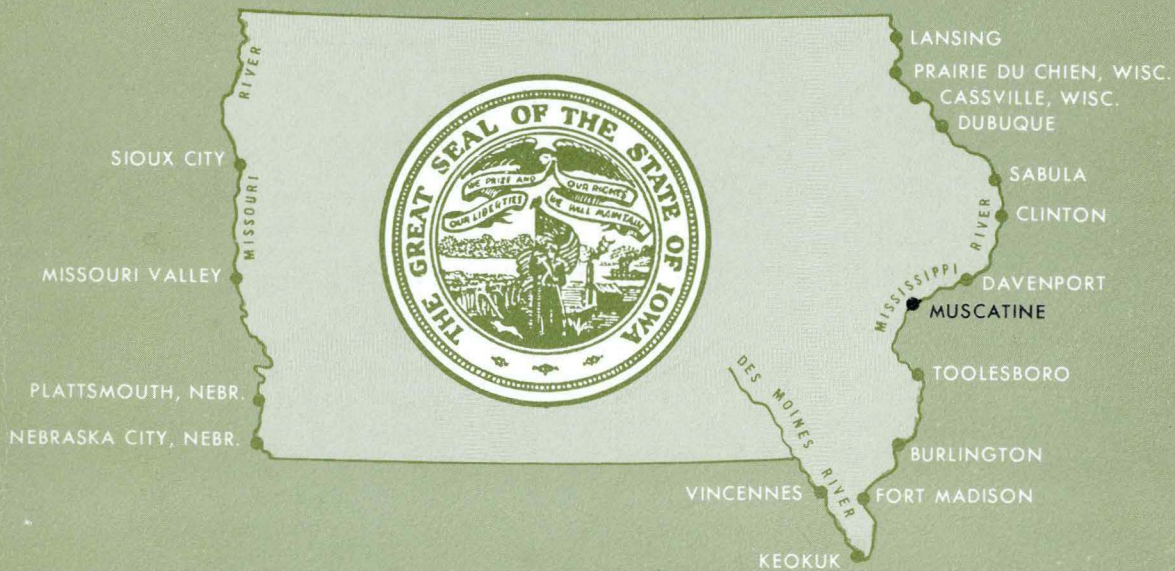


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IOWA STATE HIGHWAY COMMISSION



*Bridge Location,  
Revenue and Traffic Studies*

AT  
**MUSCATINE, IOWA**

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

WILBUR SMITH & ASSOCIATES  
traffic consultants  
NEW HAVEN, CONN.

TGB155  
H83m2

MISSISSIPPI RIVER TOLL BRIDGE

*Wilbur Smith & Associates, Inc.*

Cable: WILSMITH  
(203) 865-2191

TRANSPORTATION CONSULTANTS

155 WHITNEY AVENUE • P. O. BOX 993

*New Haven, Conn. 06510*

April 24, 1968

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

Dear Mr. Coupal:

We respectfully submit this preliminary feasibility report for a new Mississippi River Bridge at Muscatine.

The report includes preliminary engineering studies, traffic and toll revenue estimates, comparative analysis of considered alternatives, preliminary project costs and an indication of project feasibility.

The estimated revenues and project cost indicate that a subsidy will be required to finance the proposed bridge. Although the feasibility computations for the two primary locations, Cedar Street and Cypress Street, are not comparable, the final choice of location may be determined by the relationship of the proposed bridge to local urban renewal projects rather than project cost. The findings of the study are summarized on page 3 of the report.

Grateful acknowledgement is made for the time, cooperation and assistance provided by the Commission, the officials of Muscatine, the U.S. Army Corps of Engineers, the Muscatine Bridge Commission, and the numerous agencies and individuals contacted during the course of our studies.

Respectfully submitted

HOWARD, NEEDLES, TAMMEN & BERGENDOFF

*Paul L. Heineman*  
Paul L. Heineman

WILBUR SMITH & ASSOCIATES

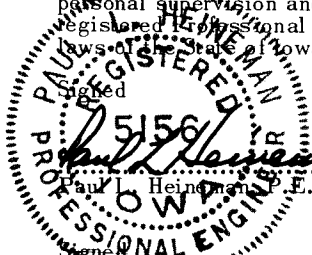
*Wilbur S. Smith*  
Wilbur S. Smith

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.

