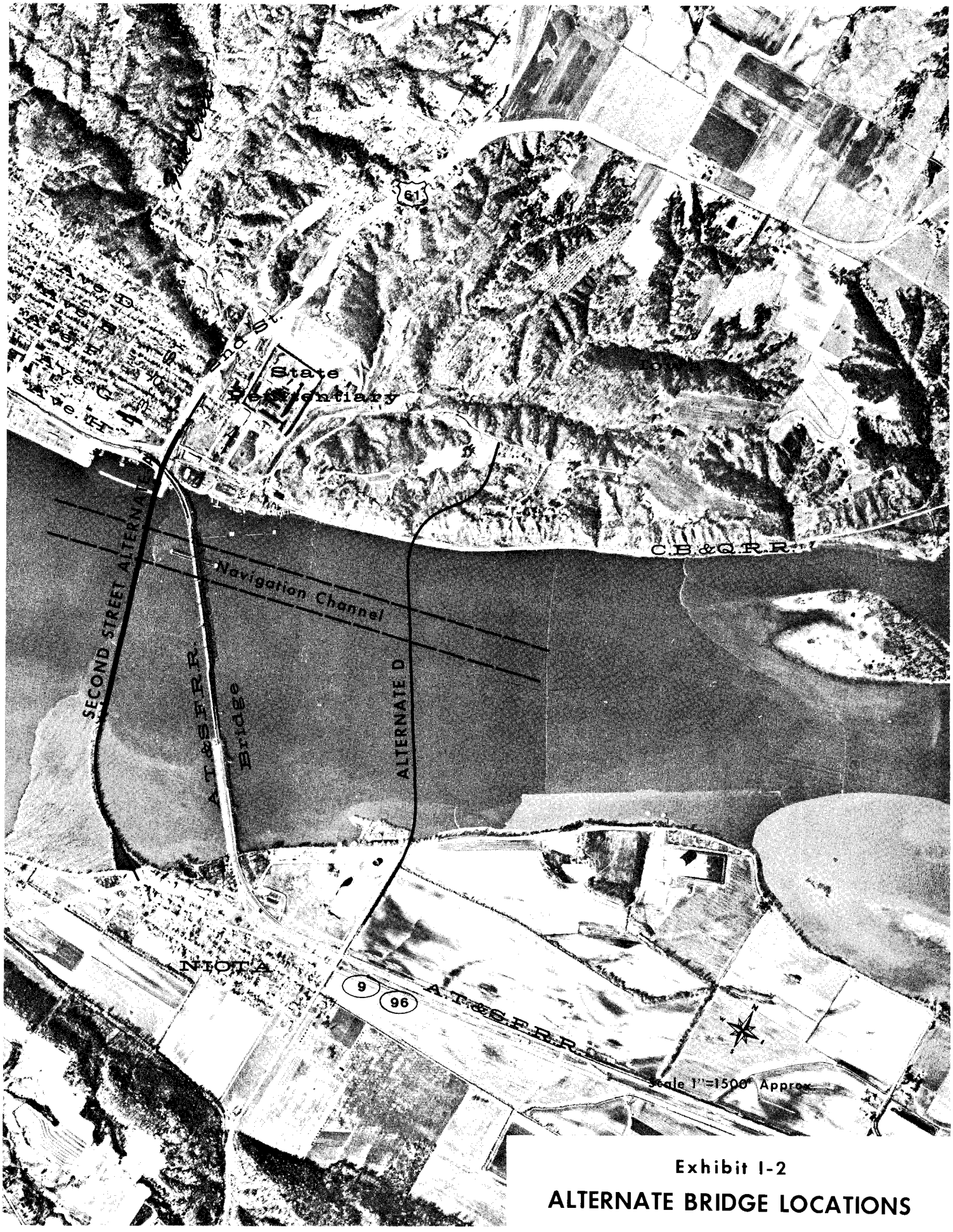


Exhibit I-2

ALTERNATE BRIDGE LOCATIONS

ramp serving southbound U. S. Route 61 traffic to the bridge. The close proximity of the C.B. & Q. tracks to Avenue H necessitates most, if not all, of the right-of-way required for the ramp serving northbound U. S. Route 61 traffic to the bridge to be acquired from within the limits of the existing roadway.

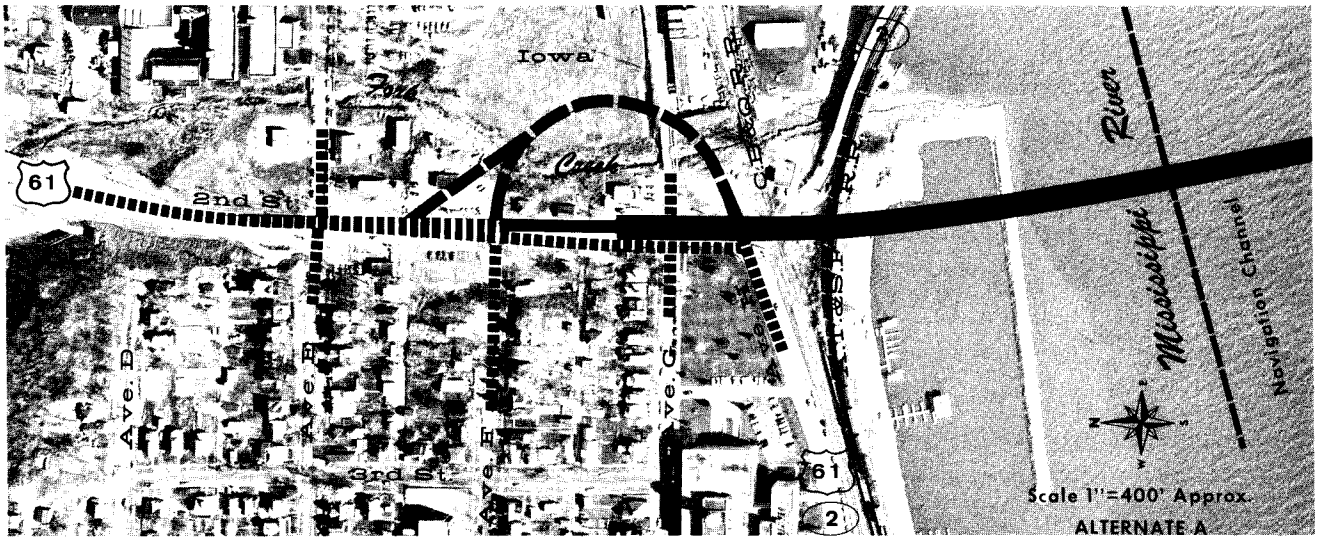
Fifteenth Street Alternate B

Entrance to the west side of the Central Business District is provided by an alignment making connections to Fifteenth Street and terminating at Avenue I. Ramps for direct access to the proposed relocation of U. S. Route 61 alignment immediately south of Avenue L have been included. The Illinois approach is placed on a fill embankment, extending into the river approximately 2100 feet, and terminates at Illinois Route 96 between Niota and Old Niota.

This location bisects Fort Madison and ties directly to Iowa Route 88. Iowa Route 103 terminates three blocks to the west and is accessible via Avenue H. Right-of-way required for the Iowa approach is relatively undeveloped from the river to Avenue L, but, from there to Avenue I, certain residential and commercial properties immediately adjacent to Fifteenth Street and the ramps are required. The Illinois approach follows an existing county road from the river bank to Old Niota where it crosses open ground to Illinois 96. Disadvantages of the alignment include the new river embankment, the requirement of two auxiliary bridge structures for the Illinois approach, and the lack of a suitable toll plaza location on the Iowa approach.

Other Alternates

Alternate C - basically identical to the Fifteenth Street Alternate B; this alignment differs only in its river crossing angle and Illinois approach roadway. The alignment crosses the navigation channel at right angles and ties to the high bluffs immediately west of Old Niota. The Illinois approach roadway is characterized by grades of 6 per cent coupled with sections of excessive cut and fill. Between the bluffs and Illinois Route 96, steep slopes to either side of Tyson Creek require a major bridge structure.



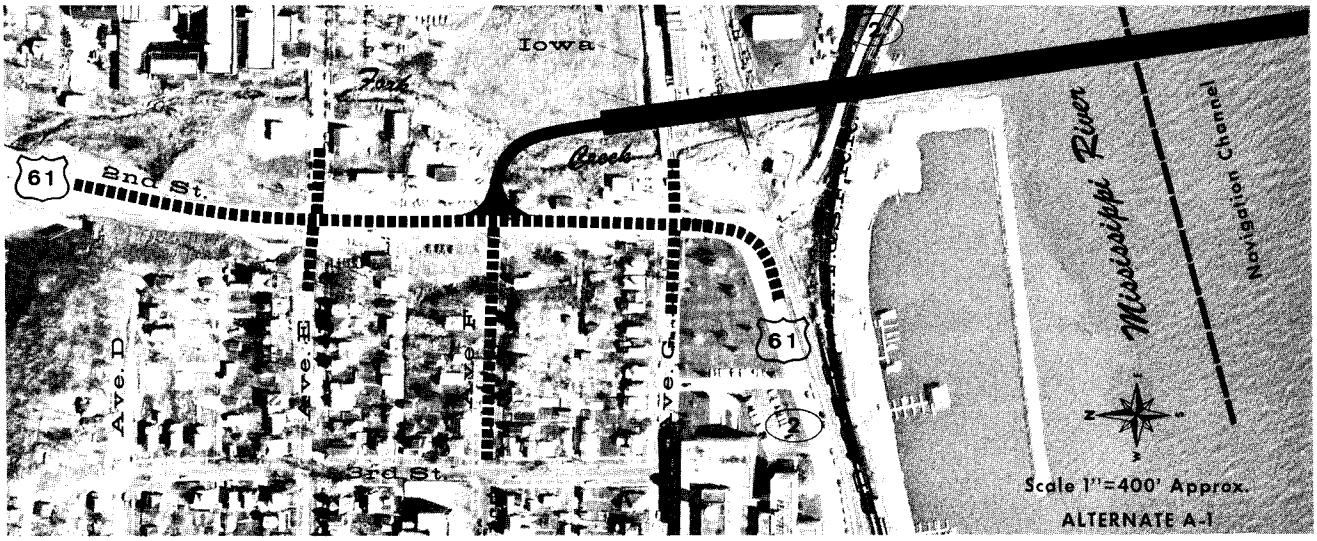


Exhibit I-3

SECOND STREET TERMINAL ALTERNATES

Alternate D - situated about one mile upstream of Alternate A, the alignment connects the high bluffs, which commence just east of the penitentiary, to the flat plain on the Illinois bank. In addition to the disadvantages introduced by the bluffs, this location traverses a high value real estate area, and major roadway improvements are required to extend the Iowa highway system to the bridge site.

Recommended Location

The Second Street Alternate is the most economical location for a replacement of the existing Fort Madison Bridge. The project cost for a crossing on this location is utilized in the project feasibility studies developed in Part II of this report.

STRUCTURE TYPE STUDIES FOR NAVIGATION SPANS

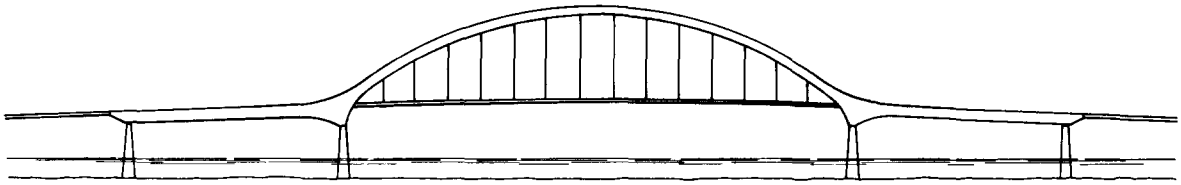
The primary intent of structure type studies as a part of this exploration study is to determine the approximate cost of a river crossing. A final recommendation for a specific type of structure cannot be made at this stage of investigations and design. The final selection of a structure type will be contingent upon economics, aesthetic factors, structural considerations, navigational clearance requirements, foundation conditions, highway alignment and vertical controls. All of these control factors would be studied in detail after a preliminary selection of bridge location has been made, based on the general considerations outlined and discussed in this report.

Six types of navigation spans are shown on Exhibit I-4. Type I is a Continuous Girder Span. These contemporary structures are popular because of economics, pleasing appearance and the elimination of obstructions above the roadway. Economic considerations usually limit spans to less than 450 feet, but with increased usage of newer high-strength steels current maximum span lengths may be economically increased. Since structure depths of the girder span are relatively greater than of other structure types, the practicality of the girder span will be dependent upon navigational clearances, existing topography, and approach grades.

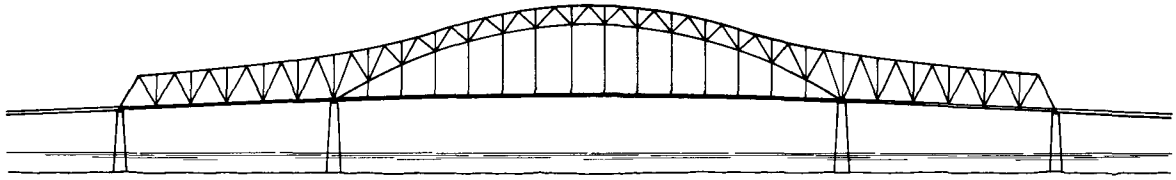
Type II navigation span of Exhibit I-4 is a Continuous Box Girder Tied Arch Span with flexible tie. The tie resists only the thrust of the arch. Without a tie the resistance would have to be provided by river piers. This type of span is considered very practical construction for bridges over the Mississippi River if navigation clearance requirements are limited to a single opening. This type of structure has a very limited depth between the low steel and roadway deck and will, therefore, permit flatter approach grades than a continuous girder design.

Type III navigation span is the Continuous Truss Tied Arch Span. This type of bridge is similar in structural function to Type II, the box girder arch. The difference being that a steel truss system is used for the arch rib and approach spans instead of box girder sections. This type of struc-

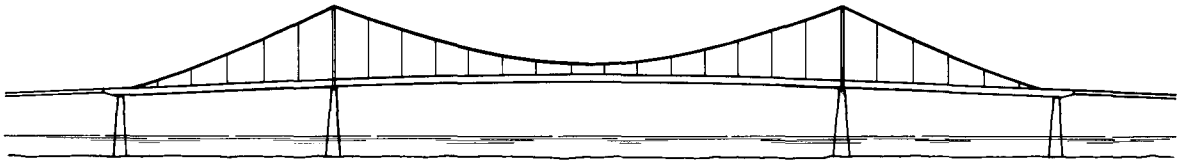
CONTINUOUS GIRDER SPAN — TYPE I



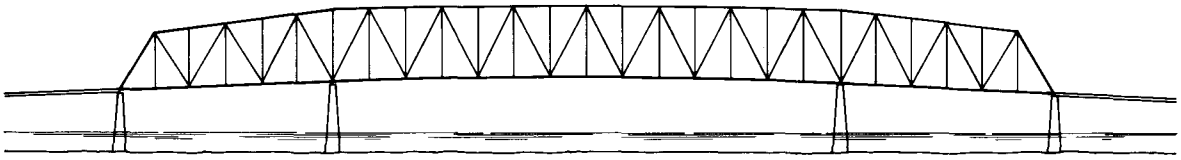
CONTINUOUS BOX GIRDER TIED ARCH SPAN — TYPE II



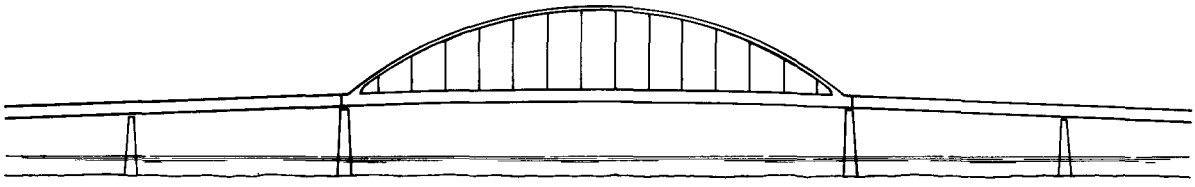
CONTINUOUS TRUSS TIED ARCH SPAN — TYPE III



SELF ANCHORED SUSPENSION SPAN — TYPE IV



CONTINUOUS TRUSS SPAN — TYPE V



BOX GIRDER TIED ARCH SPAN — TYPE VI

Exhibit I-4

NAVIGATION SPAN STRUCTURE TYPES

ture will be economical for longer spans than the box girder and, with proper proportions, can be aesthetically pleasing.

The suspension bridge is considered one of the most graceful of all bridge structures. The Self Anchored Suspension Span is shown as Type IV. This type of structure generally costs more, up to 20 per cent, than other considered types when the maximum span required is in the 500 to 600 foot range. It offers advantages of pleasing appearance, flatter approach grades and nearly equal vertical clearance in the side spans.

A Continuous Truss Span is shown as Type V. This is a common and economical type of structure. In the past it was particularly popular because of economy in total metal required, its truss members being fabricated from many small pieces of structural steel with rivets. Modern steel technology, by providing larger sizes of structural steel plates, has permitted the designer to develop other types of structures that are aesthetically pleasing and yet are competitive in cost with the continuous truss.

The navigation span identified as Type VI is the Box Girder Tied Arch Span. Side spans will be of continuous girder construction but will function independently of the center span. The tie in the center span is more rigid in comparison with the arch than the flexible tie of Type II. The depth of the tie girder is shallower than the depth of the Continuous Girder Span, Type 1. Thus, if vertical clearance requirements would cause excessive approach grades to a Continuous Girder Span, the Box Girder Tied Arch Span offers an advantage. This type of structure is aesthetically pleasing and economical for two-lane roadways for a navigational span greater than 400 feet.