Date

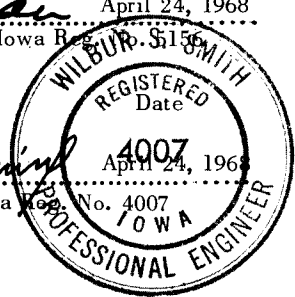
April 24, 1968

*Paul L. Heineman*  
Paul L. Heineman, P.E. Iowa Reg. No. 5156

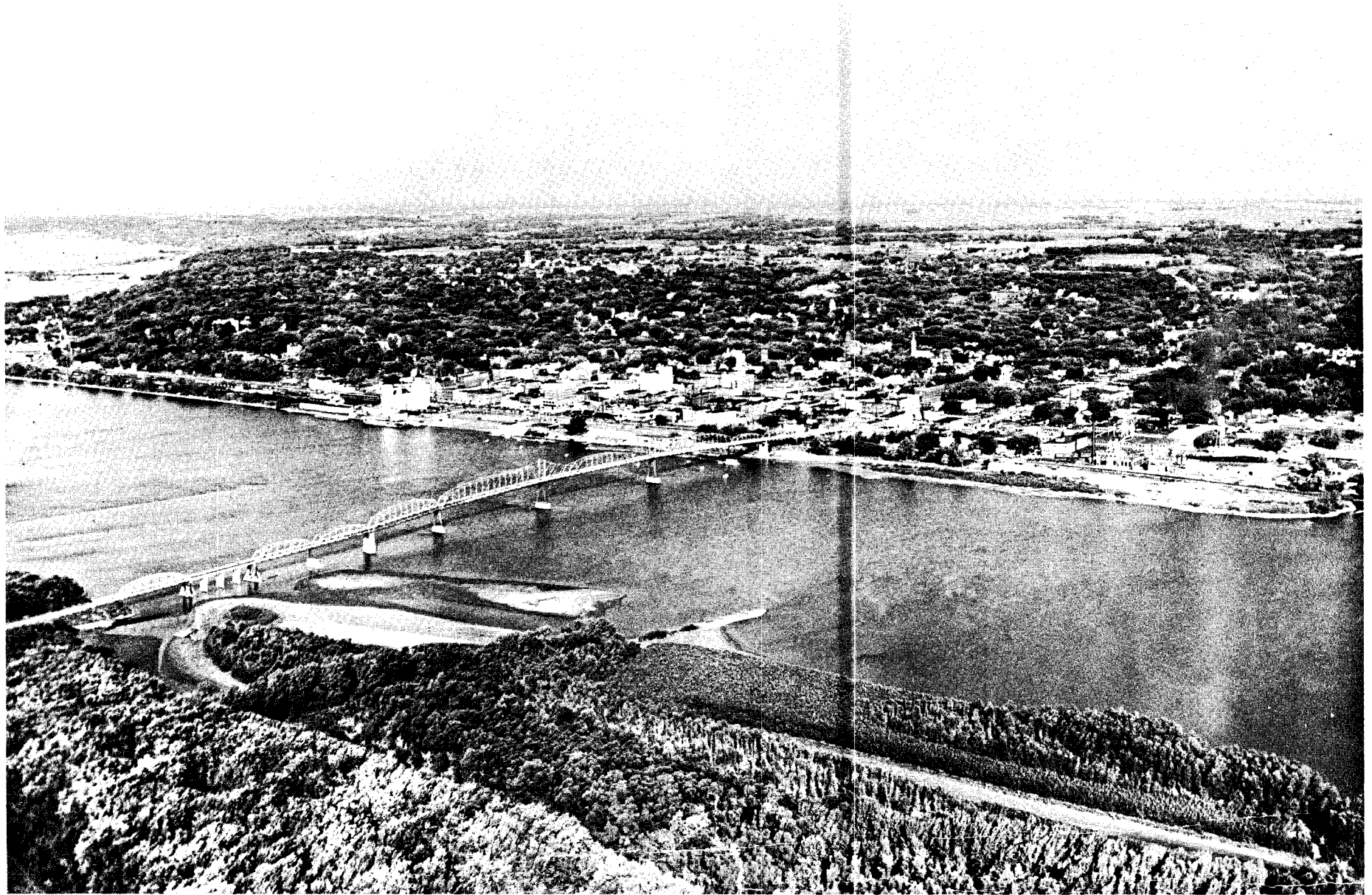


April 24, 1968

*Wilbur S. Smith*  
Wilbur S. Smith, P.E. Iowa Reg. No. 4007







AERIAL VIEW OF MUSCATINE LOOKING SOUTHWEST

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**MUSCATINE, IOWA**

**MISSISSIPPI  
RIVER  
TOLL  
BRIDGE**

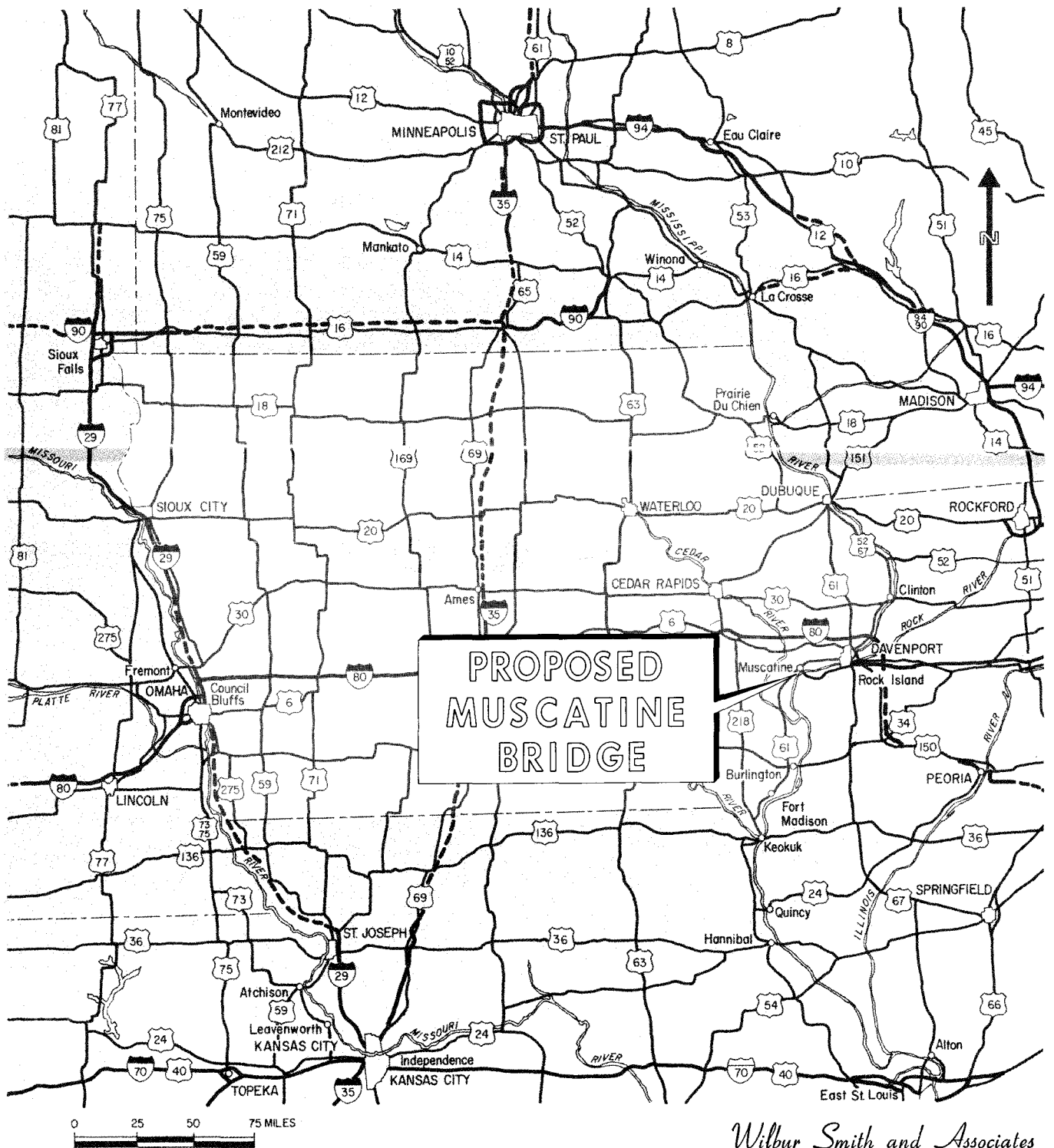
**APRIL  
1968**

**PRELIMINARY ENGINEERING REPORT**

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

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

WILBUR SMITH & ASSOCIATES  
traffic consultants  
NEW HAVEN, CONN.



*Wilbur Smith and Associates*

**Figure 1**  
**REGIONAL MAP**

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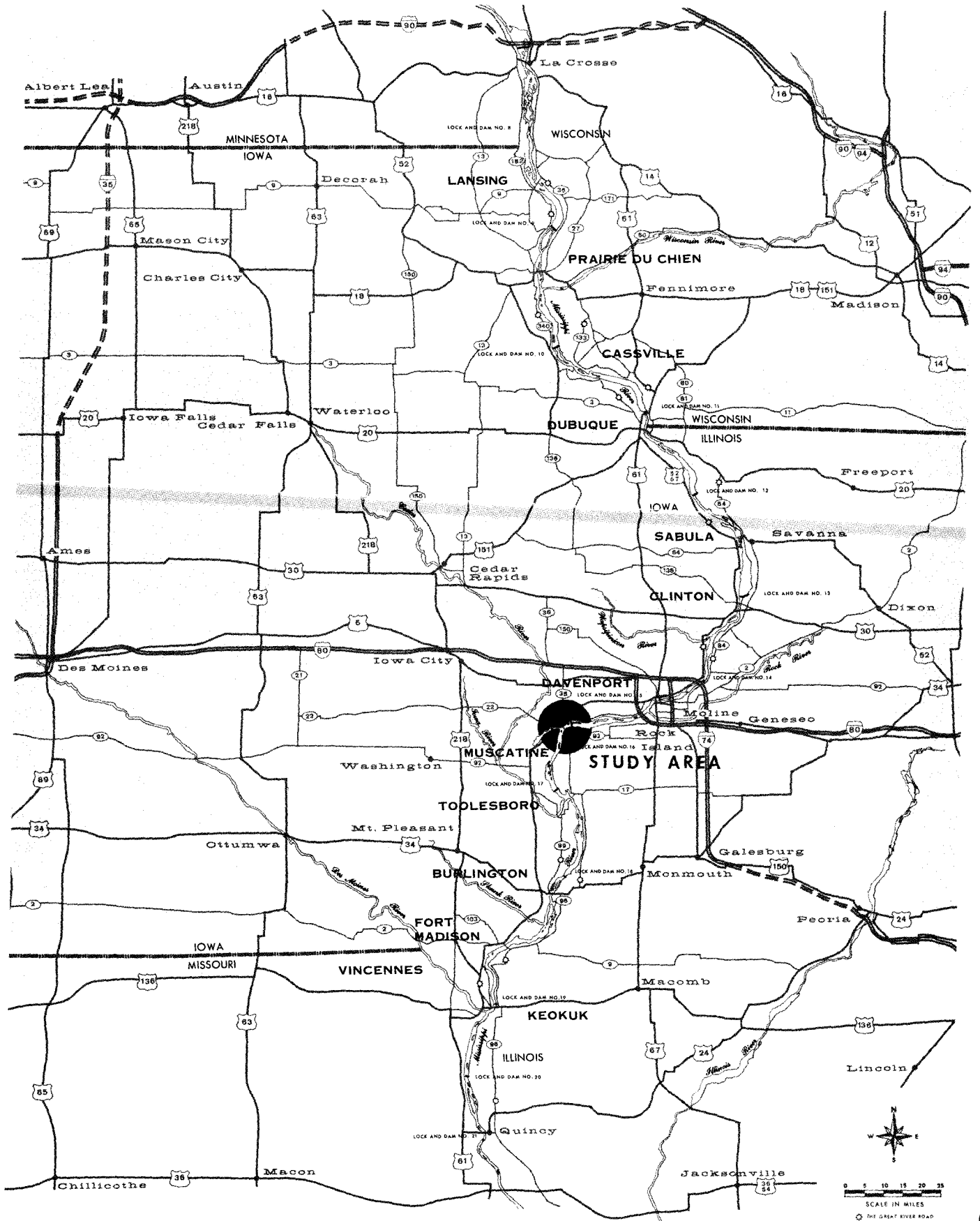


Exhibit 2  
VICINITY MAP

# MISSISSIPPI RIVER BRIDGE LOCATION STUDIES

## MUSCATINE, IOWA

### INTRODUCTION

Muscatine, Iowa, as shown in Figure 1, opposite the Table of Contents, is located on the Mississippi River, approximately 30 miles west and south of Davenport and about 45 miles north of Burlington, Iowa. The community contains several industrial activities, providing roughly 4,000 jobs, and also serves as a commercial and professional services center for a considerable area including the major portion of Muscatine County, Iowa, plus the westernmost townships in Rock Island and Mercer Counties, Illinois.

Muscatine is linked to Interstate Route 80, the major east-west route to Des Moines and across Iowa, by Iowa Route 38. U.S. Route 61 and Iowa Route 22 provide traffic service to the Davenport area on the east, while U.S. Route 61 and Iowa Route 92 connect Muscatine with Burlington and points south and west. These routes focus on Muscatine's business district, where Iowa Route 92 crosses the river on the present bridge to become Illinois Route 92, which has a generally east-west orientation through Rock Island County providing an alternative route to the Rock Island-Moline-Davenport area.

This bridge, built in 1890, has served the community for 77 years, although it has two narrow, substandard traffic lanes. It does not adequately serve the community at the present time; it cannot be expected to accommodate the traffic increase which would accompany a normal growth of the Muscatine area. Since it is estimated by local businessmen that 35 per cent of the retail business in Muscatine comes from Illinois residents, the economic well-being of Muscatine is directly related to the provision of a modern, safe Mississippi River Bridge.



## **AUTHORITY AND PURPOSE OF REPORT**

In December 1967, the Iowa State Highway Commission authorized the preparation of a preliminary feasibility report for a proposed crossing in the Muscatine area. The report is one of several comparable bridge studies to be conducted as part of the Iowa Toll Bridge program, in accord with legislation enacted by the Iowa General Assembly.

The various locations along the Mississippi River to be studied under this program are as shown on Exhibit 2, opposite page 1, with Muscatine Area set out in red as the subject of this report.

## **SCOPE OF SERVICES**

This report summarizes preliminary engineering, revenue and feasibility studies of a new Mississippi River toll bridge at Muscatine. These studies include:

1. Analysis of the physical limitations imposed by navigational requirements, terrain, existing levees, railroads, real property values, and the existing city street pattern.
2. Recommendation of the most economical river bridge and approach locations, selected by comparative analyses of considered alternatives, and estimates of project costs.
3. Forecast of the traffic estimated to use the bridge operated as a toll facility and the revenues which might be expected from that use.
4. A determination of preliminary project feasibility based on the relationship of project costs to anticipated revenues.

Documented in Part I, prepared by Howard, Needles, Tammen & Bergendoff, are the results of various bridge location studies, studies of alternative roadway approaches, together with costs, conclusions and recommendations for the location of a new Mississippi River structure.

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

### **SUMMARY OF FINDINGS**

Replacement of the existing Muscatine Bridge is necessary if existing and potential traffic are to be adequately served.

Location of a new Mississippi River Bridge one-half mile upstream from the existing bridge, with approaches connecting to the intersection of Cypress Street and Second Street, will be the most economical of all alternate locations studied. The estimated total cost of a bridge and approaches at this location is \$4,470,000. Construction of a bridge at Cedar Street would involve a total cost of \$5,045,000.

Estimated toll revenues at both locations would be about equal, however, there would be some traffic service advantages to the Cedar Street alignment.

The preliminary feasibility calculations indicate that toll operation of either bridge will not provide sufficient income to retire revenue bonds. A subsidy of \$5,050,000 will be required over a 28-year period to finance a bridge at Cypress Street or \$6,870,000 during the same period at Cedar Street. The latter sum excludes any consideration of possible credits applicable to a proposed urban renewal project in Muscatine.

## PART I

### LOCATION AND COST STUDIES

by: Howard, Needles, Tammen & Bergendoff

#### 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. The following are items of data pertinent to a Mississippi River crossing at Muscatine.

#### Geology

The study location for a proposed new crossing of the Mississippi River at Muscatine is in an area where the Mississippi River flood plain is approximately two miles wide. The alluvial deposits in the flood plain consist of sand, gravel and silt with occasional thin amounts of loess. Underlying this recent alluvium are the limestones, shales and sandstones of Mid-Devonian age. Borings taken in connection with U.S. Lock and Dam No.16 indicate sound bedrock at elevation 495 Mean Sea Level in mid-channel.

Bedrock forming the east or Illinois bluffs is the Cedar Valley limestone of Mid-Devonian age and is capped by as much as 50 feet of glacial drift and loess in places.

Limestone, shale and sandstone of the Mid-Devonian age comprise the lower bedrock strata along the eastern part of Muscatine, Iowa, adjacent to the Mississippi River. Shale, thin limestone, and occasional sandstone seams of the Des Moines series, Pennsylvanian age, overlie the Mid-Devonian rock and are capped with up to 50 feet of glacial drift and loess.

Substructures for the proposed crossing can be founded on the area bedrock directly or by bearing piles driven through the flood plain sediments to rock. Approach embankments should present no special problems in the flood plain area. Foundation borings will be required in subsequent phases of design to establish the depth to rock and quality of rock, and to verify the capability of flood plain sediments to support embankments.

### **River Conditions**

U.S. Lock and Dam No. 16, approximately one mile upstream, defines the position of the navigation channel of the Mississippi River north of Muscatine and the existing Muscatine bridge defines its position at Muscatine as approximately 750 feet from the Iowa shoreline. Between these two points the navigation channel alignment is a one degree reversed curve. For a mile south of the existing bridge the channel is straight and would impose no problems for a bridge location. From this point to the Municipal Electric Plant, the channel follows a sharp reversed curve alignment. Severe river currents, with resulting hazardous navigation conditions, preclude the location of a bridge in this area. These general features are shown in Exhibit 3, page 6.

Normal river stage at Muscatine is 536.0 Mean Sea Level. At this elevation, Mississippi Drive is 16 feet above the Mississippi River and will be flooded, on the average, once each ten years. When this happens, severe conditions of congestion and disruption of traffic are experienced in Muscatine because the only other route for U.S. 61 through traffic is via streets on the west side of Muscatine. Hershey Avenue, which provides access to these streets, is not a desirable route for through truck traffic because of extreme grades.



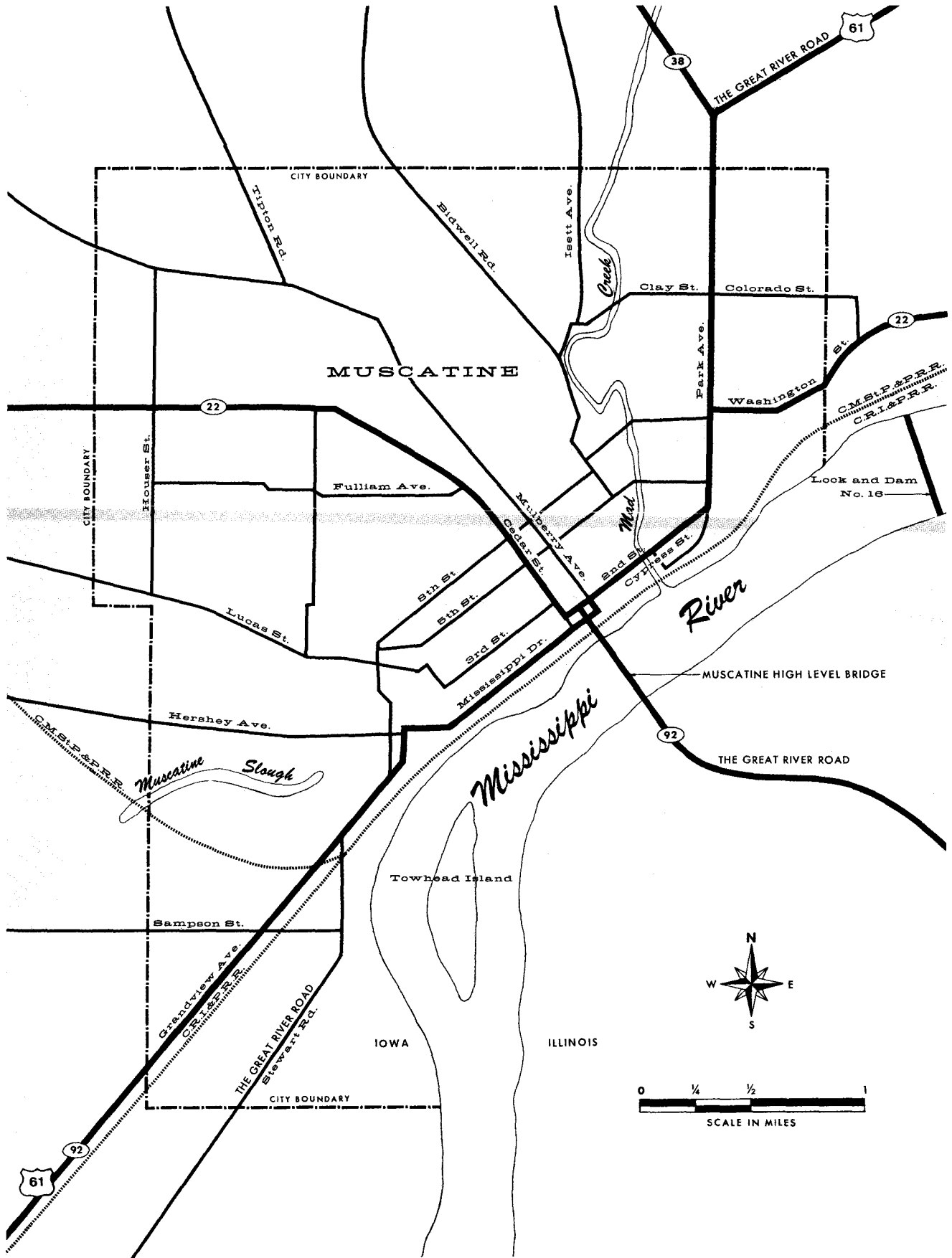


Exhibit 3

MUSCATINE STUDY AREA

## **Railroad Conditions**

Two mainline tracks of the Chicago, Rock Island & Pacific Railroad Company are parallel and adjacent to the Iowa shore through the Muscatine area. The track elevation in the downtown Muscatine area varies from elevation 550 to 555 Mean Sea Level (elevation 301 to 306 local datum), generally at the same elevation as Mississippi Drive. The tracks are subject to flooding during periods of extreme high water (elevation 555.9 in 1965).

The present Muscatine Bridge provides only 19 feet - 4 inches of vertical clearance over the railroad mainline tracks. The desirable vertical clearance over railroad tracks is 23 feet. The railroad company has indicated that if the present restriction of the existing bridge is removed, the railroad will raise its tracks to a top-of-rail elevation of 558.5. Location of the tracks at this elevation would provide 2.6 feet of freeboard over the 1965 high water elevation.

## **Existing Highways**

The Muscatine Bridge connects Iowa Route 92 and Illinois Route 92. Iowa Route 92 is a major east-west route lying approximately midway between Interstate Route 80 and U.S. Route 34. Illinois Route 92, connecting with Interstate Route 280, immediately south of Rock Island, Illinois, is coincident with U.S. Route 61 for 15 miles south of Muscatine. Therefore, Route 92 carries interstate through traffic as well as local traffic. The bridge also carries through traffic desiring to use Iowa Route 22 west of Muscatine.



Exhibit 4

## EXISTING MUSCATINE HIGH LEVEL BRIDGE

### The Existing High Level Muscatine Bridge

The existing Muscatine Bridge, Frontispiece and Exhibit 4, page 8, is a cantilevered through truss structure built in 1890. Its roadway is 16 feet - 8 inches in width, with a 4-foot sidewalk bracketed outside the truss on the downstream side of the structure. Horizontal and vertical clearances of 427.6 feet and 67.4 feet, respectively, are provided by the main channel span.

In 1956, a span on the Illinois side collapsed, dropping vehicles into the water. That failure has created an adverse psychological effect upon actual and prospective users of the bridge and has caused a substantial economic loss to the City of Muscatine, since many Illinois residents reportedly refuse to cross the antiquated structure.

A maximum speed restriction of 20 miles per hour and a weight limitation of 8 tons are currently in effect. Tandem axle trucks are prohibited from using the bridge and two loaded trucks are not permitted on the same span simultaneously. The traffic-carrying capacity of the bridge is obviously greatly reduced due to these restrictions.

### **Existing Bridges near Muscatine**

The nearest Mississippi River highway bridge downstream from Muscatine is 52 miles to the south at Burlington, Iowa. This high level structure, with a cantilever truss for the main river span, was completed in 1917. The nearest highway bridge upstream from Muscatine is 27 miles to the northeast at Davenport, Iowa. This high level bridge is of tied arch design and was completed in 1940. The nearest highway bridge upstream from Muscatine will be 24 miles to the northeast of Davenport, Iowa, when the Interstate 280 bridge is completed in 1970.

The location of these highway bridges emphasizes the importance of a modern highway bridge at Muscatine. If an adequate highway bridge was not available at Muscatine, motorists would have to go either 52 miles downstream or 24 miles upstream to cross the Mississippi River.

### **Proposed Highway Improvements**

A Comprehensive Metropolitan Plan recently prepared for Muscatine recommends a U.S. Route 61 Bypass around the west side of Muscatine and an expressway along the east side of Mad Creek. This bypass location for U.S. 61 corresponds to that shown in the preliminary studies of the Great River Road conducted by the Bureau of Public Roads in 1963.

The U.S. Route 61 Bypass, as recommended in the Comprehensive Metropolitan Plan, would be a four-lane, limited access and grade-separated circumferential highway. Two of its functions would be to provide a suitable roadway to cross the bluff north of Hershey Avenue and to remove through U.S. Highway 61 truck traffic from the Central Business District and the school crossing area north of the CBD.



The Mad Creek Expressway would serve the industrial area in the Mad Creek valley, thereby relieving local streets of truck traffic. This facility, proposed to connect with Isett Avenue approximately one-half mile south of the proposed U.S. Route 61 Bypass, would terminate at Second and Cypress Streets.

Neither the U.S. Route 61 Bypass nor the Mad Creek Expressway are programmed for design or construction by the Iowa State Highway Commission or the City of Muscatine. It is not anticipated that either project will be developed for many years.

### **Navigation Clearances**

Criteria for navigation clearances has been tentatively established by the Rock Island District of the U.S. Army Corps of Engineers. Final approval of clearances can only be determined after formal application has been filed and public hearings conducted. The minimum permissible bridge opening on the Mississippi River is 400 feet. This 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 immediately upstream from the bridge.

If a bridge is located at Cypress Street, the probable required minimum horizontal clearance will be 500 feet. This will be sufficient to allow large barge tows to maneuver while negotiating the reversed curves of the channel alignment.

If the bridge is located at Cedar Street, the required minimum horizontal clearance might be 400 feet. However, since the present bridge provides a clear opening of about 430 feet, this clearance might be imposed and has, therefore, been used for preliminary studies at the Cedar Street location.