It appears that there would be little, if any, significant difference between the combined costs of fabrication and erection of a tied arch span and a continuous truss span. Decreased erection costs favor the truss span; however, this advantage is offset by lower fabrication costs for the arch. The latter has fewer members since the bridge steel is concentrated in the arch rib and tie. In summary, the continuous girder bridge is suitable when length of approaches allow desirable grades to be used; its

cost is comparable with several other bridge designs. The continuous girder bridge with tied arch main span and box girder bridge with tied arch main span combine a pleasing appearance with economy of construction for the length of span required for a bridge at this site. The continuous truss bridge and continuous truss bridge with tied arch main span, while competitive in construction cost with the girder bridges, are not as attractive. The self anchored suspension span is uneconomical for the span lengths being considered for this project.

Inasmuch as more detailed estimates of construction cost would be developed in subsequent phases of design, a structure type other than the type recommended herein may prove to be more economical upon subsequent refinements in design. The probable variation in costs among the various structure types considered herein is within the accuracy of estimating at this stage of design.

The Box Girder Tied Arch Span Type VI, also shown in a general setting on Exhibit I-5, should be given thorough consideration in future engineering studies for a highway crossing at Fort Madison, Iowa.

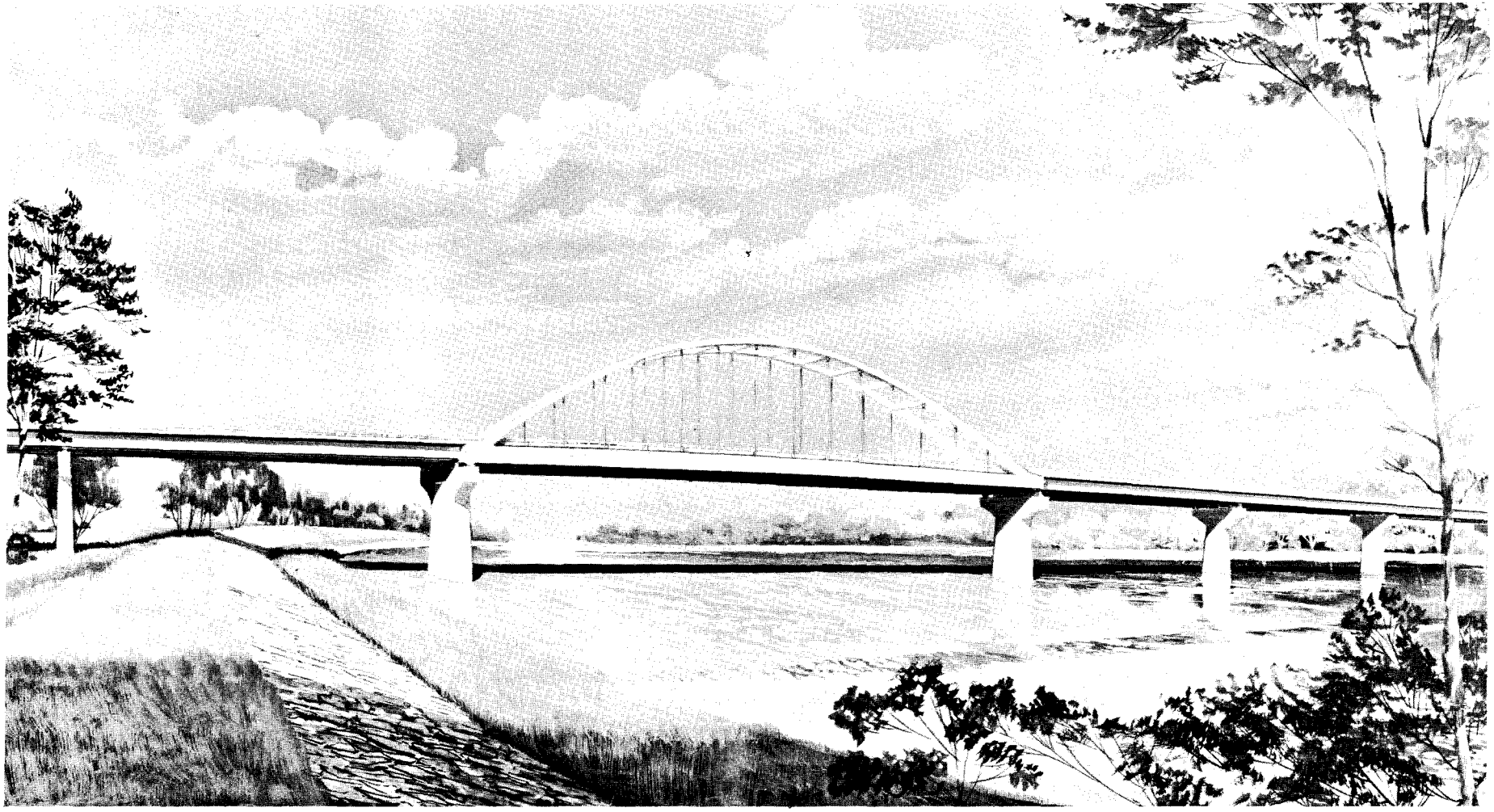


Exhibit I-5

BOX GIRDER TIED ARCH SPAN

STRUCTURE TYPE STUDIES FOR APPROACH SPANS

Economy is a primary consideration for the approach spans which extend from the bridge abutments to the main river unit. Many types of approach span construction can be blended with the main span design to achieve a pleasing appearance. However, a final layout of the most economical span lengths cannot be determined until subsurface investigations have been completed. Prestressed concrete beam spans utilizing Iowa standard design beams would offer economical construction in the river bottoms where pier foundations would not be subject to scour action of the river. These beams are usually limited in length to 80 feet. As the bridge extends into the river, the cost of piers becomes greater. To offset the increased pier cost, longer spans would be used. Steel girders with floorbeams and intermediate stringers offer the greatest economy of construction for spans greater than 80 feet.

COST ESTIMATES

General

The preliminary roadway costs were determined by applying current unit prices to preliminary quantity estimates of the principal roadway construction items. Allowances have been included for modest escalations of unit costs during the one year that will elapse before construction could begin.

Right-of-way cost estimates were based upon fair market valuations of all real property involved. Allowances have been included for damages, severance losses and acquisition expenses.

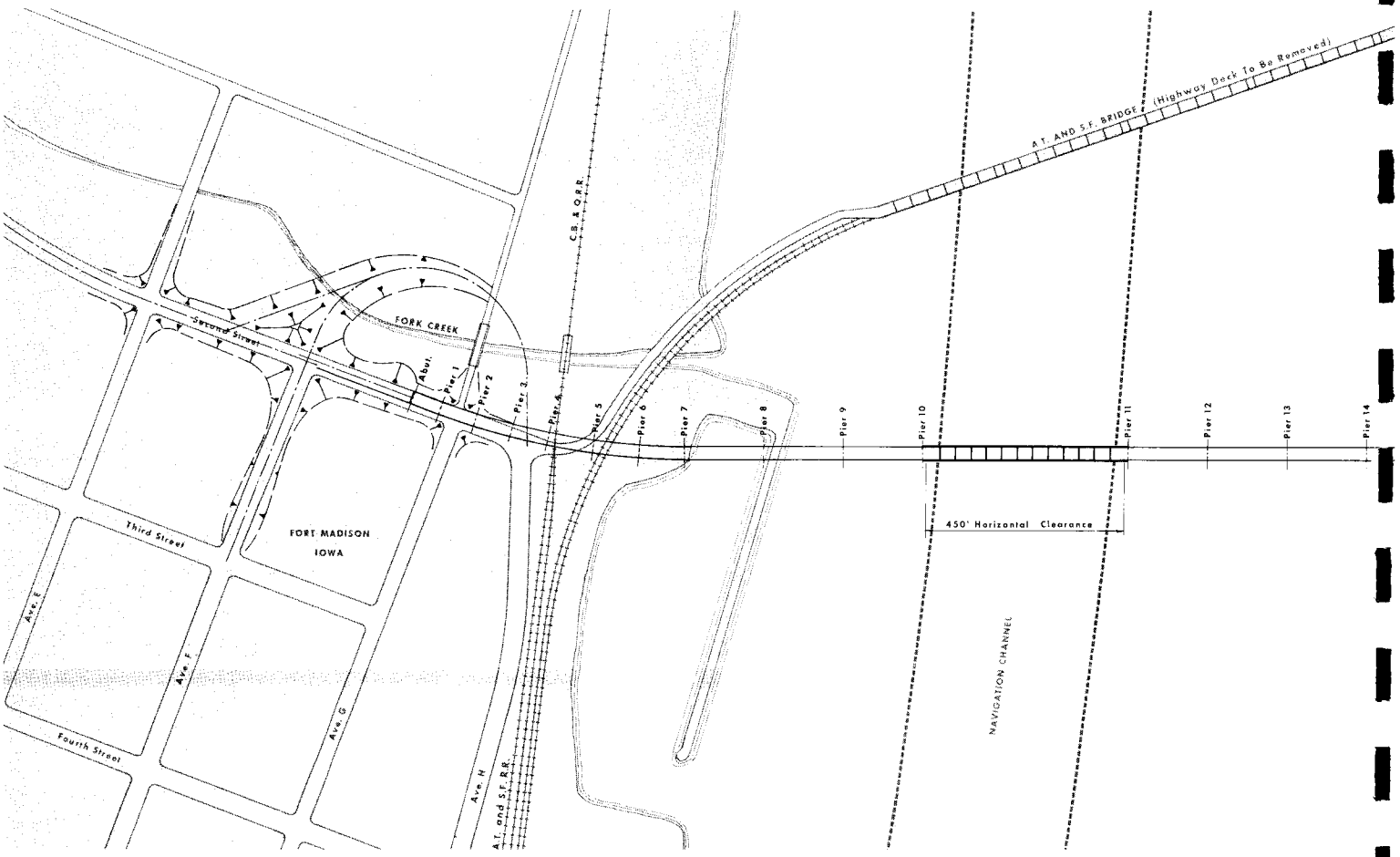
A typical toll booth installation is shown on Exhibit I-6. The exact location of this facility on the bridge approach will be established during subsequent study phases.

Prior to preparation of final design plans, additional engineering studies will be required. A complete subsurface investigation will be necessary to provide a firm basis for the determination of substructure type, substructure design and economical comparisons of several types of construction.

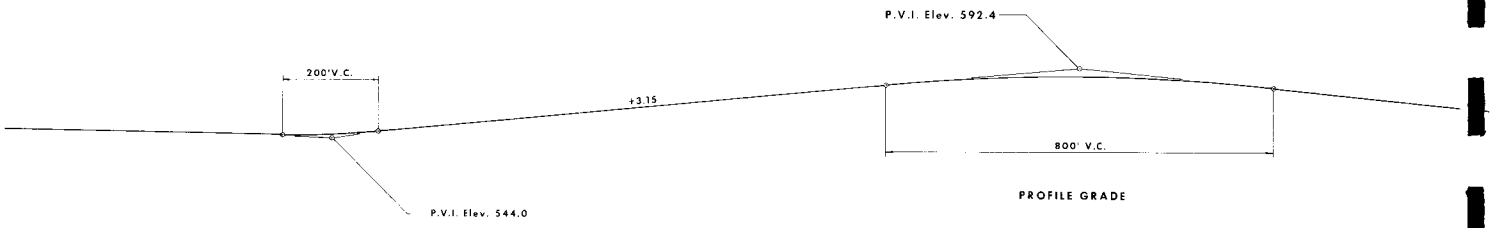
The total project cost does not include any allowance for acquisition of any franchise rights or property now vested in the private toll bridge company.

Second Street Alternate A

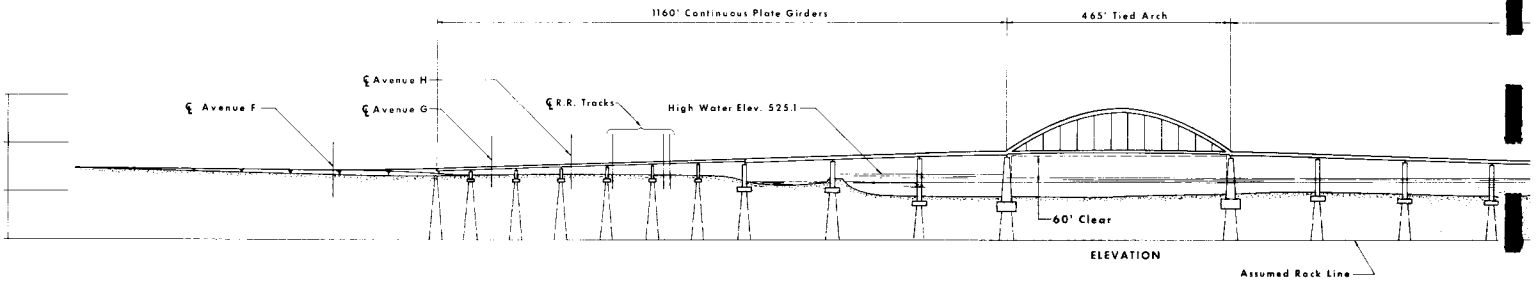
A plan, elevation and typical section for the main channel span of the Second Street Alternate A Mississippi River crossing is shown on Exhibit I-7. The 32 foot roadway width provides 4 feet 6 inches of lateral clearance between the right hand edge of a typical 12 foot traffic lane and the barrier rail. This clearance from the normal edge of the lane conforms to the modern safety requirements of the American Association of State Highway Officials and the Bureau of Public Roads. There would



PLAN



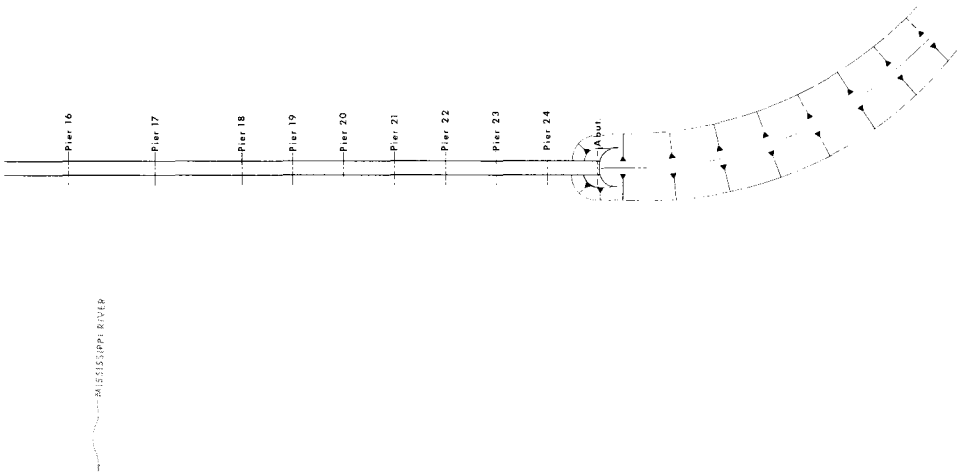
PROFILE GRADE

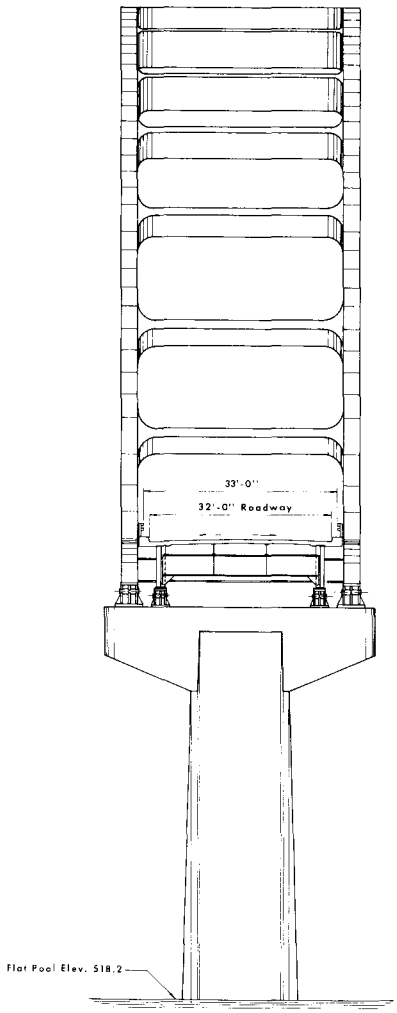


ELEVATION

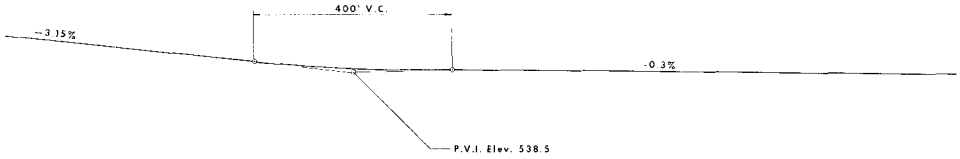
100 0 100 200 300 400

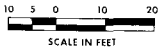
SCALE IN FEET





SECTION THRU PLATE GIRDER
SPAN NEAR CHANNEL PIER





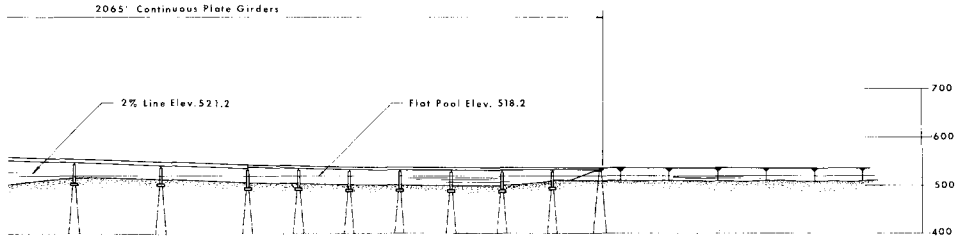


Exhibit I-7

SECOND STREET ALTERNATE A LOCATION

GENERAL PLAN AND ELEVATION

TABLE I-1

ESTIMATE OF BRIDGE CONSTRUCTION COST

SECOND STREET ALTERNATE A

Fort Madison, Iowa, Bridge

Continuous Girder Spans	1,160 ft.
Box Girder Tied Arch Span	465 ft.
Continuous Girder Spans	2,065 ft.
	3,690 ft.

Roadway Width - 32' - 0" Curb-to-Curb

ITEM	QUANTITY	UNIT PRICE	COST
Superstructure:			
Bridge Railing	7,420 L.F.	$12.00	$ 89,000
Concrete	3,440 C.Y.	90.00	309,600
Reinforcing Steel	1,030,000 Lbs.	0.14	144,200
Tied Arch Steel A-36	950,000 Lbs.	0.34	323,000
Tied Arch Steel A-441	1,050,000 Lbs.	0.38	399,000
Girder Steel A-36	1,329,000 Lbs.	0.29	385,400
Girder Steel A-441	2,209,000 Lbs.	0.32	706,900
Cast Steel and Misc. Metal	135,000 Lbs.	0.70	94,500
Navigation Lighting	—	Lump Sum	20,000
	SUBTOTAL		$2,471,600
Substructure:			
Concrete	7,000 C.Y.	$65.00	$ 455,000
Reinforcing Steel	708,000 Lbs.	0.14	99,100
Steel Bearing Piles (12BP53)	26,500 L.F.	8.00	212,000
Steel Pile Cofferdams	35,000 S.F.	5.00	175,000
Excavation	7,230 C.Y.	10.00	72,300
	SUBTOTAL		$1,013,400
	TOTAL BRIDGE COST		$3,485,000

Operation and Maintenance

The estimate of first year expenses for operation and maintenance for the Alternate A location is shown in Table I-3. Inasmuch as operation of the bridge by the Iowa State Highway Commission will be somewhat different than that of a private operator, several cost assumptions have been made: (1) No per diem for commissioners or pro rata cost for central administration by the Iowa State Highway Commission; (2) the nominal administration duties performed by the toll sergeant will require no separate administration facilities; and (3) employee fringe benefits will be similar to existing private operation. Since the proposed bridge will be owned by a public agency, it has been assumed that it will not be subject to property or other local taxes.

TABLE I-2

SUMMARY OF ESTIMATED PROJECT COSTS

Fort Madison, Iowa, Bridges

	SECOND STREET ALTERNATE A		FIFTEENTH STREET ALTERNATE B	
	Iowa	Illinois	Iowa	Illinois
Roadway	$ 386,200	$ 265,000	$ 201,000	$ 613,800
Structures	3,485,000	—	3,885,000	—
Retaining Walls	20,000	—	30,000	—
Subtotal	3,891,200	265,000	4,116,000	613,800
Toll Booth Complex	85,000	—	85,000	—
Engineering and Contingencies	795,200	53,000	840,000	122,800
Total Construction	4,771,400	318,000	5,041,000	736,600
Right-of-Way	310,400	—	62,600	5,400
Acquisitions and Contingencies	60,000	—	12,000	1,000
Administration and Legal	30,200	—	5,900	500
Total	$ 5,172,000*	$ 318,000	$ 5,121,500*	$ 743,500
Total Project Cost	$ 5,490,000		$ 5,865,000	

* Iowa costs include all costs of the river structure up to and including the south abutment.

TABLE I-3

ESTIMATE OF FIRST YEAR EXPENSES
FOR
OPERATION AND MAINTENANCE

Fort Madison, Iowa, Bridge

ADMINISTRATION		
Toll Sergeant	$ 6,600	
Travel and Car Expense	1,000	
Consulting Engineers	3,600	
Miscellaneous	800	
Total Administration		$12,000
OPERATION		
Toll Collectors	$24,000	
Utilities	2,000	
Supplies and Postage	2,000	
Employee Benefits	3,000	
Total Operation		$31,000
REPAIRS AND MAINTENANCE*		5,000
INSURANCE		6,000
MAINTENANCE RESERVE		6,000
Total Operation and Maintenance		$60,000

* By District maintenance forces on force account cost basis.

PART II

ESTIMATED PRELIMINARY TRAFFIC AND REVENUES AND PROJECT FEASIBILITY

INTRODUCTION

A general economic evaluation was made of the area now served by the present Fort Madison Bridge, as a guide in projecting future traffic growth. Route reconnaissance investigations were conducted to inventory present traffic facilities and to determine average operating speeds and other traffic service characteristics. All available trans-river travel pattern and traffic trend data for the present bridge, the MacArthur Bridge in Burlington to the north and for the Keokuk Municipal Bridge to the south, were assembled and reviewed.

Using the travel pattern information, travel speed and route inventory data and empirical diversion curves developed from studies of similar facilities, traffic assignments were made assuming replacement of the present Fort Madison highway crossing with a new, modern toll crossing. Preliminary assignments were made at several toll rates to determine the rate structure which would optimize toll revenues while still providing a high level of traffic service in the travel corridor.

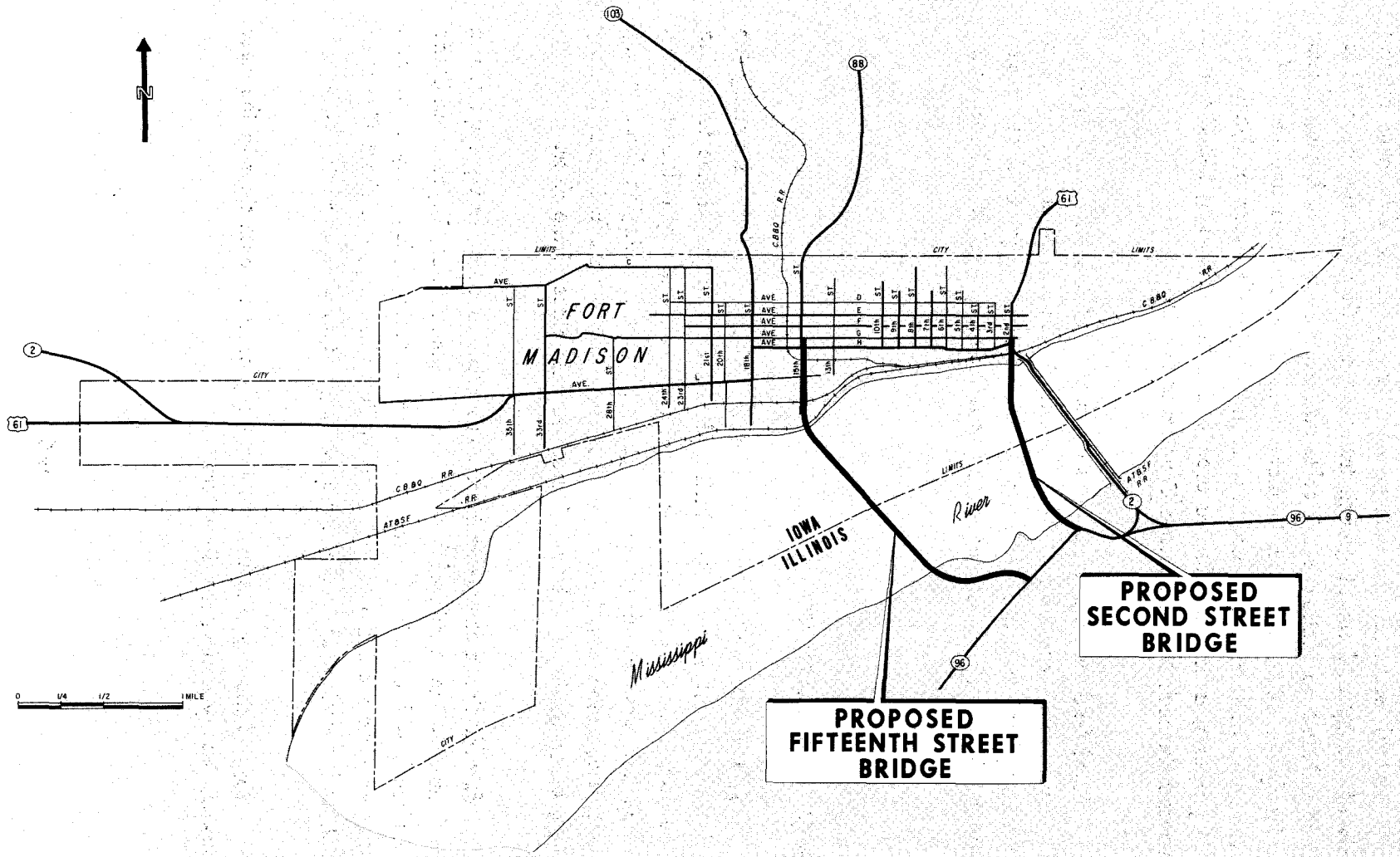
Annual estimates of preliminary toll revenues were then developed based on the economic and traffic trend studies and forecasts of future growth in the area. Using the project cost and annual maintenance and operating expense estimates developed by Howard, Needles, Tammen & Bergendoff, a preliminary indication of project feasibility was determined.

Proposed Fort Madison Bridge

The proposed Fort Madison Bridge would be constructed as a modern, two-lane facility with minimum approach grades and adequate lane widths.

The bridge would have a 32-foot curb-to-curb roadway section to enable smooth, efficient and safe passage for all vehicle types. The proposed crossing would operate as a toll bridge.

Several alternative bridge alignments were given preliminary study. The two alignments which produced the highest level of traffic service and revenues commensurate with the most economical development costs were selected for more detailed study and are illustrated in Exhibit II-1. One alternate crossing would connect with Second Street in Fort Madison and the other with Fifteenth Street.



LOCATION MAP

Wilbur Smith and Associates

EXHIBIT II-1

AREA GROWTH ANALYSES

Several economic parameters were evaluated to determine relative levels of activity and recent growth trends in the Fort Madison area. These indices included population, retail sales and average effective buying income per family. In addition, trends in motor vehicle registrations and motor fuel consumption, both excellent measures of travel growth, were analyzed. For study purposes, a bridge influence area was defined including Lee County in Iowa and Hancock and Henderson Counties in Illinois.

Local field reconnaissance was conducted in the bridge study area and contact made with various officials and others to obtain information regarding trends and characteristics of land use and economic activity. Available current data and forecasts for the bridge study area were assembled and reviewed.

Study Area Characteristics

Fort Madison, the county seat of Lee County, is located among the bluffs on the west side of the Mississippi River. Development has taken the linear form typical of many cities along the river. The city is located about halfway between Keokuk (about the same size) and Burlington (substantially larger). It competes with both its neighboring cities for trade in the tributary region, encompassing a substantial area on both sides of the river.

Fort Madison's employment profile reveals a relatively heavy emphasis on manufacturing. The divisional headquarters of the Atchison, Topeka and Santa Fe Railroad, with associated terminal and repair facilities, is an important local employer. Others are the W. A. Shaeffer Pen Company, a DuPont Company plant, and a variety of smaller metalworking, paper and chemical plants.

Beyond the city, the bulk of the study area on both sides of the river is predominantly agricultural in nature.

Population Trends

A 1960 population of 15,247 placed Fort Madison as the second largest city in the study area, behind Keokuk with 16,316 persons. These two cities were much larger than any other communities in the study area. As shown in Table II-1, Carthage, Illinois, with a 1960 population of 3,325, was the third largest community in the area, followed by La Harpe, Dallas City and Nauvoo with populations ranging between 1,322 and 1,039.

Study area communities recorded little population change between 1950 and 1960. Lee County, Iowa recorded a slight increase in population over the 16-year period 1950-1966. However, this was offset by a decrease in population in the Illinois portion of the study area. The total study area recorded a slight decline in population between 1950 and 1966, with average annual decreases of 0.1 and 1.5 per cent between 1950-1960 and 1960-1966. The 1966 study area population was estimated at 70,000.

Statewide trends in Iowa and Illinois and the national trend reflected increases in population between 1950 and 1966. During the last five years, the population of Iowa increased an average of 0.3 per cent annually, the Illinois growth was 1.1 per cent and the national increase was 1.6 per cent.

Trends in Retail Sales

Retail sales in the three-county study area increased from $73,396,000 in 1956 to $115,537,000 in 1966, an average annual growth of 2.0 per cent between 1956 and 1961 and 7.3 per cent between 1961 and 1966. During the past five years, the study area growth was substantially higher than growths realized statewide in Iowa and Illinois and in the national trend.

Average Effective Buying Income Per Family Trends

Between 1956 and 1966, effective buying income of the average study area family increased more rapidly than the statewide averages for Iowa,

TABLE II-1

POPULATION TRENDS

AREA	1950	AVERAGE ANNUAL PER CENT CHARGE	1960	AVERAGE ANNUAL PER CENT CHARGE	1966
Municipalities:					
Carthage	3,214	—	3,225	—	N.A.
Dallas City	1,275	0	1,276	—	N.A.
Donnellson	589	1.9	709	—	N.A.
Fort Madison	14,954	0.2	15,247	—	N.A.
Keokuk	16,144	0.1	16,316	–1.5	14,700
La Harpe	1,295	0.2	1,322	—	N.A.
Montrose	643	–0.2	632	—	N.A.
Nauvoo	1,242	–1.5	1,039	—	N.A.
Niota	N.A.	—	N.A.	—	N.A.
Pontoosuc	214	–0.2	210	—	N.A.
West Point	662	1.4	758	2.5	882
Counties:					
Lee	43,102	0.3	44,207	0.1	44,800
Hancock	25,790	–0.5	24,574	–0.2	24,200
Henderson	8,416	–0.2	8,237	–2.4	7,000
Three-County Total	77,308	–0.1	77,018	–1.5	70,000
States:					
Illinois	8,712,176	1.5	10,081,158	1.1	10,775,300
Iowa	2,621,073	0.5	2,757,537	0.3	2,813,600
United States[1]	150,697,361	1.7	178,464,236	1.6	196,208,200

[1] Does not include Alaska and Hawaii.

N.A. Not Available.

SOURCE: U. S. Department of Commerce, Bureau of the Census; Sales Management, "Survey of Buying Power".

Illinois and the average for the nation. Between 1956 and 1961, study area incomes increased an average of 3.3 per cent annually, accelerating to 6.8 per cent between 1961 and 1966. The average growth over the last five years was higher than that recorded in Illinois and for the nation but slightly less than the average for Iowa.

In 1966, the average family income in the three-county study area was $7,641, considerably below the Illinois and Iowa averages of $9,998 and $8416, respectively. The national average was $8,522.

Trends in Motor Vehicle Registration

In 1956, motor vehicle registrations in the three-county study area totaled 34,248. By 1966, registrations had increased to 43,731. This represented average annual growths of 1.5 per cent between 1956 and 1961 and 3.4 per cent between 1961 and 1966. The study area's growth pattern generally followed the statewide trends in Iowa and Illinois and the growth pattern experienced nationally.

Motor Fuel Consumption Trends

Reflecting the increases in personal income and motor vehicle registrations over the last decade, personal travel, as measured by motor fuel consumption, has also increased. Motor fuel consumption in Iowa increased an average of 2.0 per cent per year between 1956-1961. This growth accelerated to an average annual rate of 2.5 per cent between 1961-1966. During the same periods, motor fuel consumption in Illinois increased an average of 2.4 per cent and 3.6 per cent annually, respectively. The national growth trend was somewhat higher.

Future Growth

Population projections for the bridge study area indicate a continuation of the generally-stable population trends experienced in recent years. As shown in Table II-2, it is estimated that the three-county study area's 1960 population of 77,018 will increase to 83,800 by 1980, an average annual increase of 0.4 per cent. By comparison, average annual increases of 0.8 per cent for Iowa and 1.4 per cent for Illinois are envisioned for the same projection period.

TABLE II-2

POPULATION PROJECTIONS

AREA	1960	AVERAGE ANNUAL PER CENT CHANGE	1980
Municipalities:			
Fort Madison	15,247	0.1	15,575
Keokuk	16,316	0.1	16,367
Montrose	632	0.3	597
West Point	758	1.1	947
Counties:			
Lee	44,207	0.2	45,700
Hancock	24,574	0.7	28,450
Henderson	8,237	0.8	9,650
Three-County Total	77,018	0.4	83,800
States:			
Illinois	10,081,158	1.4	13,337,150
Iowa	2,757,537	0.8	3,192,000

SOURCE: Iowa State Highway Commission, Division of Planning; Illinois Department of Business and Economic Development.

As leisure time and general prosperity increase, recreational travel will become a more important component of total future trip-making. State parks and state forests are located on both sides of the river in or adjacent to the study area. These include Nauvoo and Argyle Lake State Parks in Illinois as well as Geode State Park and Shimek State Forest in Iowa. Pleasure driving and recreational travel is also expected to increase in importance as additional recreational facilities are developed, such as the "Great River Road" project on both sides of the river. These factors can be expected to encourage trans-river recreational movements potential to the proposed Fort Madison Bridge.

TRAFFIC STUDIES

Preliminary studies were made to evaluate the traffic potential of the proposed Fort Madison Bridge. These studies included route reconnaissance investigations to evaluate the quality of traffic service provided by alternative trans-river crossings as well as assembly and analysis of data relating to the magnitude and composition of traffic and present trans-river travel patterns.