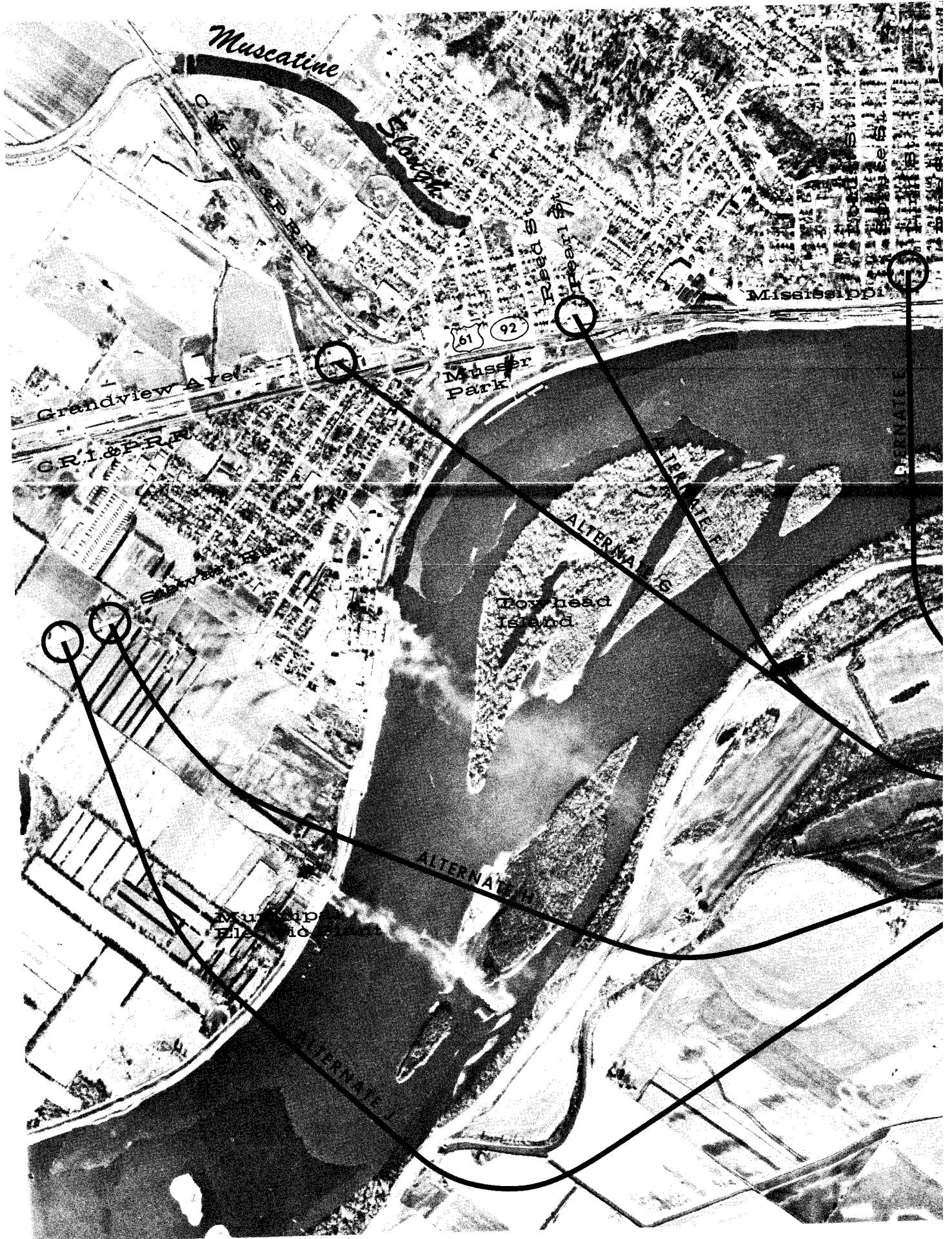
The minimum vertical clearance for a bridge structure is 52 feet above the 2 per cent waterline elevation or 60 feet above flat pool, which-

ever 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 Muscatine area, low steel elevation due to the 2 per cent waterline elevation specification is 600.7 while the elevation due to the flat pool specification is 596.0. Therefore, low steel elevation of the proposed bridge, in the main channel span, must be not less than 600.7.

### **Drainage**

A serious drainage condition in the Muscatine area influences the choice of a location for the bridge. The problem exists along the portion of U.S. 61, Mississippi Drive adjacent to the Central Business District, which was flooded in 1965. The existing Mississippi River bridge was closed from April 23 to May 11 in that year. A recent master plan report on a sewerage system for Muscatine indicates that a pumping capacity of 630,000 gpm would be necessary to eliminate the flooding of Mississippi Drive when the river reaches a stage of 20 feet or elevation 551.0. This stage is equivalent to a 10-year flood and has been exceeded twice in the past 20 years. The first flood occurred in 1952 when the river stage was 21.0 feet and the second in 1965 when the river stage was 24.8 feet. The latter was the highest flood on record and is estimated to be equivalent to a 75-year flood. The cost of all improvements to prevent Mississippi Drive from flooding has been estimated to be in excess of \$2,000,000.

Even with improvements to prevent the inundation of Mississippi Drive, U.S. 61 would be closed to traffic at the Second Street bridge over Mad Creek since levee closure structures are placed across Second and Fifth Streets when the river stage reaches 19 feet or when a heavy storm is anticipated in conjunction with a rising river. These closure structures block U.S. 61 along Second Street, on the average, for several days once each year.



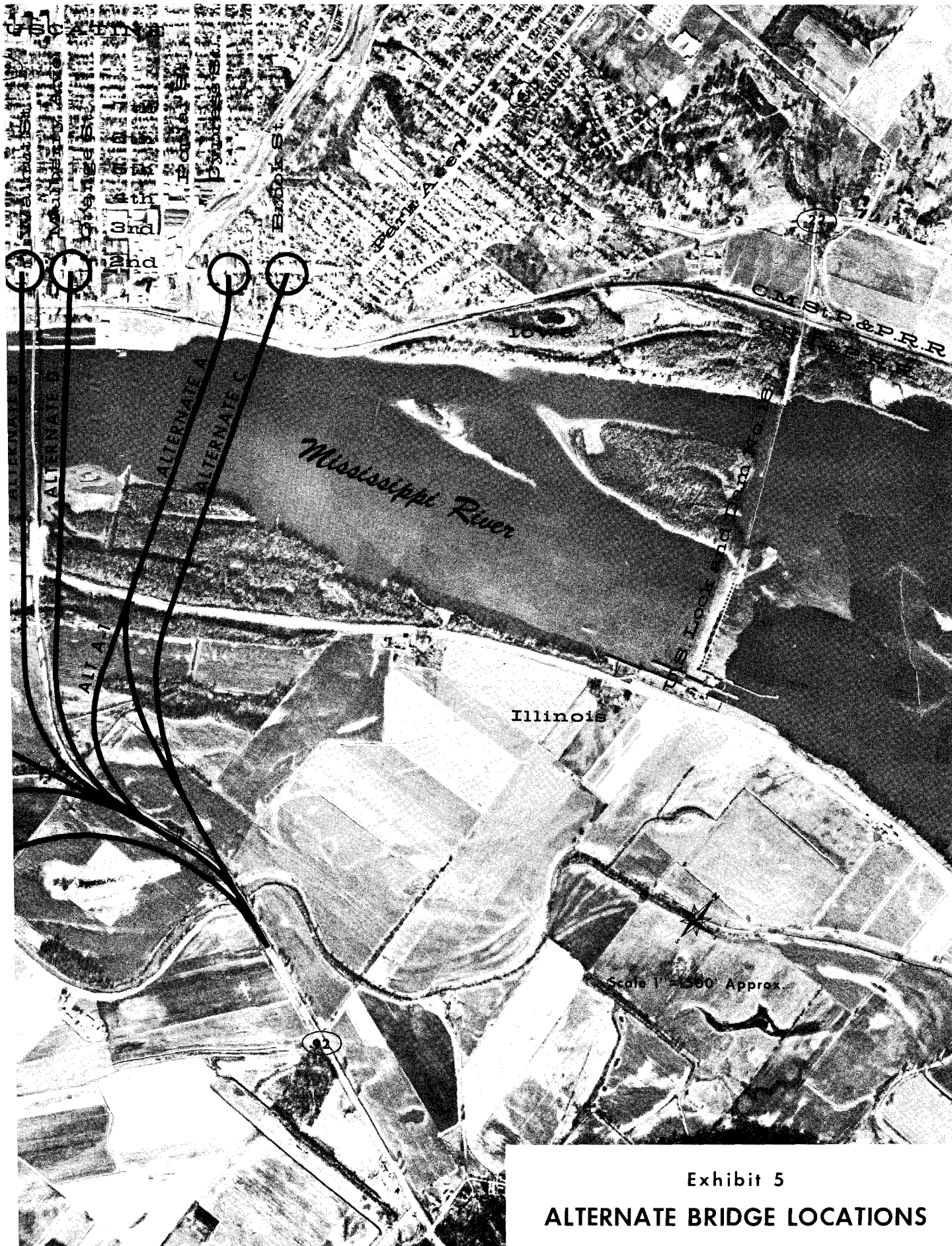


Exhibit 5  
ALTERNATE BRIDGE LOCATIONS



## **ALTERNATE LOCATIONS**

### **General**

Nine alternative bridge sites, as shown in Exhibit 5, page 12, were studied and evaluated for a new Mississippi River crossing at Muscatine. Previous location studies, prepared for the Muscatine Bridge Commission by Sverdrup & Parcel and others, were reviewed together with additional sites which appeared to warrant investigation. Two sites, Alternate A - Cypress Street Location, and Alternate B - Cedar Street Location, were subsequently developed in detail for presentation in this report. Alternate A is shown on Exhibits 6, page 15, and 11, page 27. Alternate B is shown on Exhibit 6. The principal features and relative merits of all considered alternatives are summarized in the following paragraphs.

### **Cypress Street Alternate**

Two approach configurations are practical for the Cypress Street Bridge approach at Second and Cypress Streets in Muscatine. With the first alternative, the Iowa approach may tie directly into Second Street with a tee intersection opposite the beginning point of the proposed Mad Creek Expressway. This approach plan has the advantages of being simple and economical. Traffic from the bridge destined for U.S. 61 would be routed over U.S. 61 on its present location.

A relocation of U.S. 61 from a point north of the Mad Creek bridge to a point near the intersection of Oak Street and Mississippi Drive (extended northward) would permit continuous operation on U.S. 61 even when Second Street is closed by placement of the closure structure at the Mad Creek bridge. This location, requiring relocation of the Rock Island railroad tracks, is shown on Exhibit 6.