Route Reconnaissance

Iowa Route 2 approaches Fort Madison from the west. Beyond the Des Moines River, near the Lee County line, it continues westward as an important cross-state highway in Iowa's southern tier of counties. Pavement width on Iowa Route 2 varies from 18 to 20 feet through Lee County. That portion of the highway west of U. S. Route 218 carries an "excellent" sufficiency rating, while the section to the east is rated "critical" and is scheduled for early improvement. Iowa Route 16 provides traffic service across the northern portion of Lee County. It has a pavement width of 22 to 24 feet for most of its length and has a highway sufficiency rating varying from "tolerable" to "poor" for the portion east of Iowa Route 88.

U. S. Route 61 has a pavement width ranging from 20 to 24 feet as it passes through the study area. Its highway sufficiency rating is "critical". Iowa Route 88 has a 22-foot roadway between Fort Madison and its junction with Iowa Route 15 at Denmark and is rated as "good". Iowa Route 103 has a roadway section rated "critical" between Fort Madison and West Point, along a stretch of 18-foot pavement width. Continuing westward to its junction with U. S. Route 218, it has a 24-foot bituminous pavement and is rated "good". Illinois Routes 9, 94 and 96 all serve the study area and are two-lane paved roadways. Posted speed limits in the bridge study area range downward from the daytime limit of 70 miles per hour for automobiles on principal Iowa routes, to less than 30 miles per hour in built-up areas. Speed and delay surveys revealed generally good travel conditions with no difficulty in maintaining speeds close to the posted limits.

Present Traffic Volumes

The importance of study area highways in terms of relative traffic volumes, is depicted in Exhibit II-2. Iowa Route 2 is the principal traffic artery in the east-west corridor through the study area. On the Illinois side, Illinois Routes 9 and 96 carry approximately equal traffic volumes. U. S. Route 61 in Iowa, accommodates substantially more north-south oriented traffic than does U. S. Route 218 or Illinois Routes 94 and 96

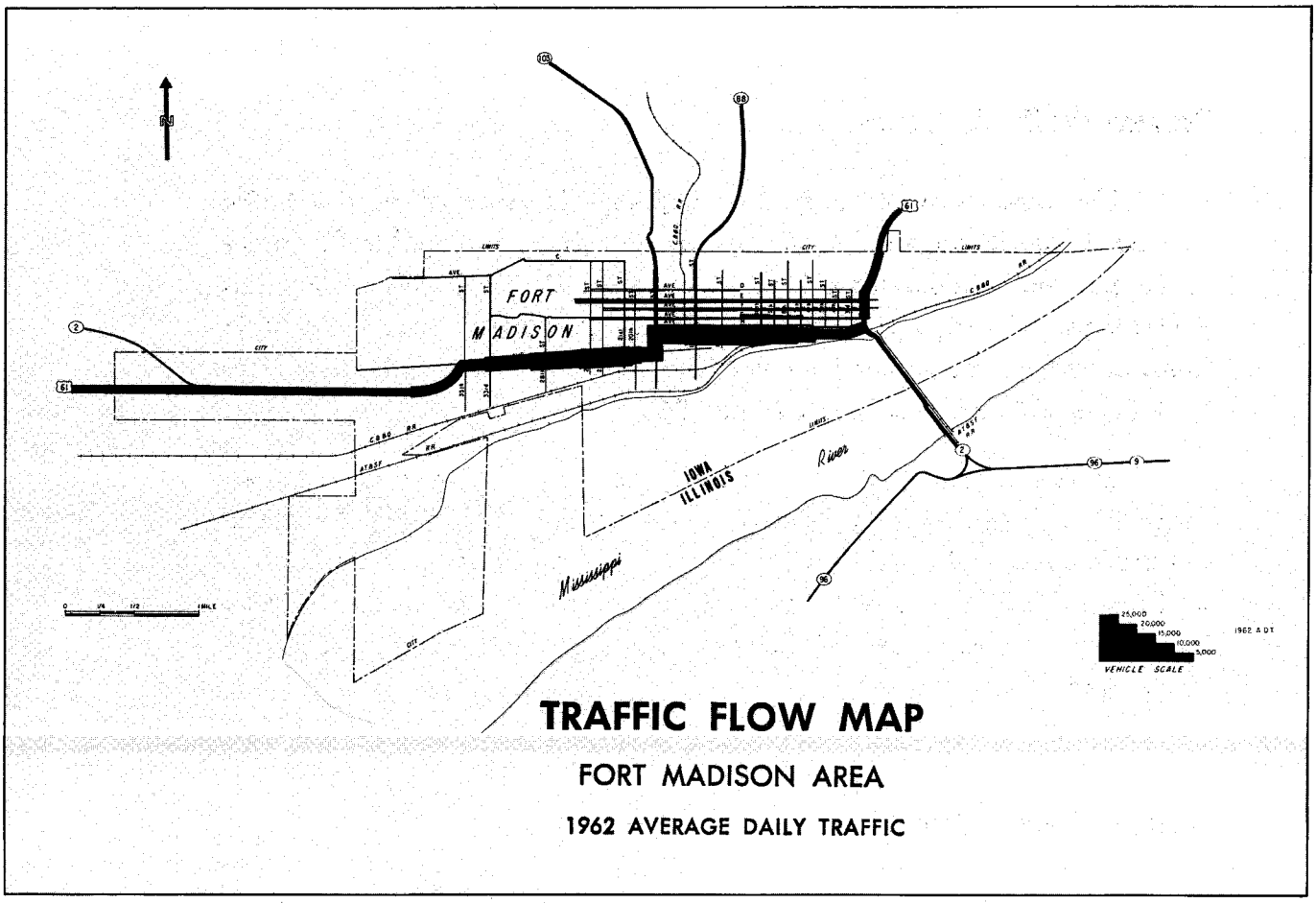
In Fort Madison, the combined alignment of U.S. Route 61 and Iowa Route 2, as illustrated in Exhibit II-2, serves as the principal travel route in the urban area. Traffic volumes on the route at the city limits range between 4,000 and 5,000 vehicles per day; near the center of the city, traffic volumes double. Iowa Routes 88 and 103 carry relatively light traffic to and through the urban area.

Annual Traffic Trends

Annual traffic and revenue trends for the present Fort Madison Bridge were assembled and reviewed. In addition, annual use of the closest alternative crossings—the MacArthur Bridge at Burlington and the Keokuk Municipal Bridge —were also reviewed and evaluated.

Fort Madison Bridge — A total of 815,239 vehicles used the bridge at Fort Madison during 1967, an average daily traffic volume of 2,235 vehicles. As shown in Table II-3, this represented an average annual growth of 3.3 per cent over the 1,960 vehicles per day recorded in 1963. Revenues during this same period increased at an average annual rate of 3.9 per cent, totaling $253,641 in 1967.

Keokuk Bridge — Average daily traffic on the Keokuk Bridge has increased from 3,800 vehicles per day in 1956 to 5,400 in 1966, an average annual increase of 3.6 per cent. As indicated in Table II-4, an even higher traffic growth was recorded over the past four years, averaging 4.7 per cent per year.



TRAFFIC FLOW MAP

FORT MADISON AREA

1962 AVERAGE DAILY TRAFFIC

REGIONAL TRAFFIC FLOW MAP

1965 AVERAGE DAILY TRAFFIC

TABLE II-3

ANNUAL TRAFFIC AND REVENUE TRENDS

Fort Madison Bridge

YEAR	TRAFFIC Annual	TRAFFIC Daily	PER CENT CHANGE	ANNUAL REVENUE	PER CENT CHANGE
1963	714,800	1,960		$217,635	
			-1.0		-7.2
1964	706,290	1,930		202,067	
			21.2		31.9
1965[1]	872,017	2,390		277,152	
			-15.3		-17.4
1966	748,981	2,050		233,029	
			8.5		8.5
1967	815,239	2,235		253,641	
Average Annual Per Cent Change					
1963-1967			3.3		3.9

[1] The flood of April-May, 1965, closed the Mississippi River bridges at Burlington, Muscatine, and Quad Cities.

SOURCE: Atchison, Topeka, and Santa Fe Railway Company.

Burlington Bridge — The MacArthur Bridge in Burlington accommodated an average of 3,600 vehicles per day in 1956. By 1966, this had increased to 5,600, an average annual growth of 4.5 per cent. Table II-4 indicates that the average annual growth over the past four years was 4.2 per cent.

TABLE II-4

ANNUAL TRAFFIC TRENDS

Alternative River Crossings

YEAR	KEOKUK BRIDGE	MACARTHUR BRIDGE
	(Annual Average Daily Traffic)	
1956	3,800	3,600
1959	4,300	4,200
1962	4,500	4,750
1965[1]	5,100	5,100
1966	5,400	5,600
Average Annual Per Cent Change		
1956-1966	3.6	4.5
1962-1966	4.7	4.2

[1] The flood of April-May, 1965, closed the Mississippi River bridges at Burlington, Muscatine and Quad Cities.

SOURCE: Illinois Division of Highways.

Monthly Traffic Variations

Monthly traffic variations on the Fort Madison Bridge have remained relatively stable over the past several years. Traffic is at minimum levels during the winter months, close to average monthly levels during spring and fall and reaches a peak in the summer. In 1967, monthly variations ranged from 30 per cent below average in February to 19 per cent above in July.

Origin and Destination Studies

During the month of August, 1962, the Iowa State Highway Commission conducted an origin and destination traffic survey in Fort Madison. As part of this survey, roadside interviews were conducted on typical summer weekdays with motorists using the Fort Madison Bridge. Information from this survey formed the basis for the travel patterns used in this study.

Vehicle Classification Counts

A summary of recent vehicle classification counts at the Fort Madison Bridge, made by the Iowa State Highway Commission, is shown in Table II-5. Seventy-eight per cent of all vehicles using the bridge were passenger cars with both cars and two-axle trucks combining to account for almost 96 per cent of total traffic. In the heavy truck categories, the distribution by number of vehicle axles was relatively uniform.

TABLE II-5

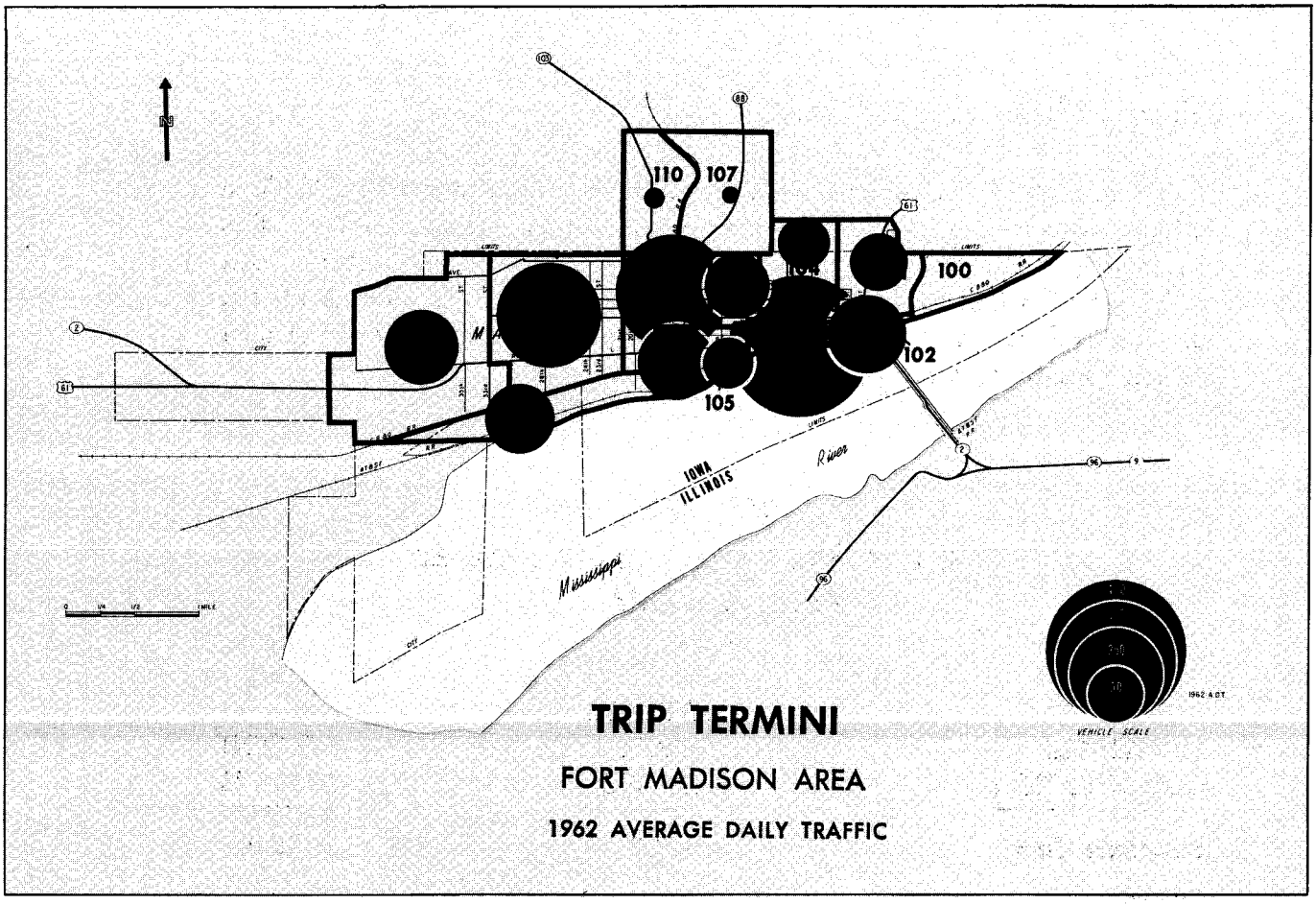
VEHICLE CLASSIFICATION COUNT SUMMARY
Fort Madison Bridge
1965

VEHICLE CLASSIFICATION	AVERAGE DAILY TRAFFIC	PER CENT OF TOTAL
Passenger Cars	1,957	78.0
Trucks:		
Two-Axle	450	17.9
Three-Axle	33	1.3
Four-Axle	31	1.2
Five-Axle	39	1.6
TOTAL	2,510	100.0

SOURCE: Iowa State Highway Commission.

Travel Desires

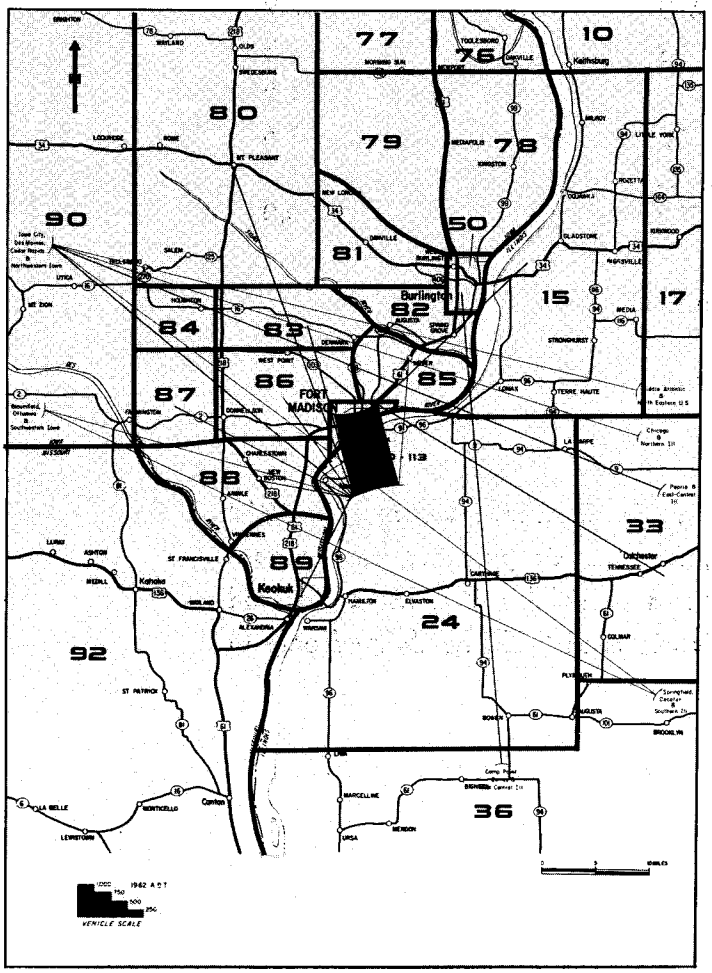
The traffic movements crossing the Fort Madison Bridge during the 1962 origin and destination survey were coded, for analysis purposes, to the geographic traffic zone pattern partially shown in Exhibit II-3. More detailed zoning was available in Iowa while Illinois trip ends could be defined only to



TRIP TERMINI

FORT MADISON AREA

1962 AVERAGE DAILY TRAFFIC



TRAVEL DESIRES

PRESENT FORT MADISON BRIDGE

1962 AVERAGE DAILY TRAFFIC

a county level. The resulting zone-to-zone travel movements were then adjusted to represent an average day in 1962 and the travel desire lines, also shown in Exhibit II-3, prepared. The widths of the traffic flow bands illustrated are proportional to the number of trips between each zone pair.

The bulk of the traffic found using the Fort Madison Bridge was local in nature, representing trips moving between the Fort Madison urban area and Hancock County in Illinois. Remaining trip movements were well dispersed with no one desire significantly higher than the others.

Exhibit II-3 also shows the relative importance, in terms of trans-river trip generation and attraction, of the various traffic zones delineated in the Fort Madison urban area. The area of the circles is proportional to the number of trips originating in or destined for each zone. The largest generator or attractor of trans-river trips was the Central Business District, approximately 400 trips per day. Adjacent zones to the west, along the alignment of U. S. Route 61—Iowa Route 2 as it passes through the city, were also important trip termini.

Typical Time and Distance Relationships

Representative time and distance relationships for several movements which could use either the proposed Fort Madison Bridge or the closest crossings to the north and south, are shown in Table II-6. The travel distances and times indicated were developed from the route reconnaissance studies conducted on pertinent roadways in the study area. The driving times shown represent average speeds rather than the fastest driving time that could be achieved between the various trip termini indicated.

Between Fort Madison and Carthage, a routing via the proposed Fort Madison Bridge would save about 14 miles and 20 minutes as compared to a routing via the Keokuk Bridge. Between Fort Madison and Galesburg, a routing via the Fort Madison Bridge would be about 14 miles and 20 minutes longer than a trip routing via the MacArthur Bridge at Burlington. Between Fort Madison and Macomb, use of the Fort Madison Bridge would be 19 miles and

TABLE II-6

TYPICAL TIME-DISTANCE RELATIONSHIPS

BETWEEN	VIA	DISTANCE (Miles)	TIME (Min.)	AVERAGE SPEED (MPH)	SAVINGS VIA PROPOSED FORT MADISON BRIDGE (Miles)	SAVINGS VIA PROPOSED FORT MADISON BRIDGE (Min.)
Fort Madison and Carthage	Proposed Fort Madison Bridge	24	32	45		
					14	20
	Keokuk Bridge	38	52	44		
Fort Madison and Galesburg	Proposed Fort Madison Bridge	79	96	49		
					–14	–20
	MacArthur Bridge	65	76	51		
Fort Madison and Macomb	Proposed Fort Madison Bridge	45	51	42		
					19	31
	Keokuk Bridge	64	82	46		
Bloomfield and Camp Point	Proposed Fort Madison Bridge	126	164	46		
					–4	–5
	Keokuk Bridge	122	159	48		

31 minutes shorter than a trip via the Keokuk crossing. On a trip between Bloomfield and Camp Point, a routing via the Fort Madison Bridge would be four miles and five minutes longer than a trip made by way of Keokuk.

For most of the relatively short, local trips between the Fort Madison area and nearby communities in northern Hancock County, no reasonable alternative river crossings exist, since trip routings via the closest crossings, at Burlington and Keokuk, would be several times longer in both time and distance than a routing using the present crossing or the proposed Fort Madison Bridge. The time-distance relationships shown in Table II-6 indicate movements for which alternative routings would be reasonably competitive.

ESTIMATED TRAFFIC AND REVENUES

Estimated traffic and revenues for the proposed Fort Madison Bridge are based upon the number of motorists now using the present Fort Madison Bridge who would continue to make trans-river trips via an improved facility under revised toll conditions. In addition, possible diversion of some motorists to the new bridge from the closest alternative crossings to the north and south as well as possible diversion from the present Fort Madison Bridge to the alternate crossings, was studied.

Basic Assumptions

Estimates of traffic and revenues for the proposed Fort Madison Bridge are predicated on the following assumptions:

1. The facility will be opened to traffic on July 1, 1971.
2. The bridge and approaches will be constructed on one of the alignments discussed in this report.
3. The recommended toll schedule will be implemented.
4. The present Fort Madison Bridge will be closed to highway traffic upon opening of the new facility.
5. No other new river crossings will be constructed or provided in the reach of the Mississippi River between Keokuk and Burlington.
6. The new bridge will be adequately maintained, efficiently operated and effectively signed to encourage maximum usage.
7. The present general trend in economic activity in the bridge study area will continue and no national emergency will arise which would abnormally restrict the use of motor vehicles.

Any departure from the above conditions could materially affect estimated traffic and revenues for the proposed bridge.

Recommended Method of Toll Collection

It is recommended that tolls be collected from all motorists using the proposed bridge at a toll plaza located on or near the western approach of the facility. Initially, toll collection could be accomplished from a single toll booth designed for use by two attendants, one collecting from each direction of travel. However, more detailed studies may indicate that a multi-lane plaza should be constructed with possible provision for automatic as well as attended toll lanes.

Recommended Toll Schedule

Several toll rates were analyzed to determine an optimum toll structure for the proposed Fort Madison Bridge. These studies indicated that the preliminary toll schedule shown in Table II-7 would produce maximum revenues for the proposed facility while still maintaining a reasonable level of traffic service. A higher toll would tend to discourage usage and would also place an unreasonable financial burden on those persons dependent on the facility for work trips or other necessary trans-river movements. As indicated previously, a high percentage of local traffic now crossing at Fort Madison has no real alternative trans-river travel route. Conversely, a lower toll would tend to increase usage, but not sufficiently to produce higher toll revenues than those projected.

TABLE II-7

RECOMMENDED TOLL SCHEDULE

VEHICLE CLASS	DESCRIPTION	TOLL
1	Two-Axle vehicles	$0.40
2	Three-Axle vehicles and vehicle combinations	0.60
3	Four-Axle vehicles and vehicle combinations	0.80
4	Five-Axle vehicles and vehicle combinations	1.00
	Each additional axle	0.20

Under the recommended toll schedule, drivers of two-axle vehicles would pay a cash toll of $0.40 for each crossing. Larger vehicles would be charged a toll based on a rate of $0.20 per axle. For example, three-axle vehicles and vehicle combinations would pay a $0.60 toll while four-axle vehicles and vehicle combinations would pay a toll of $0.80. The recommended per-axle toll would provide maximum control and auditing benefits as well as being easily understood by bridge users.

Estimated Base Year (1966) Traffic Assignments

The number of motorists that would use the proposed Fort Madison Bridge at base year (1966) traffic levels was estimated based upon relative trip costs via the closest river crossings to the north and south versus the proposed new facility.

Previous studies indicate a good correlation between the ratio of road-user costs and the proportion of vehicles that will use alternative routes available. In general, equal costs for alternate routes indicate an equal division of a traffic movement. A high ratio of trip costs for use of a new bridge to costs via the most competitive routing, indicates a lower percentage of traffic is assignable to the proposed facility. Conversely, a low ratio of road-user costs via the new facility to cost via the most competitive alternative routing, indicates that a high percentage of traffic is divertible.

The route reconnaissance studies made during the field phases of this project were used as the basis for assigning trip times and distances via alternative crossings. In addition to mileage and time costs, tolls were also added to arrive at total estimated trip costs.

The travel patterns determined from the origin and destination studies conducted in 1962 by the Iowa State Highway Commission were used to determine a redistribution of trans-river trips, assuming the proposed Fort Madison Bridge was constructed. Since bridge traffic levels in 1966 were almost identical to those recorded in 1962, 1966 was considered as the base year for traffic

assignment purposes. Although the pattern of trans-river trip movements may have changed somewhat between 1962 and 1966, it does not appear that any changes that may have occurred would significantly affect assignments to the proposed bridge.

Since the recommended toll for the proposed facility is somewhat higher than that in effect on the existing Fort Madison Bridge, it was estimated that some motorists would divert to the Burlington and Keokuk bridges. In addition, the higher toll is expected to result in a decrease in overall trip production through some "car-pooling" of work trips and fewer trans-river shopping and social trips. A determination of the magnitude of this decrease in travel due to toll impact was based on trip purpose data obtained from the Comprehensive Study surveys conducted in Fort Madison and on experience on comparable facilities elsewhere.

As shown in Table II-8, an estimated 1,709 vehicles, at 1966 traffic levels, were assigned to the proposed Fort Madison Bridge at the recommend toll rate. Of this total, 1,636, or 96 per cent, are expected to be two-axle passenger cars and light trucks. An additional 23—three-axle vehicles and vehicle combinations, 22—four-axle vehicles and 28—five-or-more axle vehicles were assigned.

TABLE II-8

ESTIMATED BASE-YEAR (1966) DIVERTED TRAFFIC

VEHICLE TOLL CLASS	DESCRIPTION	AVERAGE DAILY TRAFFIC
1	Two-Axle vehicles	1,636
2	Three-Axle vehicles and vehicle combinations	23
3	Four-Axle vehicles and vehicle combinations	22
4	Five-or-more Axle vehicles and vehicle combinations	28
	TOTAL	1,709

The bridge assignment does not reflect any diversion of motorists to the new crossing from the present bridges at Keokuk and Burlington due to the distance from these crossings to Fort Madison and the higher toll recommended for the new bridge. The MacArthur Bridge in Burlington and the Keokuk crossing both provide a reasonable level of traffic service, with no weight limitations.

Several alternative bridge alignments in the vicinity of Fort Madison were considered during the course of the preliminary studies and two alignments, on Second Street and Fifteenth Street, were selected for further study. Preliminary assignments to both alignments indicated that the relationship between the distance of the two alternates, when compared to the closest crossings to the north and south, was such that no differential assignments would result. Therefore, for purposes of this preliminary study, the Second Street and Fifteenth Street alternates would carry approximately the same level of traffic.

However, the analysis showed that the Fifteenth Street alignment would provide some slight traffic advantages over the Second Street alignment due to fewer vehicle-miles of travel and resulting costs incurred on city streets in Fort Madison. The degree to which one or the other alternate bridge location minimizes total approach road travel required of bridge users could be an important factor in selection of a bridge location. Travel is a direct cost to motorists both in terms of distance and travel time. Additional travel also contributes to congestion on city streets which might otherwise be eliminated.

It is estimated, based on the location of the various trans-river travel generators in Fort Madison, that approximately 3,900 vehicle-miles of daily travel at 1966 levels would be associated with a bridgehead located at Second Street, as compared with an estimated 3,300 vehicle-miles for the Fifteenth Street alignment. Converting the difference in travel to monies would result in a savings of about $31,000, at 1966 levels, in travel time and distance, assuming the Fifteenth Street alignment were selected. Annual savings would, of course, escalate upward once the bridge were placed in operation and anticipated annual traffic growths occur.

Estimated Annual Traffic and Toll Revenues

Annual growth in usage of the proposed Fort Madison Bridge was estimated based upon normal increases in trans-river traffic which might be anticipated over the next several years in the bridge travel corridor, and also on generated and development traffic. Generated traffic would consist of additional trips made by motorists now moving in the bridge travel corridor, solely due to the convenience and attractiveness of the new facility. Development traffic would occur from growths in residential, commercial and industrial activity resulting from the location and access advantages afforded by and directly attributed to the proposed bridge.

Estimates of normal growth in the travel corridor were based upon trends in actual use of the present Fort Madison Bridge as well as at the alternative river bridges immediately to the north and south. In addition, trends and projected increases in population and other economic parameters in the bridge study area were considered.

It is estimated that a normal corridor traffic growth of 3.0 per cent per year will occur on the proposed Fort Madison Bridge between 1966 and 1975. This is estimated to decrease to 2.5 per cent annually between 1975 and 1980 and to 2.0 per cent annually thereafter through 1985. For purposes of conservatism, no normal traffic growth was projected beyond 1985, although some increase in usage is anticipated.

Estimated induced or generated and development growth was based on experience during the early years of operation of similar facilities and taking into consideration operating characteristics of the existing bridge as well as the development potential of the study area. The present Fort Madison Bridge, while having narrower lane widths and less desirable approaches than the proposed crossing, does provide a reasonable level of traffic service. Truck movements are not restricted by any reasonable weight or clearance limitations. However, the proposed bridge would be a high-level structure, eliminating the trans-river traffic service interruptions now resulting from passage of river traffic

due to opening of the swing-span on the present combination bridge. Therefore, a nominal traffic inducement of 3.0 per cent was estimated during the first full year of operation of the proposed crossing.

As shown in Table II-9, it is estimated that an average of 2,041 vehicles per day will use the proposed Fort Madison Bridge during its first full year of operation, the twelve-month period beginning July 1, 1971, producing gross toll revenues of $311,000. By the 15th year of operation, an estimated 2,869 vehicles per day will use the crossing, resulting in gross annual revenues of $437,000.

Average annual toll revenues for the first five years of operation are estimated at $330,000. Over the 28-year earning period of the assumed bond issue, average annual gross revenues of $404,000 are projected.

These estimates are preliminary and intended to show the earning trend over a period of years rather than the exact earnings for any particular year. There could, of course, be years in which growth in traffic and revenues might be higher or lower than indicated, depending upon economic conditions and other local factors that might affect bridge usage at that time.

TABLE II-9

ESTIMATED ANNUAL TRAFFIC AND REVENUES

FISCAL[1] YEAR	AVERAGE DAILY TRAFFIC	GROSS REVENUES
1971	2,041	$311,000
1972	2,102	320,000
1973	2,165	330,000
1974	2,230	340,000
1975	2,297	350,000
1976	2,354	359,000
1977	2,413	368,000
1978	2,473	377,000
1979	2,535	386,000
1980	2,598	396,000
1981	2,650	404,000
1982	2,703	412,000
1983	2,757	420,000
1984	2,813	429,000
1985	2,869	437,000
Next 13 years Annually	2,869	$437,000

AVERAGE ANNUAL REVENUES

First Five Years	$330,000
First Ten Years	$354,000
Twenty-Eight Years	$404,000

[1] Twelve-month period beginning July 1.

PRELIMINARY PROJECT FEASIBILITY

Net revenues derived from the proposed Fort Madison Bridge were determined by deducting estimated annual maintenance and operating costs, developed by Howard, Needles, Tammen & Bergendoff, from gross revenues anticipated from the project. Preliminary project feasibility computations were then made by relating estimated annual net revenues to the maximum interest and level debt service requirements of an assumed bond issue sufficient to meet estimated capital costs of the proposed bridge.

Estimated Annual Net Revenues

Estimated annual net revenues for the proposed Fort Madison Bridge are shown in Table II-10. In the first full year of operation, net revenues of $251,000 are estimated, increasing to $321,000 by 1985. Over the first five years of operation, average annual net revenues are estimated at $262,000. Average annual net revenues over the 28-year earning period of the assumed bond issue are estimated at $303,000.

Preliminary Project Feasibility

There are two "tests" which financial advisors usually employ to determine the relative range of feasibility of a toll project. The first is the coverage of first-year (maximum) interest by first-year net revenues. The second is the coverage of level debt service by average annual net revenues over the earning period of the assumed bond issue.

As a measure of feasibility, financial interests normally regard a first-year net revenue coverage of maximum interest of 1.20 to be satisfactory. An average annual net revenue coverage of level debt service in excess of 1.50 is usually considered indicative of financial feasibility.

TABLE II-10

ESTIMATED ANNUAL NET REVENUES

FISCAL YEAR[1]	GROSS REVENUES	MAINTENANCE AND[2] OPERATING COSTS	NET REVENUES
1971	$311,000	$ 60,000	$251,000
1972	320,000	64,000	256,000
1973	330,000	68,000	262,000
1974	340,000	72,000	268,000
1975	350,000	76,000	274,000
1976	359,000	80,000	279,000
1977	368,000	84,000	284,000
1978	377,000	88,000	289,000
1979	386,000	92,000	294,000
1980	396,000	96,000	300,000
1981	404,000	100,000	304,000
1982	412,000	104,000	308,000
1983	420,000	108,000	312,000
1984	429,000	112,000	317,000
1985	437,000	116,000	321,000
Next 13 Years Annually	$437,000	$116,000	$321,000

AVERAGE ANNUAL NET REVENUES

First Five Years	$262,000
First Ten Years	$276,000
Twenty-Eight Years	$303,000

[1] Twelve-month period beginning July 1.

[2] Estimated by Howard, Needles, Tammen & Bergendoff.

The feasibility computations, shown in Table II-11, were developed assuming a bond interest rate of 5.5 per cent and a bond term of 30 years. Based on project costs developed by Howard, Needles, Tammen & Bergendoff, it is estimated that a bond issue of $6,588,000 would be required to construct the bridge on the Second Street alignment while a bond issue of $7,038,000 would be necessary for the proposed Fifteenth Street crossing. The escalation from estimated project costs to bond issue size includes such financing items as bond discount, legal and financial fees, capitalized interest during construction, etc. Based upon the relationship between project costs and bond issue size for several comparable projects which have been successfully financed, a factor of 1.2 was applied to project costs to determine a preliminary bond issue.

TABLE II-11

PRELIMINARY PROJECT FEASIBILITY

ITEM	SECOND STREET BRIDGE	FIFTEENTH STREET BRIDGE
Bond Term	30 Years	
Bond Earning Period	28 Years	
Bond Interest Rate	5.5 Per Cent	
Preliminary Project Costs[1]	$5,490,000	$5,865,000
Estimated Bond Issue[2]	6,588,000	7,038,000
First Year Interest	362,000	387,000
Level Debt Service over 28 Years	467,000	498,000
Estimated First Year Net Revenues	251,000	251,000
Estimated Average Annual Net Revenues—28 Years	303,000	303,000
COVERAGES		
First Year Interest by First Year Net Revenues	0.69	0.65
Level Debt Service by Average Annual Net Revenues	0.65	0.61

[1] Estimated by Howard, Needles, Tammen & Bergendoff.

[2] Assumes ratio of project cost to bond issue of 1.0 to 1.2.

As shown in Table II-11, estimated first-year net revenues for the proposed Second Street crossing would provide a first-year interest coverage of 0.69. The corresponding coverage for the Fifteenth Street alignment would be 0.65. Average annual net revenues would provide a 0.65 coverage of level debt service for the Second Street alignment and 0.61 for the Fifteenth Street alignment.

Both coverage values are substantially below levels usually considered adequate for revenue financing purposes. It should be emphasized, however, that the above computations were developed only as a general guide and that a final determination of project feasibility should be made by financial advisors selected for this purpose.