The second alternative Iowa approach requires the relocation of a section of U.S. 61. Traffic on U.S. 61 is a major problem confronting the City of Muscatine during periods of high water. When the old bridge is removed, the Rock Island Railroad proposes to raise its tracks. If, at

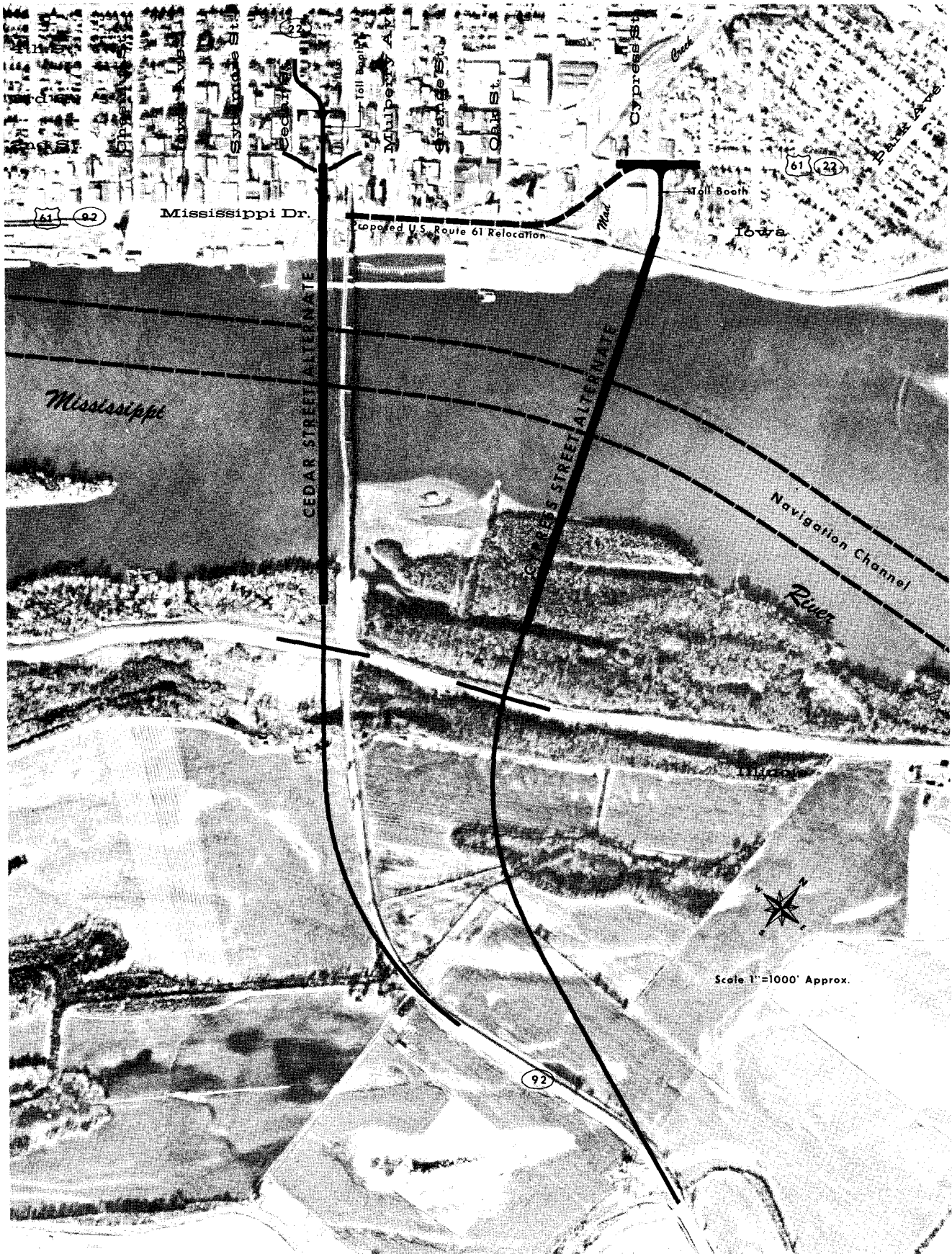


Exhibit 6  
CYPRESS STREET AND CEDAR STREET BRIDGE LOCATIONS

that time, U.S. 61 were relocated above the highwater elevation from the intersection of Park Avenue and Second Street to Mississippi Drive near Oak Street, traffic on U.S. 61 would not be affected by future floods. The realignment would generally follow Park Avenue down to Mississippi Drive, thence along Mississippi Drive to a point near a new railroad embankment, along a parallel embankment to Mad Creek, over Mad Creek above its flood stage, and again along a parallel embankment southward to existing Mississippi Drive at Oak Street. This plan would require extensive realignment of the Chicago, Rock Island & Pacific tracks and a new structure over Mad Creek.

These two realignments of U.S. 61 could be easily coordinated with the type of area redevelopment visualized in the recent Muscatine Comprehensive Plan. The approaches to the Muscatine Bridge, as proposed, would incorporate both direct access to Second Street to serve Central Business District traffic and direct access to relocated U.S. 61 to serve through traffic.

#### **Cedar Street Alternates**

The most promising alignment of a location into the Central Business District proper is midway between Cedar and Walnut Streets connecting directly to Third Street. This alignment, shown on Exhibit 6, page 15, permits Cedar Street and Walnut Street, one block to the north of Cedar Street, to be used as a one-way pair, Third Street and Second Street as a one-way pair, and a direct connection to Cedar Street west of Third Street for State Route 22 traffic. Second Street would need to be relocated between Cedar and Walnut to provide adequate vertical clearance under the new bridge. The grade on the Iowa approach of the river bridge would be 4%, a desirable grade. The problems inherent in the relocation of Second Street would be minimized if the rehabilitation of the area, under Urban Renewal programs, could be coordinated with the bridge construction.

The Cedar Street alignment shown on Exhibit 6 assumes that Cedar is one-way eastbound and Walnut one-way westbound. These travel directions will cause a "scissors" crossing movement at the approach terminal at Third Street. To eliminate this movement, Third Street should be one way northbound which would necessitate reversal of the present one way northbound movement on Second Street. Regardless of the travel direction on Cedar and Walnut, the cost of the bridge and its approaches at the Cedar Street alignment will be the same.

Two other approach treatments are possible for a bridge approach from the CBD, see Exhibit 7, page 18. The first involves a direct connection to the intersection of Cedar and Second Streets. While this alignment provides direct access to the CBD at Second Street, the approach alignment is reversed 150-ft. radius curves. This alignment does, however, give the relatively small volume of traffic desiring to use Iowa Highway 22 a direct route since Cedar Street is Highway 22. The major disadvantage of this alternative is its reverse curve alignment. This alignment is necessary to provide sufficient distance between the Rock Island tracks and the Second Street-Cedar Street intersection for a toll booth. The reverse curves would need to be not greater than 150 foot radius to result in an approach grade of not more than 4%.

A second alternative bridge approach could connect directly to Mississippi Drive with a 160-ft. loop alignment. This would eliminate the problem of routing non-Central Business District traffic along CBD streets, but would not solve the problem of poor alignment and approach grades. Grades would approximate 4.9% and most of the property in the block bounded by Cedar Street, Second Street, Walnut Street and Mississippi Drive would be required. The approach grade is controlled by the Rock Island Railroad which plans to raise its tracks when the existing bridge is replaced. This revision of track elevation of some 7 feet causes the undesirable grades on the approach, which, although better than on the approach to the existing bridge, would be less than satisfactory for a new modern structure, particularly in combination with the 160-foot radius loop approach from Mississippi Drive.



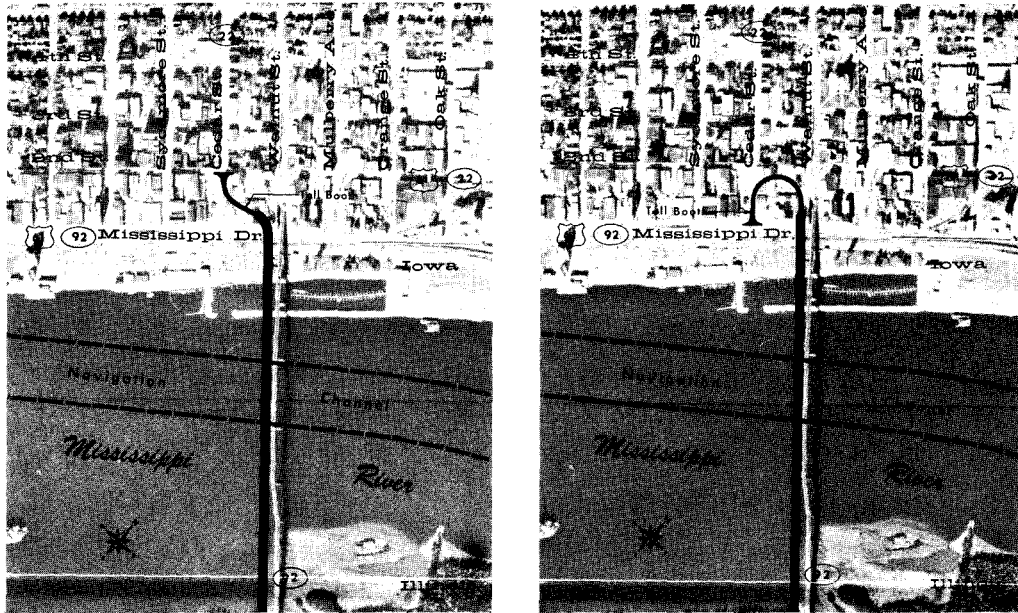


Exhibit 7

## CEDAR STREET TERMINAL ALTERNATIVES

A new bridge at the Cedar Street location would, according to expressions of opinion by several community leaders, "split the Central Business District", cause problems for the small boat harbor, and require relocation of access to the city park fronting on the Mississippi River. The large turning radii required for trucks and semi-trailers has also been a subject of local concern in past discussions of the location of a new bridge. Current design criteria for minimum truck turning radii - as established by the American Association of State Highway Officials - is 50 feet. Such turning radii has been incorporated in planning for all of the alternative alignments; however, these truck radii could be provided at existing street intersections only by acquiring additional right of way. These are all valid matters of concern which must be considered in the selection of the bridge location.

The impact of a bridge at Cedar Street could also be beneficial to the city because the Central Business District is the origin or destination of many cross-river trips and the approach is generally within the

boundaries proposed for an urban renewal project. Possible non-cash credits resulting from construction of the bridge require further study since such credits might be used to offset the greater cost of the Cedar Street Bridge. Thus, the final determination of bridge location may involve considerations beyond the scope of the engineering and revenue studies of this report. The bridge location and cost data contained herein can be compared with the benefits accruing to the urban renewal project to finally resolve the question of bridge location between the Cedar and Cypress Street sites.

### **Other Alternates**

Alternate C - This alignment would intersect Second Street at Brook Street, approximately eight blocks north of the existing bridge. The Alternate C location is generally comparable to the Cypress Street Alternate. It has an advantage of a nearly level bridge approach on the Iowa side because of a relatively high terminal elevation at Second and Brook Streets. The principal disadvantages are increased right-of-way costs in Muscatine and the difficulty of providing a future connection to the proposed Mad Creek Expressway.

Alternate D - A crossing site immediately upstream from the existing bridge would connect with either Second Street or Mississippi Drive in the vicinity of Mulberry Avenue. The Alternate D location is generally similar to the Alternate at Cedar Street; however, right-of-way costs would be somewhat greater. Alternate D offers no particular advantages over Alternates A, B and C.

Alternate E - This alignment serves the southern portion of the Muscatine Central Business District in the vicinity of Linn Street, approximately six blocks south of the existing bridge. Connection to U.S. 61 would involve undesirable approach grades and service to the Central Business District is poor, compared to Alternates B and D.

Alternate F - This river crossing is approximately 1.3 miles downstream from the existing bridge. The west approach would terminate in the vicinity of U.S. 61 and Pearl Street. Principal disadvantages of this location are: (1) Substantial adverse travel distance for traffic between Illinois and the Muscatine Central Business District; (2) Increased roadway construction on the Illinois approach; (3) Greater overall structure length requirements and (4) A greater main navigational span length because of the curved river channel alignment.