Relationship Between Level Debt Service and Net Revenues

An indication of the amount of subsidy required during the earning period of the bond issue to supplement net revenues in order to meet level debt service, is shown in Table II-12.

It is estimated that the proposed Second Street alignment would incur a deficit of $216,000 in the first full year of operation, decreasing annually to $146,000 in 1985. For the proposed Fifteenth Street crossing, a first year deficit of $247,000 is estimated, declining each year to $177,000 in 1985. Total deficits are estimated at $4,584,000 for the proposed Second Street alignment and $5,452,000 for the Fifteenth Street crossing.

TABLE II-12

RELATIONSHIP BETWEEN LEVEL DEBT SERVICE AND NET REVENUES

FISCAL YEAR[1]	NET REVENUES	LEVEL DEBT SERVICE		NET REVENUES TO LEVEL DEBT SERVICE DEFICIT	
		Second Street	Fifteenth Street	Second Street	Fifteenth Street
1971	$251,000	$467,000	$498,000	$216,000	$247,000
1972	256,000	467,000	498,000	211,000	242,000
1973	262,000	467,000	498,000	205,000	236,000
1974	268,000	467,000	498,000	199,000	230,000
1975	274,000	467,000	498,000	193,000	224,000
1976	279,000	467,000	498,000	188,000	219,000
1977	284,000	467,000	498,000	183,000	214,000
1978	289,000	467,000	498,000	178,000	209,000
1979	294,000	467,000	498,000	173,000	204,000
1980	300,000	467,000	498,000	167,000	198,000
1981	304,000	467,000	498,000	163,000	194,000
1982	308,000	467,000	498,000	159,000	190,000
1983	312,000	467,000	498,000	155,000	186,000
1984	317,000	467,000	498,000	150,000	181,000
1985	321,000	467,000	498,000	146,000	177,000
1986	321,000	467,000	498,000	146,000	177,000
1987	321,000	467,000	498,000	146,000	177,000
1988	321,000	467,000	498,000	146,000	177,000
1989	321,000	467,000	498,000	146,000	177,000
1990	321,000	467,000	498,000	146,000	177,000
1991	321,000	467,000	498,000	146,000	177,000
1992	321,000	467,000	498,000	146,000	177,000
1993	321,000	467,000	498,000	146,000	177,000
1994	321,000	467,000	498,000	146,000	177,000
1995	321,000	467,000	498,000	146,000	177,000
1996	321,000	467,000	498,000	146,000	177,000
1997	321,000	467,000	498,000	146,000	177,000
1998	321,000	467,000	498,000	146,000	177,000
TOTAL				$4,584,000	$5,452,000

[1] Twelve-month period beginning July 1.

APPENDIX

Iowa Senate File 131

The General Bridge Act

Chap. CCXIII - 42nd Congress

STATE HIGHWAY COMMISSION - INTERSTATE BRIDGES
SENATE FILE 131

AN ACT AUTHORIZING THE STATE HIGHWAY COMMISSION TO ACQUIRE, PURCHASE AND CONSTRUCT INTERSTATE BRIDGES, APPROACHES THERETO AND SITES THEREFOR, TO RECONSTRUCT, COMPLETE, IMPROVE, REPAIR, REMODEL, CONTROL, MAINTAIN, AND OPERATE INTERSTATE BRIDGES, TO ESTABLISH TOLLS AND CHARGES FOR THE USE OF INTERSTATE BRIDGES, TO BORROW MONEY AND ISSUE BONDS PAYABLE SOLELY FROM THE REVENUES DERIVED FROM THE OPERATION OF INTERSTATE BRIDGES, AND TO REFUND BONDS PAYABLE FROM SUCH REVENUES.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF IOWA:

Section 1. The following words or terms, as used in this Act, shall have the respective meanings as stated:

"Toll bridge" shall mean an interstate bridge constructed, purchased or acquired under the provisions of this Act, upon which tolls are charged, together with all appurtenances, additions, alterations, improvements, and replacements thereof, and the approaches thereto, and all lands and interests therein used therefor, and buildings and improvements thereon.

"Commission" shall mean the state highway commission, the agency of the state of Iowa created and provided for under the provisions of chapter three hundred seven (307) of the Code.

"Construct, constructing, construction or constructed" shall include the reconstruction, remodeling, repair, or improvement of any existing toll bridge as well as the construction of any new toll bridge.

"Acquisition by purchase, gift, or condemnation" as used in this Act shall mean acquisition by the state highway commission, whether such terms "purchase, gift, or condemnation" are used singularly or in sequence.

Section 2. The state highway commission shall have full charge of the construction and acquisition of all toll bridges constructed or acquired under the provisions of this Act, the operation and maintenance thereof and the imposition and collection of tolls and charges for the use thereof. The commission shall have full charge of the design of all toll bridges constructed under the provisions of this Act. The commission shall proceed with the construction of such toll bridges and other facilities and the approaches thereto by contract immediately upon there being made available funds for such work and shall prosecute such work to completion as rapidly as practicable. The commission shall advertise for bids for the construction, reconstruction, improvement, repair or remodeling of any toll bridge by publication of a notice once each week for at least two (2) consecutive weeks in a newspaper published and having a general circulation throughout the state of Iowa, the first publication to appear at least fifteen (15) days prior to the date set for receiving bids. The commission shall have the power to accept such offer or offers, propositions or bids, and enter into such contract or contracts as it shall deem to be to the best interest of the state.

Section 3. The commission is hereby authorized to establish and construct toll bridges upon any public highway, together with approaches thereto, wherever it is considered necessary or advantageous and practical for crossing any navigable river between this state and an adjoining state. The necessity or advantage and practicality of any toll bridge shall be determined by the commission. To obtain information for the consideration of the commission upon the construction of any toll bridge or any other matter pertaining thereto, any officer or employee of the state, upon the request of the commission, shall make reasonable examination, investigation, survey, or reconnaissance to determine material facts pertaining thereto and shall report such findings to the commission. The cost thereof shall be borne by the department or office conducting it from funds provided for its functions.

Section 4. The commission is hereby authorized to enter into agreements with any federal bridge commission or any county, city, or town of this state, and with an adjoining state or county, city, or town thereof, for the purpose of implementing an investigation of the feasibility of any toll bridge project for the bridging of a navigable river forming a portion of the boundary of this state and such adjoining state. The commission may use any funds available for the purposes of this section. Such agreements may provide that in the event any such project is determined to be feasible and adopted, any advancement of funds by any state, county, city, or town may be reimbursed out of any proceeds derived from the sale of bonds or out of tolls and revenues to be derived from such project.

Section 5. Whenever the commission deems it necessary or advantageous and practical, it may acquire by gift, purchase, or condemnation any interstate bridge which connects with or may be connected with the public highways and the approaches thereto, except that the commission may not condemn an existing interstate bridge used for interstate highway traffic and combined highway and railway traffic and presently owned by a municipality, or a person, firm, or corporation engaged in interstate commerce. In connection with the acquisition of any such bridge, the commission and any federal bridge commission or any city, town, county, or other political subdivision of the state are authorized to do all acts and things as in this Act are provided for the establishing and constructing of toll bridges and operating, financing, and maintaining such bridges insofar as such powers and requirements are applicable to the acquisition of any toll bridge and its operation, financing, and maintenance. In so doing, they shall act in the same manner and under the same procedures as provided for establishing, constructing, operating, financing, and maintaining toll bridges insofar as such manner and procedures are applicable. Without limiting the generality of the above provisions, the commission is hereby authorized to cause surveys to be made to determine the propriety of acquiring any such bridge and the rights-of-way necessary therefor, and other facilities necessary to carry out the provisions hereof; to issue, sell, redeem bonds or issue and exchange bonds with present holders of outstanding bonds of bridges being acquired under the provisions of this Act and deposit and pay out of the proceeds of the bonds for the financing thereof; to impose, collect, deposit, and expend tolls therefrom; to secure and remit financial and other assistance in connection with the purchase thereof, and to carry insurance thereon.

Section 6. The commission, its officials, and all state officials are hereby authorized to perform such acts and make such agreements consistent with the law which are necessary and desirable in connection with the duties and powers conferred upon them regarding the construction, maintenance, and operation and insurance of toll bridges or the safeguarding of the funds and revenues required for such construction and the payment of the indebtedness incurred therefor. The commission shall adopt such rules and regulations in accordance with the provisions of chapter seventeen A (17A) of the Code as it may deem necessary for the administration and exercise of its powers and duties granted by this Act, and shall prepare annual financial statements regarding the operation of such toll bridges which shall be made available for inspection by the public and by the holders of revenue bonds issued by the commission under the provisions of this Act at all reasonable times.

Section 7. Whenever the commission deems it to be in the best interest of the primary highway system that any new toll bridge be constructed upon any public highway and across any navigable river between this state and an adjoining state, the commission shall adopt a resolution declaring that the public interest and necessity require the construction of such toll bridge and authorizing the issuance of revenue bonds in an amount sufficient for the purpose of obtaining funds for such construction. The issuance of bonds as provided in this Act for the construction, purchase, or acquisition of more than one (1) toll ridge may, at the discretion of the commission, be included in the same authority and issue or issues of bonds, and the commission is hereby authorized to pledge the gross revenues derived from the operation of any such toll bridge under its control and jurisdiction to pay the principal of and interest on bonds issued to pay the cost of purchasing, acquiring, or constructing any such toll bridge financed under the provisions of this Act. The commission is hereby granted wide discretion, in connection with the financing of the cost of any toll bridge, to pledge the gross revenues of a single toll bridge for the payment of bonds and interest thereon issued to pay the cost of such bridge and to pledge the gross revenues of two (2) or more toll bridges to pay bonds issued to pay the cost of one (1) or more toll bridges and interest thereon as long as the several bridges included herein are not more than ten (10) miles apart.

In addition, if the commission in its discretion determines that the construction of a toll bridge cannot be financed entirely through revenue bonds and that the construction of such toll bridge is necessary, the commission may advance funds from the primary highway fund to pay for that part of the construction cost, including the cost of approaches and all incidental costs, which is not paid out of the proceeds of revenue bonds. After all revenue bonds and interest thereon issued and sold pursuant to this Act and payable from the tolls and revenues of said bridge have been fully paid and redeemed or funds sufficient to pay said bonds and interest, including premium, if any, have been set aside and pledged for that purpose, then such amount advanced from the primary road fund shall be repaid to the primary road fund from the tolls and revenues of said bridge before said bridge is made a toll free bridge under the provisions of this Act.

Section 8. Whenever the commission shall authorize the construction of any toll bridge, the commission is empowered to secure rights-of-way therefor and for approaches thereto by gift or purchase or by condemnation in the manner provided by law for the taking of private property for public purposes.

Section 9. The right-of-way is hereby given, dedicated, and set apart upon which to locate, construct, and maintain toll bridges or approaches thereto or other highway crossings, and transportation facilities thereof or thereto, through, over or across any of the lands which are now or may be the property of this state, including highways; and through, over, or across the streets, alleys, lanes, and roads within any city, town, county, or other political subdivision of the state. If any property belonging to any city, town, county or other political subdivision of the state is required to be taken for the construction of any such bridge or approach thereto or should any such property be injured or damaged by such construction, such compensation therefor as may be proper or necessary and as shall be agreed upon may be paid by the commission to the particular county, city, town, or other political subdivision of the state owning such property, or condemnation proceedings may be brought for the determination of such compensation.

Section 10. Before the commission shall proceed with any action to secure right-of-way or with the construction of any toll bridge under the provisions of this Act, it shall first pass a resolution finding that public interest and necessity require the acquisition of right-of-way for and the construction of such toll bridge. Such resolution shall be conclusive evidence of the public necessity of such construction and that such property is necessary therefor. To aid the commission in determining the public interest, a public hearing shall be held in the county or counties of this state in which any portion of a bridge is proposed to be located. Notice of such hearing shall be published at least once in a newspaper published and having a general circulation in the county or counties where such bridge is proposed to be located, not less than twenty (20) days prior to the date of the hearing. When it becomes necessary for the commission to condemn any real estate to be used in connection with any such bridge, or to condemn any existing bridge, such condemnation shall be carried out in a manner consistent with the provisions of chapters four hundred seventy-one (471) and four hundred seventy-two (472) of the Code. In eminent domain proceedings to acquire property for any of the purposes of this Act, any bridge, real property, personal property, franchises, rights, easements, or other property or privileges appurtenant thereto appropriated or dedicated to a public use or purpose by any person, firm, private, public or municipal corporation, county, city or town, district, or any political subdivision of the state, may be condemned and taken, and the acquisition and use thereof as herein provided for the same public use or purpose to which such property has been so appropriated or dedicated, or for any other public use or purpose, shall be deemed a superior and permanent right and necessity, and a more necessary use and purpose than the public use or purpose to which such property has already been appropriated or dedicated, and any condemnation award may be paid from the proceeds of revenue bonds issued under the provisions of this Act.

Section 11. If the commission determines that any toll bridge should be constructed or acquired under its authority, all costs thereof, including land, right-of-way, surveying, engineering, construction, legal and administrative expenses, and fees of any fiscal adviser, shall be paid out of any funds available for payment of the cost of the bridge.

Section 12. The commission is hereby authorized and empowered to issue revenue bonds for the acquisition, purchase or construction of any interstate bridge. Any and all bonds issued by the commission for the acquisition, purchase, or construction of any interstate bridge under the authority of this Act shall be issued in the name of the Iowa highway commission and shall constitute obligations only of the commission, shall be identified by some appropriate name, and shall contain a recital on the face thereof that the payment or redemption of said bonds and the payment of the interest thereon are secured by a direct charge and lien upon the tolls and other revenues of any nature whatever received from the operation of the particular bridge for the acquisition, purchase, or construction of which the bonds are issued and of such other bridge or bridges as may have been pledged therefor, and that neither the payment of the principal or any part thereof nor of the interest thereon or any part thereof constitutes a debt, liability, or obligation of the state of Iowa. When it is determined by the commission to be in the best public interest, any bonds issued under the provisions of this Act may be refunded and refinanced at a lower rate, the same rate or a higher rate or rates of interest and from time to time as often as the commission shall find it to be advisable and necessary so to do. Bonds issued to refund other bonds theretofore issued by the commission under the provisions of this Act may either be sold in the manner hereinafter provided and the proceeds thereof applied to the payment of the bonds being refunded, or the refunding bonds may be exchanged for and in payment and discharge of the bonds being refunded. The refunding bonds may be sold or exchanged in installments at different times or an entire issue or series may be sold or exchanged at one (1) time. Any issue or series or refunding bonds may be exchanged in part or sold in part in installments at different times or at one (1) time. The refunding bonds may be sold at any time on, before, or after the maturity of any of the outstanding bonds to be refinanced thereby and may be issued for the purpose of refunding a like or greater principal amount of bonds, except that the principal amount of the refunding bonds may exceed the principal amount of the bonds to be refunded to the extent necessary to pay any premium due on the call of the bonds to be refunded or to fund interest in arrears or about to become due. The gross revenues of any toll bridge pledged to the payment of the bonds being refunded, together with the unpledged gross revenues of any other toll bridges located within ten (10) miles of said bridge, may be pledged by the commission to pay the principal of and interest on the refunding bonds and to create and maintain reserves therefor.

The commission is empowered to receive and accept funds from the state of Iowa or the federal government or any other state upon a cooperative or other basis for the acquisition, purchase, or construction of any interstate bridge authorized under the provisions of this Act and is empowered to enter into such agreements with the state of Iowa or any other state or the federal government as may be required for the securing of such funds.

The commission is authorized and empowered to spend from annual primary road fund receipts sufficient moneys to pay the cost of operation, maintenance, insurance, collection of tolls and accounting therefor and all other charges incidental to the operation and maintenance of any toll bridge administered under the provisions of this Act.

Section 13. The revenue bonds may be issued and sold or exchanged by the commission from time to time and in such amounts as it deems necessary to provide sufficient funds for the acquisition, purchase, or construction of any such bridge and to pay interest on bonds issued for the construction of any toll bridge during the period of actual construction and for six (6) months after completion thereof. The commission is hereby authorized to adopt all necessary resolutions prescribing the form, conditions, and denominations of the bonds, the maturity dates therefor, and the interest rate or rates which the bonds shall bear. All bonds of the same issue need not bear the same interest rate. Principal and interest of the bonds shall be payable at such place or places within or without the state of Iowa as determined by the commission, and the bonds may contain provisions for registration as to principal or interest, or both. Interest shall be payable at such times as determined by the commission and the bonds shall mature at such times and in such amounts as the commission prescribes. The commission may provide for the retirement of the bonds at any time prior to maturity, and in such manner and upon payment of such premiums as it may determine in the resolution providing for the issuance of the bonds. All such bonds and any coupons attached thereto shall be signed by such officials of the commission as the commission may direct. Successive issues of such bonds within the limits of the original authorization shall have equal preference with respect to the payment of the principal thereof and the payment of interest thereon. The commission may fix different maturity dates, serially or otherwise, for successive issues under any one (1) original authorization. All bonds issued under the provisions of this Act shall have all the qualities of negotiable instruments under the laws of the state of Iowa. All bonds issued and sold hereunder shall be sold to the highest and best bidder on the basis of sealed proposals received pursuant to a notice specifying the time and place of sale and the amount of bonds to be sold which shall be published at least once not less than seven (7) days prior to the sale in a newspaper published in the state of Iowa and having a general circulation in said state. None of the provisions of chapter seventy-five (75) of the Code shall apply to bonds issued under the provisions of this Act but such bonds shall be sold upon terms of not less than par plus accrued interest. The commission may reject any or all bids received at the public sale and may thereafter sell the bonds at private sale on such terms and conditions as it deems most advantageous to its own interests, but not at a price below that of the best bid received at the advertised sale. The commission may enter into contracts and borrow money through the sale of bonds of the same character as those herein authorized, from the United States or any agency thereof, upon such conditions and terms as may be agreed to and the bonds shall be subject to all the provisions of this Act, except that any bonds issued hereunder to the United States or any agency thereof need not first be offered at public sale. The commission may also provide for the private sale of bonds issued under the provisions of this Act to the state treasurer of Iowa upon such terms and conditions as may be agreed upon, and in such event said bonds need not first be offered at public sale. Temporary or interim bonds, certificates, or receipts, of any denomination, and with or without coupons attached, signed by such official as the commission may direct, may be issued and delivered until the definitive bonds are executed and available for delivery.