Alternate G - This alignment is similar to the location of Alternate F and has the same disadvantages. Construction and right-of-way costs would be even greater than for Alternate F, however, because of increased lengths in both the main river structure and the Iowa approach. Alternate G provides no significant advantages.

Alternate H - A location immediately upstream from the Municipal Electric Plant is shown in this alignment. This site, approximately 2.5 miles downstream from the existing bridge, would require substantial adverse travel for all traffic movements between Illinois and the Muscatine Central Business District. Approximately two miles of new approach roadway construction would also be required between the main bridge and State Route 92 in Illinois. Other major deficiencies inherent to this site are an increased main navigational span length because of the curved river channel and an at-grade crossing of the Chicago, Rock Island and Pacific Railroad tracks for all traffic movements between the bridge and existing U.S. 61.

Alternate J - This site, approximately three miles downstream from the existing Muscatine bridge and immediately south of the Municipal Electric Plant, is similar to Alternate H. Although the river is narrow at this point, a combination of severe currents and a curved channel alignment would create undesirable bridge design and construction conditions. A crossing at this site would provide the least desirable traffic service of any of the alternates studied.

## 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 8, page 22. 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. The principal disadvantage of the girder span is the relatively greater structure depth, which raises the roadway surface higher in the air above clearance requirements. Therefore, approach grades from the shores will be steeper than with other types of structures.

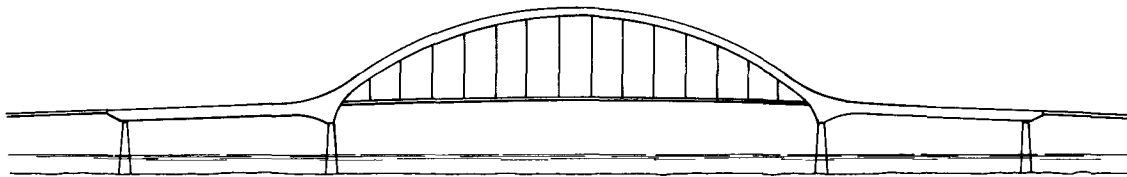
Type II navigation span of Exhibit 8 is a Continuous Box Girder Tied Arch Span with flexible tie. The tie resists only the thrust of the arch. Without a tie the resistance would have to be provided by river piers. This type of span is considered very practical construction for bridges over the Mississippi 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 structure will be economical for longer spans than the box girder and, with proper proportions, can be aesthetically pleasing.



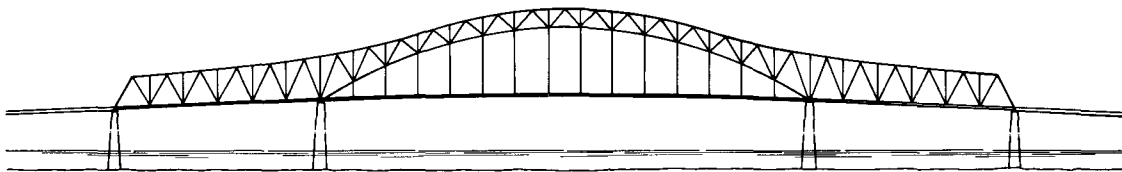
CONTINUOUS GIRDER SPAN

TYPE I



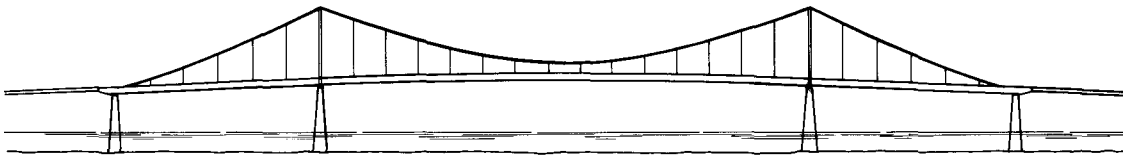
CONTINUOUS BOX GIRDER TIED ARCH SPAN

TYPE II



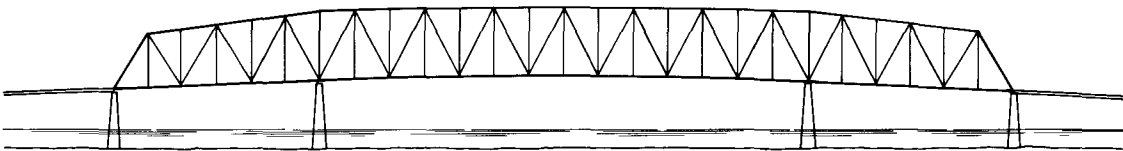
CONTINUOUS TRUSS TIED ARCH SPAN

TYPE III



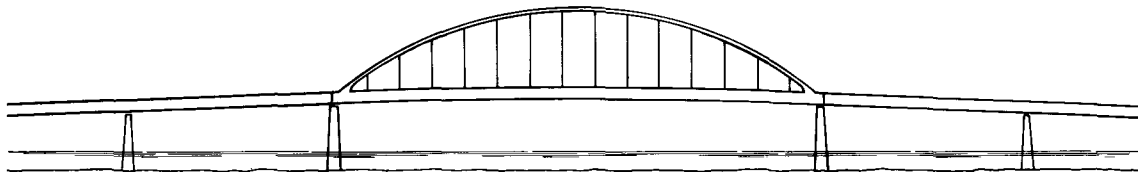
SELF ANCHORED SUSPENSION SPAN

TYPE IV



CONTINUOUS TRUSS SPAN

TYPE V



BOX GIRDER TIED ARCH SPAN

TYPE VI

Exhibit 8

**NAVIGATION SPAN  
STRUCTURE TYPES**

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 and high labor costs for fabrication, have permitted the designer to develop other structures that 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 I. Thus, if vertical clearance requirements cause excessive approach grades, the Box Girder Tied Arch Span offers an advantage. This type of structure is aesthetically pleasing and economical for two-lane roadways of the spans required for the Mississippi River.

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 the Muscatine Bridge.



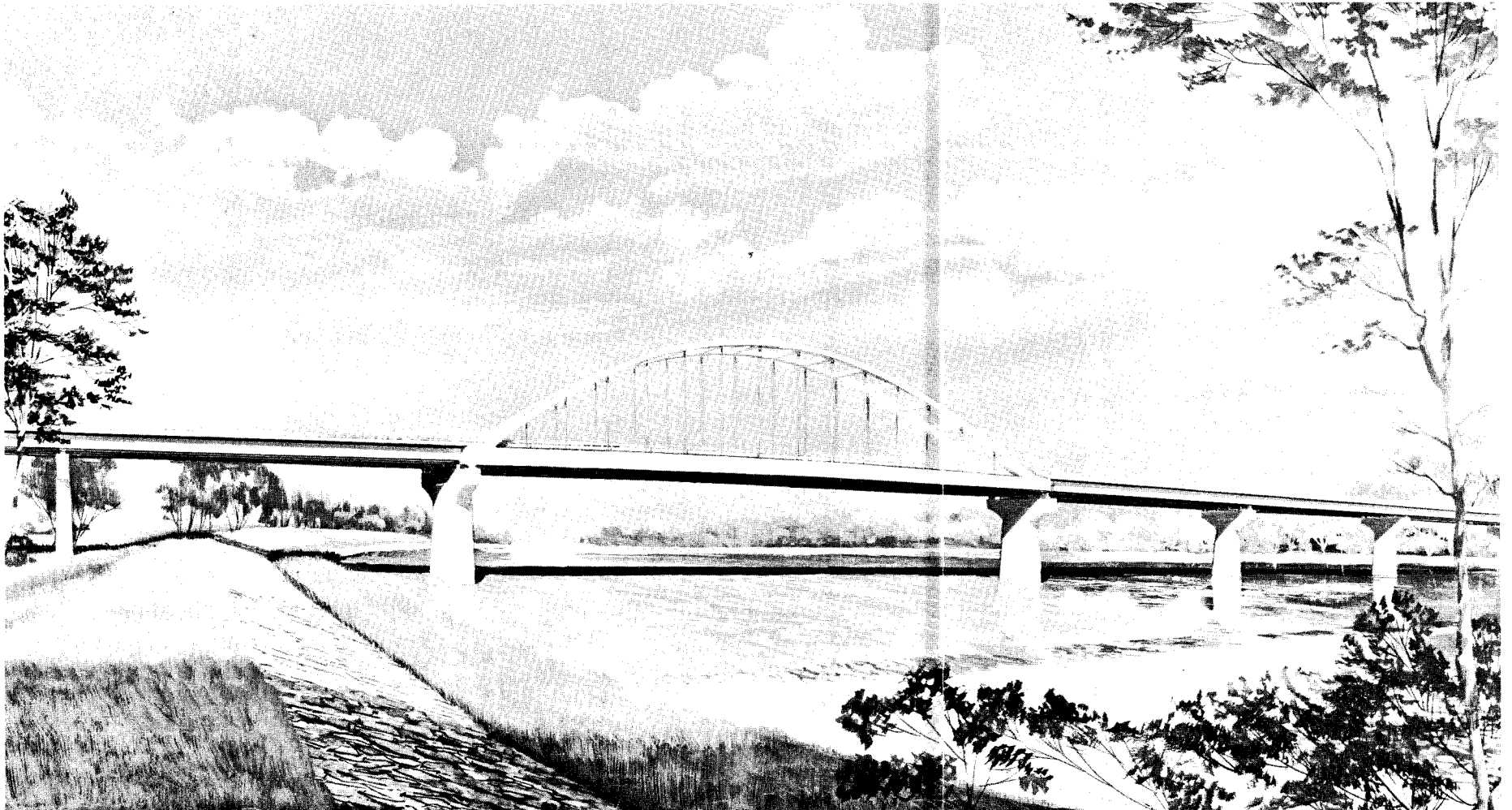


Exhibit 9

**BOX GIRDER TIED ARCH SPAN**

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.

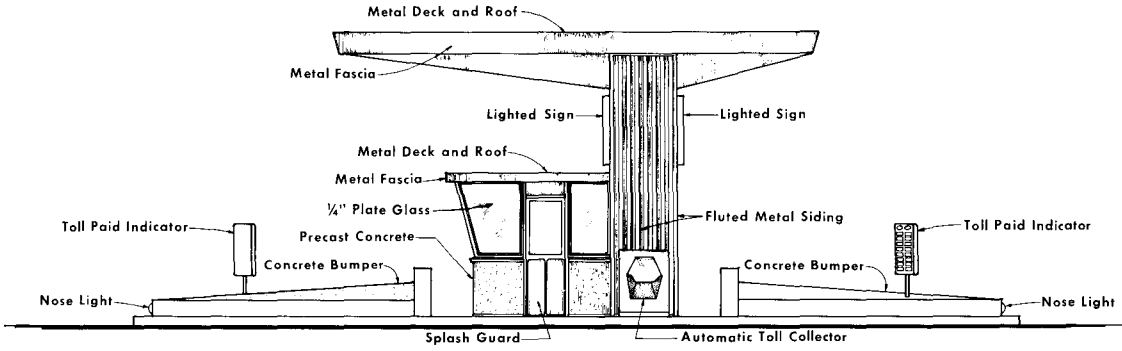
Inasmuch as more detailed estimates of construction cost would be developed in subsequent phases of design, a structure type other than the type recommended herein may prove to be more economical upon subsequent refinements in design. The probable variation in costs among the various structure types 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 9, page 24, should be given thorough consideration in future engineering studies for a highway crossing at Muscatine, Iowa.