Section 14. The proceeds from the sale of all bonds authorized and issued under the provisions of this Act shall be deposited by the commission in a fund designated as the construction fund of the particular interestate bridge or bridges for which such bonds were issued and sold, which fund shall not be a state fund and shall at all times be kept segregated and set apart from all other funds and in trust for the purposes herein set out. Such proceeds shall be paid out or disbursed solely for the acquisition, purchase, or construction of such interstate bridge or bridges and expenses incident thereto, the acquisition of the necessary lands and easements there-

for and the payment of interest on such bonds during the period of actual construction and for a period of six (6) months thereafter, only as the need therefor shall arise and the commission may agree with the purchaser of said bonds upon any conditions or limitations restricting the disbursement of such funds that may be deemed advisable, for the purpose of assuring the proper application of such funds. All moneys in such fund and not required to meet current construction costs of the interstate bridge or bridges for which such bonds were issued and sold, and all funds constituting surplus revenues which are not immediately needed for the particular object or purpose to which they must be applied or are pledged may be invested in obligations issued or guaranteed by the United States or by any person controlled by or supervised by and acting as an instrumentality of the United States pursuant to authority granted by the congress of the United States; provided, however, that the commission may provide in the proceedings authorizing the issuance of said bonds that the investment of such moneys shall be made only in particular bonds and obligations within the classifications eligible for such investment and such provisions shall thereupon be binding upon the commission and all officials having anything to do with such investment. Any surplus which may exist in said construction fund shall be applied to the retirement of bonds issued for the acquisition, purchase, or construction of any such interstate bridge by purchase or call and, in the event such bonds cannot be purchased at a price satisfactory to the commission and are not by their terms callable prior to maturity, such surplus shall be paid into the fund applicable to the payment of principal and interest of said bonds and shall be used for that purpose. The proceedings authorizing the issuance of bonds may provide limitations and conditions upon the time and manner of applying such surplus to the purchase and call of outstanding bonds and the terms upon which they shall be purchased or called and such limitations and conditions shall be followed and observed in the application and use of such surplus. All bonds so retired by purchase or call shall be immediately canceled.

Section 15. All tolls or other revenues received from the operation of any toll bridge acquired, purchased, or constructed with the proceeds of bonds issued and sold hereunder shall be deposited by the commission to the credit of a special trust fund to be designated as the toll revenue fund of the particular toll bridge or toll bridges producing such tolls or revenue, which fund shall be a trust fund and shall at all times be kept segregated and set apart from all other funds.

Section 16. From the money so deposited in each separate construction fund as hereinabove provided, at the direction of the commission there shall be transferred to the place or places of payment named in said bonds such sums as may be required to pay the interest as it becomes due on all bonds issued and outstanding for the construction of such particular toll bridge or toll bridges during the period of actual construction and during the period of six (6) months immediately thereafter. The commission shall thereafter transfer from each separate toll revenue fund to the place or places of payment named in the bonds for which said revenues have been pledged such sums as may be required to pay the interest on said bonds and redeem the principal thereof as such interest and principal become due. All funds so transferred for the payment of principal of or interest on bonds issued for any particular toll bridge or toll bridges shall be segregated and applied solely for the payment of said principal or interest. The proceedings authorizing the issuance of the bonds may provide for the setting up of a reserve fund or funds out of the tolls and other revenues not needed for the payment of principal and interest, as the same currently matures and for the preservation and continuance of such fund in a manner to be provided therein, and such proceedings may also require the immediate application of all surplus moneys in such toll revenue fund to the retirement of such bonds prior to maturity, by call or purchase, in such manner and upon such terms and the payment of such premiums as may be deemed advisable in the judgment of the commission. The moneys remaining in each separate toll revenue fund after providing the amount required for the payment of principal of and interest on bonds as hereinabove provided, shall be held and applied as provided in the proceedings authorizing the issuance of said bonds. In the event the proceedings authorizing the issuance of said bonds do not require surplus revenues to be held or applied in any particular manner, they shall be allocated and used for such other purposes incidental to the construction, operation, and maintenance of any toll bridge as the commission may determine and as permitted under sections seven (7) and twelve (12) of this Act.

Section 17. Warrants for payments to be made on account of such bonds shall be drawn by the commission on duly approved vouchers. Moneys required to meet the costs of purchase or construction and all expenses and costs incidental to the acquisition, purchase, or construction of any particular interstate bridge or to meet the costs of operating, maintaining, and repairing the same, shall be paid by the commission from the proper fund therefor upon duly approved vouchers. All interest received or earned on money deposited in each and every fund herein provided for shall be credited to and become a part of the particular fund upon which said interest accrues.

Section 18. The commission may provide in the proceedings authorizing the issuance of bonds or may otherwise agree with the purchasers of bonds regarding the deposit of all moneys constituting the construction fund and the toll revenue fund and provide for the deposit of such money at such times and with such depositaries or paying agents and upon the furnishing of such security as may meet with the approval of the purchasers of such bonds.

Section 19. Notwithstanding any provision contained in this Act, the proceeds received from the sale of bonds and the tolls or other revenues received from the operation of any toll bridge may be used to defray any expenses incurred by the commission in connection with and incidental to the issuance and sale of bonds for the acquisition, purchase, or construction of any such toll bridge including expenses for the preparation of surveys and estimates, legal, fiscal and administrative expenses, and the making of such inspections and examinations as may be required by the the purchasers of such bonds; provided, that the proceedings authorizing the issuance of such bonds may contain appropriate provisions governing the use and application of said bond proceeds and toll or other revenues for the purposes herein specified.

Section 20. While any bonds issued by the commission remain outstanding, the powers, duties or existence of the commission or of any other official or agency of the state shall not be diminished or impaired in any manner that will affect adversely the interests and rights of the holders of such bonds. The holder of any bond may by mandamus or other appropriate proceeding require and compel the performance of any of the duites imposed upon any state department, official, or employee or imposed upon the commission or its officers, agents, and employees in connection with the acquisition, purchase, construction, maintenance, operation, and insurance of any bridge and in connection with the collection, deposit, investment, application, and disbursement of all tolls and other revenues derived from the operation and use of any bridge and in connection with the deposit, investment, and disbursement of the proceeds received from the issuance of bonds; provided, that the enumeration of such rights and remedies herein shall not be deemed to exclude the exercise or prosecution of any other rights or remedies by the holders of such bonds.

Section 21. When any toll bridge authorized hereunder is being built by the commission it may carry or cause to be carried such an amount of insurance or imdemnity bond or bonds as protection against loss or damage as it may deem proper. The commission is hereby further empowered to carry such an amount of insurance to cover any accident or destruction in part or in whole to any toll bridge. All moneys collected on any indemnity bond or insurance policy as the result of any damage or injury to any such toll bridge shall be used for the purpose of repairing or rebuilding of any such toll bridge as long as there are revenue bonds against any such structure outstanding and unredeemed. The commission is also empowered to carry insurance or indemnity bonds insuring against the loss of tolls or other revenues to be derived from any such toll bridge by reason of any interruption in the use of such toll bridge from any cause whatever, and the proceeds of such insurance or indemnity bonds shall be paid into the fund into which the tolls and other revenues of the bridge thus insured are required to be paid and shall be applied to the same purposes and in the same manner as other moneys in the said fund. Such insurance or indemnity bonds may be in an amount equal to the probable tolls and other revenues to be received from the operation of such toll bridge during any period of time that may be determined upon by the commission and fixed in its discretion, and be paid for out of the toll revenue fund as may be specified in said proceedings. The commission may provide in the proceedings authorizing the issuance of bonds for the carrying of insurance as authorized by this Act and the purchase and carrying of insurance as authorized by this Act shall thereupon be obligatory upon the commission and be paid for out of the toll revenue fund as may be specified in said proceedings.

Section 22. The commission is hereby empowered to fix the rates of toll and other charges for all interstate bridges acquired, purchased, or constructed under the terms of this Act. Toll charges so fixed may be changed from time to time as conditions may warrant. The commission in establishing toll charges shall give due consideration to the amount required annually to pay the principal of and interest on bonds payable from the revenues thereof. The tolls and charges shall be at all times fixed at rates sufficient to pay the bonds and interest as they mature, together with the creation and maintenance of bond reserve funds and other funds as established in the proceedings authorizing the issuance of the bonds, for any particular toll bridge. The amounts required to pay the principal of and interest on bonds shall constitute a charge and lien on all such tolls and other revenues and interest thereon and sinking funds created therefrom received from the use and operation of said toll bridge, and the commission is hereby authorized to pledge a sufficient amount of said tolls and revenues for the payment of bonds issued under the provisions of this Act and interest thereon and to create and maintain a reserve therefor. Such tolls and revenues, together with the interest earned thereon, shall constitute a trust fund for the security and payment of such bonds and shall not be used or pledged for any other purpose as long as such bonds or any of them are outstanding and unpaid.

Section 23. Whenever a proposed interstate bridge is to be acquired, purchased or constructed, any city, town, county, or other political subdivision located in relation to such facility so as to benefit directly or indirectly thereby, may, either jointly or separately, at the request of the commission advance or contribute money, rights-of-way, labor, materials, and other property toward the expense of acquiring, purchasing or constructing the bridge, and for preliminary surveys and the preparation of plans and estimates of cost therefor and other preliminary expenses. Any such city, town, county, or other political subdivision may, either jointly or separately, at the request of the commission advance or contribute money for the purpose of guaranteeing the payment of interest or principal on the bonds issued by the commission to finance the bridge. Appropriations for such purposes may be made from any funds available, including county road funds received from or credited by the state, or funds obtained by excess tax levies made pursuant to law or the issuance of general obligation bonds for this purpose. Money or property so advanced or contributed may be immediately transferred or delivered to the commission to be used for the purpose for which contribution was made. The commission may enter into an agreement with a city, town, county, or other political subdivision to repay any money or the value of a right-of-way, labor, materials or other property so advanced or contributed. The commission may make such repayment to a city, town, county, or other political subdivision and reimburse the state for any expenditures made by it in connection with the bridge out of tolls and other revenues for the use of the bridge.

Section 24. If the commission deems that any land, including improvements thereon, is no longer required for toll bridge purposes and that it is in the public interest, it may negotiate for the sale of such land to the state or to any city, town, county, or other political subdivision or municipal corporation of the state. The commission shall certify the agreement for the sale to the state executive council, with a description of the land and the terms of the sale and the state executive council may execute the deed and deliver it to the grantee.

Section 25. If the commission is of the opinion that any land, including improvements thereon, is no longer required for toll bridge purposes, it may be offered for sale upon publication of a notice once each week for two (2) consecutive weeks in a newspaper published and having a general circulation throughout the state of Iowa, specifying the time and place fixed for the receipt of bids.

Section 26. The commission may reject all such bids if the highest bid does not equal the reasonable fair market value of the real property, plus the value of the improvements thereon, computed on the basis of the reproduction value less depreciation. The commission may accept the highest and best bid, and certify the agreement for the sale to the state executive council, with a description of the land and the terms of the sale and the state executive council shall execute the deed and deliver it to the grantee.

Section 27. If the commission deems it consistent with the use and operation of any toll bridge, the commission may grant franchises to persons, firms, associations, private or municipal corporations, the United States government or any agency thereof, to use any portion of the property of any toll bridge, including approaches thereto, for the construction and maintenance of water pipes, flumes, gas pipes, telephone, telegraph and electric light and power lines and conduits, trams or railways, and any other such facilities in the manner of granting franchises on state highways.

Section 28. Any moneys received pursuant to the provisions of sections twenty-four (24) through twenty-seven (27) of this Act shall be deposited by the commission into the separate and proper trust fund established for the bridge.

Section 29. The commission shall have the right to impose and reimpose tolls for pedestrian or vehicular traffic over any interstate bridges under its control and jurisdiction for the purpose of paying the cost of reconstructing and improving existing bridges and their approaches, purchasing existing bridges, and constructing new bridges and approaches, provided that any such existing bridge or new bridge is located within ten miles of the bridge on which tolls are so imposed or reimposed, to pay interest on and create a sinking fund for the retirement of revenue bonds issued for the account of such projects and to pay any and all costs and expenses incurred by the commission in connection with and incidental to the issuance and sale of bonds and for the preparation of surveys and estimates and to establish the required interest reserves for and during the estimated construction period and for six (6) months thereafter.

Section 30. The bridges herein provided for may be incorporated into the primary road system as toll free bridges whenever the costs of the construction of the bridges and the approaches thereto and the reconstruction and improvement of existing bridges and approaches thereto, including all incidental costs, have been paid and when all revenue bonds and interest thereon issued and sold pursuant to this Act and payable from the tolls and revenues thereof shall have been fully paid and redeemed or funds sufficient to pay said bonds and interest, including premium, if any, have been set aside and pledged for that purpose. However, tolls may again be imposed as provided in section twenty-nine (29) of this Act.

Section 31. The commission shall have the power and is hereby authorized by resolution to issue, sell, or pledge its revenue bonds in an amount sufficient to provide funds to pay all or any part of the costs of construction of a new bridge and approaches thereto and the reconstruction, improvement, and maintaining of an existing bridge and approaches thereto, including all costs of survey, acquisition of right-of-way, engineering, legal, fiscal and incidental expenses, to pay the interest due thereon during the period beginning with the date of issue of the bonds and ending at the expiration of six (6) months after the first imposition and collection of tolls from the users of said bridges, and all costs incidental to the issuance and sale of the bonds.

Except as may be otherwise specifically provided by statute, all of the other provisions of this Act shall govern the issuance and sale of revenue bonds issued under this section, the execution thereof, the disbursement of the proceeds of issuance thereof, the interest rate or rates thereon, their form, terms, conditions, convenants, negotiability, denominations, maturity date or dates, the creation of special funds or accounts safeguarding and providing for the payment of the principal thereof and interest thereon, and their manner of redemption and retirement.

Such bonds shall include a covenant that the payment of the principal thereof and the interest thereon are secured by a first and direct charge and lien on all of the tolls and other gross revenues received from the operation of said toll bridges and from any interest which may be earned from the deposit or investment of any such revenues. The tolls and charges shall be at all times fixed at rates sufficient to pay the bonds and interest as they mature, together with the creation and maintenance of bond reserve funds and other funds as established in the proceedings authorizing the issuance of the bonds.

Section 32. The commission is hereby authorized to operate and to assume the full control of said toll bridges and each portion thereof whether within or without the borders of the state of Iowa, with full power to impose and collect tolls from the users of such bridges for the purpose of providing revenues at least sufficient to pay the cost and incidental expenses of construction and acquisition of said bridges and approaches in both states in which located and for the payment of the principal of and interest on its revenue bonds as authorized by this Act.

Section 33. Under no circumstances shall any bonds issued under the terms of this Act be or become or be construed to constitute a debt of or charge against the state of Iowa within the purview of any constitutional or statutory limitation or provision. No taxes, appropriations or other funds of the state of Iowa may be pledged for or used to pay such bonds or the interest thereon, but any such bonds shall be payable solely and only as to both principal and interest from the tolls and revenues derived from the operation of any toll bridge or toll bridges acquired, purchased, or constructed under this Act, and the sole remedy for any breach or default of the terms of any such bonds or proceedings for their issuance shall be a proceeding either in law or in equity by suit, action or mandamus to enforce and compel performance of the duties required by this Act and the terms of the resolution under which such bonds are issued.

Section 34. The commission is authorized to enter into such agreement or agreements with other state highway commissions and the governmental agencies or subdivisions of the state of Iowa or other states and with federal bridge commissions as they shall find necessary or convenient to carry out the purposes of this Act, and is authorized to do any and all acts contained in such agreement or agreements that are necessary or convenient to carry out the purposes of this Act. Such agreements may include, but shall not be restricted to, the following provisions:

1. A provision that the commission shall assume and have complete responsibility for the operation of such bridges and approaches thereto, and with full power to impose and collect all toll charges from the users of such bridges and to disburse the revenue derived therefrom for the payment of principal and interest on any revenue bonds herein provided for and to carry out the purposes of this Act.

2. A provision that the commission shall provide for the issuance, sale, exchange or pledge, and payment of revenue bonds payable solely from the revenues derived from the imposition and collection of tolls upon such toll bridges.

3. A provision that the commission, after consultation with the other governmental agencies or subdivisions who are parties to such agreements, shall fix and revise the classifications and amounts of tolls to be charged and collected from the users of the toll bridges, with the further provision that such toll charges shall be

removed after all costs of planning, designing, and construction of such toll bridges and approaches thereto and all incidental costs shall have been paid, and all of said revenue bonds, and interest thereon, issued pursuant to this Act shall have been fully paid and redeemed or funds sufficient therefor have been set aside and pledged for that purpose.

4. A provision that all acts pertaining to the design and construction of such toll bridges may be done and performed by the commission and that any and all contracts for the construction of such toll bridges shall be awarded in the name of the commission.

5. A provision that the state of Iowa and adjoining state and all governmental agencies or subdivisions party to such agreement shall be reimbursed out of the proceeds of the sale of such bonds or out of tolls and revenues as herein allowed for any advances they may have made or expenses they may have incurred for any of the purposes for which said revenue bonds may be issued, after duly verified itemized statements of such advances and expenses have been approved by all parties to such agreement.

6. A provision that when all outstanding indebtedness or other obligations payable from the revenues of such bridges have been paid the adjoining state agrees to accept ownership of that portion of the bridge within such state and agrees to pay the cost of maintaining such portions of the bridge or proportionate share of the total cost of maintaining the bridge.

Section 35. Counties are hereby authorized to issue general obligation bonds for the purpose of contributing money to the commission to help finance the construction of toll bridges across navigable rivers constituting boundaries between the county and an adjoining state. Prior to the issuance of such bonds the board of supervisors shall call and hold an election in said county at which the proposition shall be submitted to the voters of the county in the following form:

Shall the county of _____ issue its bonds in the amount of $_____ for the purpose of _____?

Notice of such election, stating the date of the election, the hours of opening and closing the polls, the precints and polling places therefor, and the question to be submitted shall be published once each week for three (3) consecutive weeks in at least one (1) newspaper published and having a general circulation in the county. The election shall be held on a day not less than five (5) nor more than twenty (20) days after the last publication of such notice. The proposition shall not be deemed carried or adopted unless the vote in favor thereof is equal to at least sixty (60) per cent of the total vote cast for and against said proposition at said election.

Section 36. The exercise of the powers granted by this Act will be in all respects for the benefit of the people of the state of Iowa, for the increase of their commerce and prosperity and for the improvement of their health and living conditions, and as the acquisition, construction, operation, and maintenance by the commission of the projects herein defined will constitute the performance of essential governmental functions, the commission shall not be required to pay any taxes or assessments upon such projects or upon any property acquired or used by the commission under the provisions of this Act or upon the income from such projects, and the bonds issued under the provisions of this Act, their transfer and the income therefrom including any profit made on the sale thereof shall at all times be free from taxation by or within the state of Iowa.

Section 37. Any person who uses any toll bridge and fails or refuses to pay the toll provided therefor shall be punished by a fine of not more than one hundred (100) dollars or by imprisonment for not more than thirty (30) days, or both.

Section 38. This Act shall be construed as providing an alternative and independent method for the acquisition, purchase, or construction of interstate bridges, for the issuance and sale or exchange of bonds in connection therewith and for refunding bonds pertinent thereto, and for the imposition, collection, and application of the proceeds of tolls and charges for the use of interstate bridges, without reference to any other statute, and shall not be construed as an amendment of or subject to the provisions of any other law, and no publication of any notice, and no other or further proceeding in respect to the issuance or sale or exchange of bonds under this Act shall be required except such as are prescribed by this Act, any provisions of other statutes of the state to the contrary notwithstanding.

Section 39. This Act, being necessary for the public safety and welfare, shall be liberally construed to effectuate the purposes thereof. If any provision of this Act or the application thereof to any person or circumstances is held to be invalid, such invalidity shall not affect other provisions or applications of the Act which can be given effect without the invalid provisions or application, and to this end the provisions of this Act are declared to be severable.

Approved June 22, 1967.

Section 525. Construction and operation of bridges; consent of Congress; approval of plans; private highway toll bridges.

(a) The consent of Congress is granted for the construction, maintenance, and operation of bridges and approaches thereto over the navigable waters of the United States, in accordance with the provisions of sections 525–533 of this title.

(b) The location and plans for such bridges shall be approved by the Chief of Engineers and the Secretary of the Army before construction is commenced, and, in approving the location and plans of any bridge, they may impose any specific conditions relating to the maintenance and operation of the structure which they may deem necessary in the interest of public navigation, and the conditions so imposed shall have the force of law.

(c) Notwithstanding the provisions of subsections (a) and (b) of this section, it shall be unlawful to construct or commence the construction of any privately owned highway toll bridge until the location and plans thereof shall also have been submitted to and approved by the highway department or departments of the State or States in which the bridge and its approaches are situated; and where such bridge shall be between two or more States and the highway departments thereof shall be unable to agree upon the location and plans therefor, or if they, or either of them, shall fail or refuse to act upon the location and plans submitted, such location and plans then shall be submitted to the Bureau of Public Roads and, if approved by the Bureau of Public Roads, approval by the highway departments shall not be required. (Aug. 2, 1946, ch. 753, title V, Section 502, 60 Stat. 847; June 30, 1949, ch. 288, title I, Section 103 (a), 63 Stat. 380; 1949 Reorg. Plan No. 7, Section 1, eff. Aug. 19, 1949, 14 F. R. 5288, 63Stat. 1070.)

CODIFICATION

The Department of War was designated the Department of the Army and the title of the Secretary of War was changed to Secretary of the Army by section 205 (a) of act July 26, 1947, ch. 343, title II, 61 Stat. 501. Section 205 (a) of act July 26, 1947, was repealed by section 53 of act Aug. 10, 1956, ch. 1041, 70A Stat. 641. Section 1 of act Aug. 10, 1956, enacted "Title 10, Armed Forces", which in sections 3011–3013 continued the military Department of the Army under the administrative supervision of a Secretary of the Army.

SHORT TITLE

Congress in enacting sections 525–533 of this title provided by section 501 of act Aug. 2, 1946 that they should be popularly known as the "General Bridge Act of 1946".

TRANSFER OF FUNCTIONS

The functions of all other officers of the Department of Commerce and the functions of all agencies and employees of such Department were, with a few exceptions, transferred to the Secretary of Commerce, with power vested in him to authorize their performance or the performance of any of his functions by any of such officers, agencies, and employees, by 1950 Reorg. Plan No. 5, Sections 1, 2, eff. May 24, 1950, 15 F.R. 3174, 64 Stat. 1263, set out in note under Section 591 of Title 5, Executive Departments and Government Officers and Employees.

The Public Roads Administration, which was transferred to the Bureau of Public Roads within the General Services Administration, was transferred to the Department of Commerce by 1949 Reorg. Plan No. 7.

All functions of the Public Roads Administration were transferred to the Bureau of Public Roads within the General Services Administration by section 103 (a) of Act June 30, 1949. Section 103 (a) is set out as section 630b (a) of Title 5, Executive Departments and Government Officers and Employees.

RESERVATION OF RIGHT TO ALTER, AMEND, OR REPEAL

Section 511 of act Aug. 2, 1946, provided: "The right to alter, amend, or repeal this title [sections 525–533 of this title] is hereby expressly reserved as to any and all bridges which may be built under authority hereof (said sections)."

Section 526. Amount of tolls.

If tolls shall be charged for the transit over any interstate bridge of engines, cars, street cars, wagons, carriages, vehicles, animals, foot passengers, or other passengers, such tolls shall be reasonable and just, and the Secretary of the Army may, at any time, and from time to time, prescribe the reasonable rates of toll for such transit over such bridge, and the rates so prescribed shall be the legal rates and shall be the rates demanded and received for such transit. (Aug. 2, 1946, ch. 753, title V, Section 503, 60 Stat. 847.)

Section 527. Acquisition of interstate bridges by public agencies; amount of damages.

After the completion of any interstate toll bridge constructed by an individual, firm, or corporation, as determined by the Secretary of the Army, either of the States in which the bridge is located, or any public agency or political subdivision of either of such States, within or adjoining which any part of such bridge is located, or any two or more of them jointly, may at any time acquire and take over all right, title, and interest in such bridge and its approaches, and any interest in real property for public purposes by condemnation or expropriation. If at any time after the expiration of five years after the completion of such bridge the same is acquired by condemnation or expropriation, the amount of damages or compensation to be allowed shall not include good will, going value, or prospective revenues or profits, but shall be limited to the sum of (1) the actual cost of constructing such bridge and its approaches, less a reasonable deduction for actual depreciation in value; (2) the actual costs of acquiring such interests in real property; (3) actual financing and promotion costs, not to exceed 10 per centum of the sum of the cost of constructing the bridge and its approaches and acquiring such interests in real property; and (4) actual expenditures for necessary improvements. (Aug. 2, 1946, ch. 753, title V, Section 504, 60 Stat. 848.)

Section 528. Statement of construction costs of privately owned interstate bridges; investigation of costs; conclusiveness of findings; review.

Within ninety days after the completion of a privately owned interstate toll bridge, the owner shall file with the Secretary of the Army and with the highway departments of the States in which the bridge is located, a sworn itemized statement showing the actual original cost of constructing the bridge and its approaches, the actual cost of acquiring any interest in real property necessary therefor, and the actual financing and promotion costs. The Secretary of the Army may, and upon request of a highway department shall, at any time within three years after the completion of such bridge, investigate such costs and determine the accuracy and the reasonableness of the costs alleged in the statement of costs so filed, and shall make a finding of the actual and reasonable costs of constructing, financing, and promoting such bridge. For the purpose of such investigation the said individual, firm, or corporation, its successors and assigns, shall make available all of its records in connection with the construction, financing, and promotion thereof. The findings of the Secretary of the Army as to the reasonable costs of the construction, financing, and promotion of the bridge shall be conclusive for the purposes mentioned in section 527 of this title subject only to review in a court of equity for fraud or gross mistake. (Aug. 2, 1946, ch. 753, title V, Section 505, 60 Stat. 848.)

Section 529. Sinking funds; rate of tolls, cancellation of tolls.

If tolls are charged for the use of an interstate bridge constructed or taken over or acquired by a State or States or by any municipality or other political subdivision or public agency thereof, under the provisions of sections 525–533 of this title, the rates of toll shall be so adjusted as to provide a fund sufficient to pay for the reasonable cost of maintaining, repairing, and operating the bridge and its approaches under economical management, and to provide a sinking fund sufficient to amortize the amount paid therefor, including reasonable interest and financing cost, as soon as possible under reasonable charges, but within a period of not to exceed thirty years from the date of completing or acquiring the same. After a sinking fund sufficient for such amortization shall have been so provided, such bridge shall thereafter be maintained and operated free of tolls. An accurate record of the amount paid for acquiring the bridge and its approaches, the actual expenditures for maintaining, repairing, and operating the same, and of the daily tolls collected, shall be kept and shall be available for the information of all persons interested. (Aug. 2, 1946, ch. 753, title V, Section 506, 60 Stat. 848; May 25, 1948, ch. 336, 62 Stat. 267.)

AMENDMENTS

1948–Act May 25, 1948, extended the amortization period from 20 to 30 years.

Section 530. Bridges included and excluded.

The provisions of sections 525–533 of this title shall apply only to bridges over navigable waters of the United States, the construction of which is approved after August 2, 1946, under the provisions of said sections; and the provisions of the first proviso of section 401 of this title, and the provisions of sections 491–498 of this title, shall not apply to such bridges. (Aug. 2, 1946, ch. 753, title V, Section 507, 60 Stat. 849.)

Section 531. International bridges.

Sections 525–533 of this title shall not be construed to authorize the construction of any bridge which will connect the United States, or any Territory or possession of the United States, with any foreign country. (Aug. 2, 1946, ch. 753, title V, Section 508, 60 Stat. 849.)

Section 532. Eminent domain.

There are conferred upon any individual, his heirs, legal representatives, or assigns, any firm or corporation, its successors or assigns, or any State, political subdivision, or municipality authorized in accordance with the provisions of sections 525–533 of this title to build a bridge between two or more States, all such rights and powers to enter upon lands and acquire, condemn, occupy, possess, and use real estate and other property in the respective States needed for the location, construction, operation, and maintenance of such bridge and its approaches, as are possessed by railroad corporations for railroad purposes or by bridge corporations for bridge purposes in the State in which such real estate or other property is situated, upon making just compensation therefore to be ascertained and paid according to the laws of such State, and the proceedings therefor shall be the same as in the condemnation or expropriation of property for public purposes in such State. (Aug. 2, 1946, ch. 753, title V, Section 509, 60 Stat. 849.)

Section 533. Penalties.

Any person who fails or refuses to comply with any lawful order of the Secretary of the Army or the Chief of Engineers issued under the provisions of sections 525–533 of this title, or who fails to comply with any specific condition imposed by the Chief of Engineers and the Secretary of the Army relating to the maintenance and operation of bridges, or who refuses to produce books, papers, or documents in obedience to a subpena or other lawful requirement under said sections, or who otherwise violates any provisions of said sections, shall, upon conviction thereof, be punished by a fine of not to exceed $5,000 or by imprisonment for not more than one year, or by both such fine and imprisonment. (Aug. 2, 1946, ch. 753, title V, Section 510, 60 Stat. 849.)

Section 534. Conveyance of right, title, and interest of United States in bridges transferred to States or political subdivisions; terms and conditions.

The Secretary of the Army is authorized to transfer or convey to State authorities or political subdivisions thereof all right, title, and interest of the United States, in and to any and all bridges heretofore or hereafter constructed or acquired in connection with the improvement of canals, rivers and harbors, or works of flood control, together with the necessary lands, easements, or rights-of-way, upon such terms and conditions and with or without consideration, as may be determined to be in the best interest of the United States by the Chief of Engineers: Provided, That such transferred bridges shall be toll-free. (May 17, 1950, ch. 188, title I, Section 109, 64 Stat. 168.)

CODIFICATION

Section was not enacted as a part of the General Bridge Act of 1946 which comprises sections 525–533 of this title.

FORTY-SECOND CONGRESS

SESSION II

CHAP. CCXIII

An Act to authorize the Construction of a Bridge, and to establish the same as a Post-road.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That it shall be lawful for any person or persons, company or corporation, having authority from the States of Iowa and Illinois, to build a bridge across the Mississippi river at Fort Madison, Iowa, and to lay on or over said bridge railway-tracks, for the more perfect connection of any railroads that are or shall be constructed to the said river at or opposite said point, under the limitations and conditions hereinafter provided; that said bridge shall not interfere with the free navigation of said river beyond what is necessary in order to carry into effect the rights and privileges hereby granted; and in case of any litigation arising from any obstruction or alleged obstruction to the free navigation of said river, the cause may be tried before the district court of the United States of any State in which any portion of said obstruction or bridge touches.

Sec. 2. That any bridge built under the provisions of this act, may, at the option of the company building the same, be built either as a pivot drawbridge, with a pivot or other form of draw, or with unbroken or continuous spans: **Provided,** That if the said bridge shall be made with unbroken and continuous spans, it shall not be of less elevation in any case than fifty feet above high-water mark, as understood at the point of location, to the bottom chord of the bridge, nor shall the spans of said bridge be less than two hundred and fifty feet in length; and the piers of said bridge shall be parallel with the current of the river, and the main span shall be over the main channel of the river, and not less than three hundred feet in length: **And provided also,** That if any bridge built under this act shall be constructed as a pivot drawbridge, the same shall be construc-

ted with a draw over the main channel of the river at an accessible and navigable point, and with spans of not less than one hundred and sixty feet in length in the clear on each side of the central or pivot pier of the draw, and the next adjoining spans to the draw shall not be less than two hundred and fifty feet, if the proper location of the draw over the channel will admit spans of this width between it and the shore, and said spans shall not be less than thirty feet above low-water mark and not less than ten above extreme high-water mark, measuring to the bottom chord of the bridge; and the piers of said bridge shall be parallel with the current of the river where said bridge may be erected: **And provided also,** That said draw shall be open promptly, upon reasonable signal, for the passage of boats, and in no case shall unnecessary delay occur in opening the said draw during or after the passage of trains.

Sec. 3. That any bridge constructed under this act, and according to its limitations, shall be a lawful structure, and shall be known and recognized as a post-route, upon which, also, no higher charge shall be made for the transmission over the same of the mails, the troops, and the munitions of war of the United States than the rate per mile paid for their transportation over the railroads or public highways leading to the said bridge; and the United States shall have the right of way for postal-telegraph purposes across said bridge.

Sec. 4. That all railway companies desiring to use the said bridge shall have and be entitled to equal rights and privileges in the passage of the same and in the use of the machinery and fixtures thereof and of all the approaches thereto, under and upon such terms and conditions as shall be prescribed by the Secretary of War, upon hearing the allegations and proofs of the parties in case they shall not agree.

Sec. 5. That the structure herein authorized shall be built and located under and subject to such regulations for the security of navigation of said river as the Secretary of War shall prescribe; and to secure that object the said person or persons, company or corporation, shall submit to the Secretary of War, for his examination and approval, a design and drawings of the bridge and piers, and a map of the location, giving,

for the space of at least one mile above and one mile below the proposed location, the topography of the banks of the river, the shore-lines at high and low water, the direction and strength of the currents at all stages, and the soundings accurately showing the bed of the stream, the location of any other bridge or bridges, and shall furnish such other information as may be required for a full and satisfactory understanding of the subject; and until the said plan and location of the bridge are approved by the Secretary of War, the bridge shall not be built; and if any change be made in the plan of construction of said bridge during the progress of the work thereon, or before the completion of said bridge, such change shall be subject to the approval of the Secretary of War; and the said structure shall be at all times so kept and managed as to offer reasonable and proper means for the passage of vessels through or under said structure; and the said structure shall be changed at the cost and expense of the owners thereof, from time to time, as Congress may direct, so as to preserve the free and convenient navigation of said river. And the authority to erect and continue said bridge shall be subject to revocation or modification by law whenever the public good shall, in the judgment of Congress, so require, without any expense or charge to the United States.

Sec. 6. That the right to alter or amend this act, so as to prevent or remove all material obstructions to the navigation of said river by the construction of bridges, without expense to the United States, is hereby expressly reserved.

Approved, May 25, 1872.