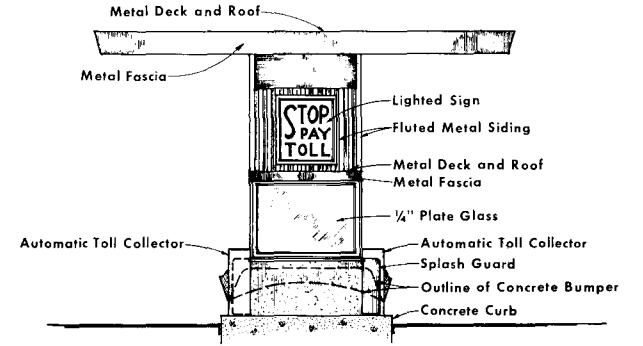
#### **STRUCTURE TYPE STUDIES FOR APPROACH SPANS**

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. Based on available geologic data, it appears that 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.

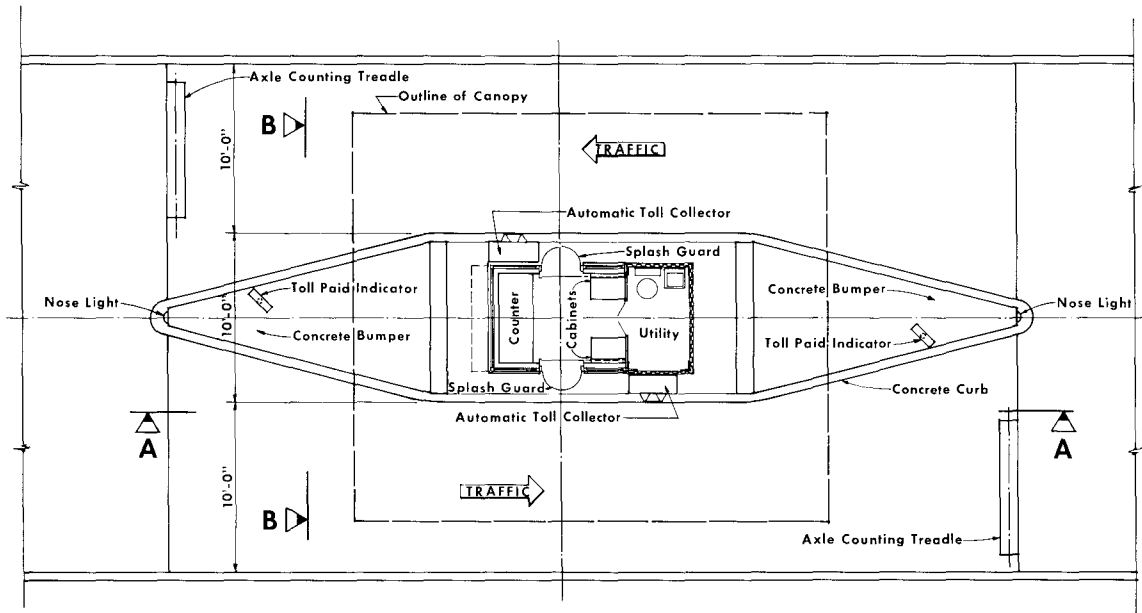
A typical toll booth installation is shown on Exhibit 10, page 26. The exact location of this facility on the bridge approach will be established during subsequent study phases.



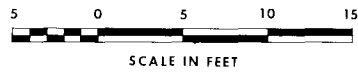
**ELEVATION A-A**



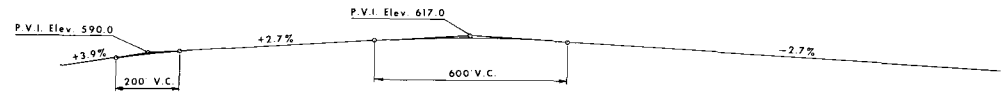
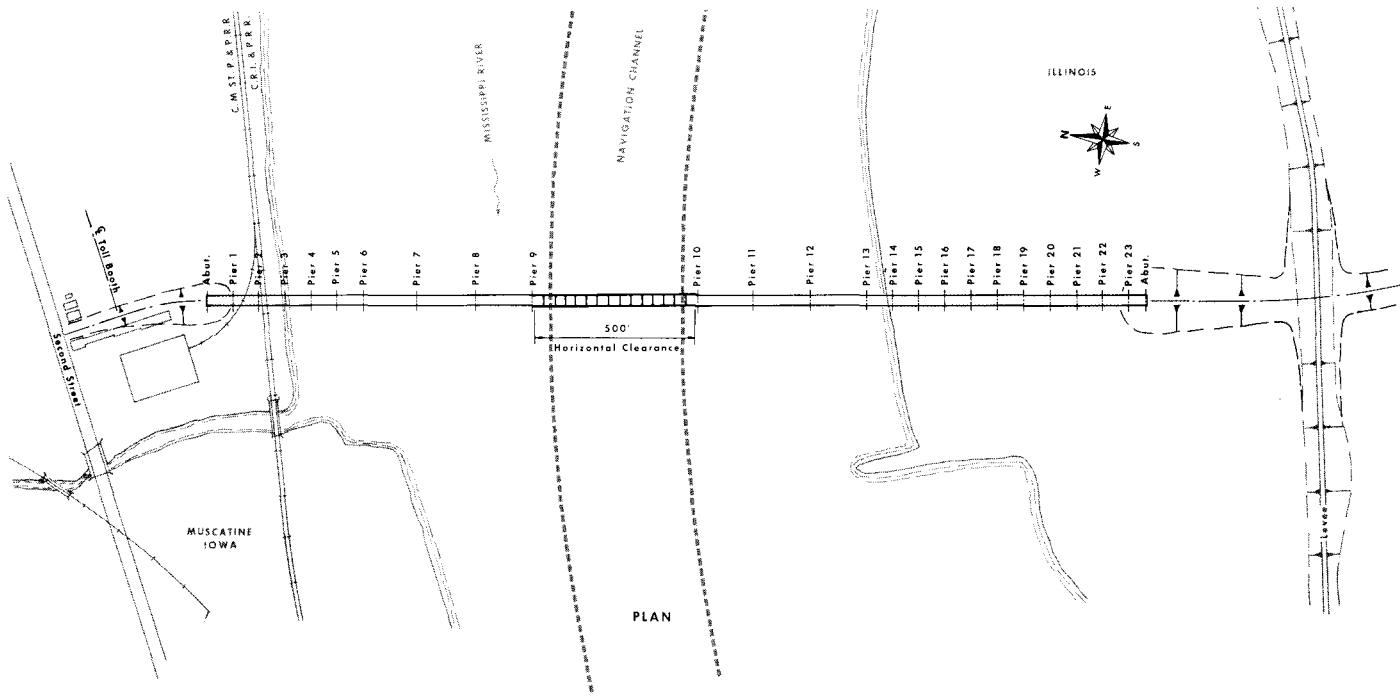
**ELEVATION B-B**



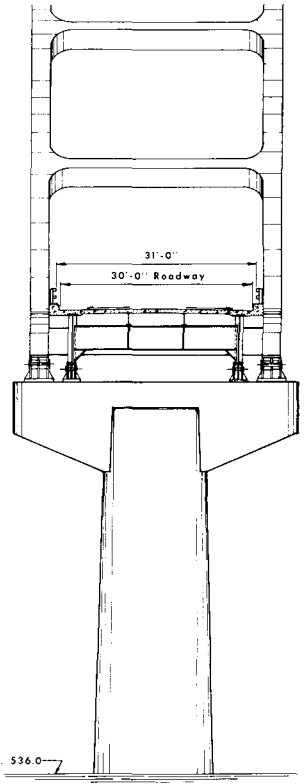
**PLAN**



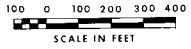
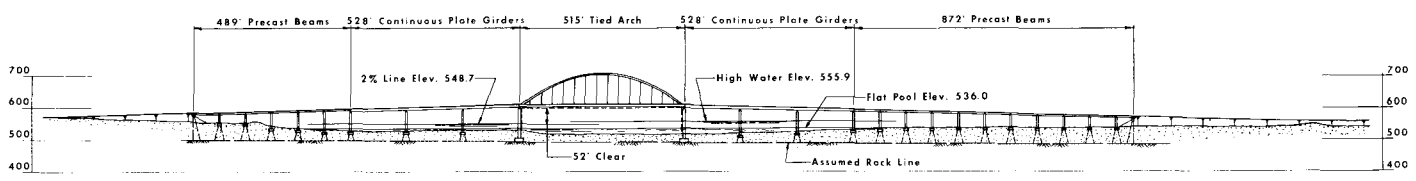
**Exhibit 10  
GENERAL PLAN AND ELEVATION  
TOLL BOOTH**



PROFILE GRADE



SECTION THRU PLATE GIRDER SPAN NEAR CHANNEL PIER



**Exhibit 11**  
**CYPRESS STREET BRIDGE LOCATION**  
**GENERAL PLAN AND ELEVATION**

## **COST ESTIMATES**

### **Cypress Street Alternate**

A plan, elevation and typical section for the Alternate A crossing at Cypress Street is shown on Exhibit 11, page 27. The 30-foot roadway width provides 3 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 are few pedestrians crossing the river, therefore, sidewalks will not be necessary and have not been provided.

A navigation span of 515 feet permits a 500-foot navigation channel as will probably be required at this site. A Box Girder Tied Arch Span is shown on Exhibits 8, page 22 and 9, page 24. This aesthetically pleasing structure allows desirable approach grades and its cost will compare favorably with other types of spans.

The estimated construction cost of the bridge at the Cypress Street location is \$2,783,400. A detailed breakdown of this cost is shown in Table I-1, page 29. Quantities shown are based on a preliminary design of all structural components. Unit prices are based on a review of current construction prices of similar items with modest escalation to reflect the elapse of at least one year before bids could be received for construction contracts.

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 span lengths. Main river unit studies will include economic comparisons of several types of construction. Architectural studies will also be needed to develop pleasing transitions between differing structure types and desirable aesthetic treatments for the entire structure.

TABLE I-1

## ESTIMATE OF BRIDGE CONSTRUCTION COST

## CYPRESS STREET ALTERNATE

Prestressed Beam Spans	489 ft.
Continuous Girder Spans	528 ft.
Box Girder Tied Arch Span	515 ft.
Continuous Girder Spans	528 ft.
Prestressed Beam Spans	<u>872 ft.</u>

2932 ft.

Roadway Width - 30'-0" Curb-to-Curb

ITEM	QUANTITY	UNIT PRICE	COST
Superstructure:			
Bridge Railing	5,860 L.F.	\$ 12.00	\$ 70,300
Concrete	2,726 C.Y.	90.00	245,300
Reinforcing Steel	788,000 Lbs.	0.14	110,300
Prestressed Concrete Beams C-1	5 Ea.	970.00	4,900
Prestressed Concrete Beams C-7	80 Ea.	1625.00	130,000
Tied Arch Steel A-36	1,050,000 Lbs.	0.34	357,000
Tied Arch Steel A-441	1,160,000 Lbs.	0.38	440,800
Girder Steel A-36	320,000 Lbs.	0.29	92,800
Girder Steel A-441	1,004,000 Lbs.	0.32	321,300
Cast Steel and Miscellaneous Metal	25,000 Lbs.	0.70	17,500
Navigation Lighting		Lump Sum	<u>20,000</u>
	SUBTOTAL		\$1,810,200
Substructure:			
Concrete	6,350 C.Y.	65.00	412,800
Reinforcing Steel	603,000 Lbs.	0.14	84,400
Steel Bearing Piles (14BP73)	13,000 L.F.	10.00	130,000
Steel Pile Cofferdams	54,000 S.F.	5.00	270,000
Excavation	7,600 C.Y.	10.00	<u>76,000</u>
	SUBTOTAL		<u>\$ 973,200</u>
	TOTAL BRIDGE COST		\$2,783,400

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 begins.

Right-of-way cost estimates were based upon an on-site reconnaissance of the entire area to be traversed by each alternate and current fair market valuations of all real property involved. Allowances have been included for damages, severance losses and acquisition expenses.

Total estimated project costs for alternative bridge locations at both Cypress Street and Cedar Street are shown in Table I-3, page 32.

#### **Cedar Street Alternate**

While a plan and elevation drawing is not included in this report, the criteria for design and roadway cross-section of a bridge at Cedar Street will be similar to one at Cypress Street. For purposes of cost estimating, a five-span, continuous girder span structure has been assumed for the bridge over the Mississippi River at Cedar Street. The Iowa abutment would be located about 50 feet west of Relocated Second Street. Prestressed concrete beam spans would be utilized for 635 feet of west approach. The river unit, with continuous welded steel deck girders, would be 1,460 feet long and have spans of 220, 290, 440, 290 and 220 feet. The westerly 220-foot span is required to clear the yacht harbor, while the 440-foot span is required for the river navigation channel. Steel spans east of the navigation channel would be identical with those to the west to provide a symmetrical river unit. Beyond the river unit, prestressed concrete beam spans would be used for the remaining 970 feet of structure. The proposed Illinois abutment would be adjacent to the abutment of the existing bridge. The total length of structure would be 3,065 feet.

The estimated construction cost of the bridge at the Cedar Street location is \$2,849,600. A detailed breakdown of this cost is shown in Table I-2 and costs are compared with the Cypress Street Bridge in Table I-3.



TABLE I-2

ESTIMATE OF BRIDGE CONSTRUCTION COST

CEDAR STREET ALTERNATE

Prestressed Beam Spans	635 ft.
Continuous Girder Spans	1460 ft.
Prestressed Beam Spans	<u>970 ft.</u>
	3065 ft.

Roadway Width - 30'-0" Curb-to-Curb

ITEM	QUANTITY	UNIT PRICE	COST
Superstructure:			
Bridge Railing	6,170 L.F.	\$ 12.00	\$ 74,000
Concrete	2,800 C.Y.	90.00	252,000
Reinforcing Steel	700,000 Lbs.	0.14	98,000
Prestressed Concrete Beams	8,010 L.F.	Lump Sum	168,000
Girder Steel A-36	821,000 Lbs.	0.29	238,100
Girder Steel A-441	2,531,000 Lbs.	0.32	809,900
Cast Steel and Miscellaneous Metal	60,000 Lbs.	0.70	42,000
Navigation Lighting	—	Lump Sum	<u>20,000</u>
	SUBTOTAL		\$1,702,000
Substructure:			
Concrete	6,630 C.Y.	\$ 65.00	431,000
Reinforcing Steel	486,000 Lbs.	0.14	68,000
Steel Bearing Piles (14BP73)	12,000 L.F.	10.00	120,000
Steel Pile Cofferdams	60,000 S.F.	5.00	300,000
Excavation	6,900 C.Y.	10.00	<u>69,000</u>
	SUBTOTAL		<u>\$ 988,000</u>
	TOTAL BRIDGE COST		\$2,690,000

TABLE I-3

SUMMARY OF ESTIMATED PROJECT COSTS

	CYPRESS STREET ALTERNATE		CEDAR STREET ALTERNATE	
	Iowa	Illinois	Iowa	Illinois
Roadway	\$ 118,800	\$461,000	\$ 128,200	\$386,200
Structures	2,783,400	—	2,690,000	—
Removal of Existing Bridge	<u>200,000</u>	<u>—</u>	<u>200,000</u>	<u>—</u>
Subtotal	3,102,200	461,000	3,018,200	386,200
Toll Booth Complex	85,000	—	85,000	—
Engineering and Contingencies	<u>637,400</u>	<u>92,200</u>	<u>620,600</u>	<u>77,200</u>
Total Construction	3,824,600	553,200	3,723,800	463,400
Right-of-Way	54,200	15,000	690,000	10,000
Acquisitions and Contingencies	10,800	3,000	138,000	2,000
Administration and Legal	<u>7,100</u>	<u>2,100</u>	<u>16,200</u>	<u>1,600</u>
Total	\$3,896,700	<u>\$573,300*</u>	\$4,568,000	<u>\$477,000*</u>
Total Project Cost	\$4,470,000		\$5,045,000	

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

## Operation and Maintenance

The estimate of first year expenses for operation and maintenance for either of the Muscatine Iowa Bridges is shown in Table I-4, page 34. 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 administrative 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-4  
 ESTIMATE OF FIRST YEAR EXPENSES  
 FOR  
 OPERATIONS AND MAINTENANCE

Muscatine, Iowa, Bridge

ADMINISTRATION

Toll Sergeant	\$ 6,600	
Travel and Car Expense	1,000	
Consulting Engineers	3,600	
Miscellaneous	<u>800</u>	
Total Administration		\$12,000

OPERATION

Toll Collectors	\$24,000	
Utilities	2,000	
Supplies and Postage	2,000	
Employee Benefits	<u>3,000</u>	
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 TRAFFIC AND REVENUES**

By: Wilbur Smith and Associates

#### **Scope of Work**

A general economic evaluation was made of the area served by the Muscatine 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. All available trans-river travel pattern and traffic trend data were assembled.

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 to the proposed alternate crossing locations. Preliminary assignments were made for several toll rates to determine the rate structure which would serve to optimize toll revenues while still providing a high level of traffic service. Annual estimates of preliminary toll revenues were then developed, based upon the economic and traffic trend studies and estimates of future growth in the area. Using the project costs and annual maintenance and operating expense estimates prepared by Howard, Needles, Tammen & Bergendoff, estimated preliminary project feasibility of the alternate crossing was determined.

#### **Present Muscatine Bridge**

The present Muscatine Bridge is an old structure, inadequate to provide full service for modern traffic. The bridge was opened to traffic in 1890 and has a travelway width of somewhat less than 17 feet, providing the equivalent of two travel lanes slightly under 8.5 feet wide. In recent years, the bridge has been operated on a restricted basis, prohibiting tandem-axle vehicles.

The bridgehead in Muscatine is located near the center of the Central Business District. Poor turning radii make certain approach and exit movements difficult, especially for larger vehicles. On the Illinois side, the bridge approach is located in an area free of urban development and no alignment or grade problems are encountered.

Tolls are collected at a toll booth at the Muscatine bridgehead. The present toll schedule, based on a rate of \$0.35 for a passenger car or light truck, is detailed in Table II-1, page 37.

### **Alternative River Crossings**

The closest present river crossings to the north or east of Muscatine are in the Davenport-Rock Island area. They include the Rock Island Centennial Bridge and the Iowa-Illinois Memorial Bridge. Both of these relatively new toll structures provide a good level of traffic service to motorists. Travelers may also cross the river via the free Government Bridge, an old and narrow structure primarily serving the Rock Island Arsenal. Interstate Route 80, to the east of the Davenport-Rock Island "Quad-Cities" area provides a fourth crossing of the river; it is a modern, recently completed toll-free structure.

As shown in Table II-2, page 37, the toll for passenger cars on the Centennial Bridge is \$0.10. Toll charges for larger vehicles are primarily based on number of axles. The cash toll for passenger cars on the Memorial Bridge, Table II-3, page 38, is \$0.15 with heavy trucks assessed \$0.30. However, commuters may purchase ticket books which reduces the cash passenger car and light truck toll to \$0.10.

South of Muscatine, motorists may cross the river via the New Boston Ferry. It is located approximately 25 miles south of Muscatine and connects Oakville, Iowa, with New Boston, Illinois. The ferry provides service "on-call" between 7:00 A.M. and 7:00 P.M., seven days per week between Memorial Day and Labor Day. Limited service is provided before and after this period, by arrangement. Operations are suspended during periods of high water on the river. The approximate load limit



TABLE II-1

PRESENT TOLL SCHEDULE  
Muscatine Bridge

<u>Toll Class</u>	<u>Toll</u>
Bicycle (or pedestrian)	\$0.10
Motorcycle	0.20
Passenger car	0.35
Truck--2-axle, 4-tire	0.35
Truck or bus--2-axle, 6-tire	0.70
Truck--3 axle and semi-trailer	0.85
Car trailer	0.20
House trailer	0.60
Truck trailer	0.60
Special	5.00

Source: Muscatine Bridge Commission.

TABLE II-2

PRESENT TOLL SCHEDULE  
Rock Island Centennial Bridge

<u>Toll Class</u>	<u>Description</u>	<u>Toll</u>
1	Pedestrians--Use Sidewalk Turnstile	\$0.05
2	Motorcycles, Bicycles, Passenger Cars with two axles	0.10
3	Trucks with single rear tire, two axles	0.15
4	Trucks, buses with dual rear tires, two axles	0.25
5	All vehicles with three axles	0.30
6	All vehicles with four axles	0.35
7	All vehicles with five axles	0.40
8	All vehicles with six axles	0.45
9	For all vehicles with more than six axles --Each additional axle	0.05
10	For all vehicles with special equipment and weights	Special Rates

Source: Iowa-Illinois Memorial Bridge Commission.

TABLE II-3

PRESENT TOLL SCHEDULE  
IOWA - ILLINOIS MEMORIAL BRIDGE

<u>Toll Class</u>	<u>Description</u>	<u>Toll</u>
1	Passenger automobiles with seating capacity for not more than seven persons, including driver	\$0.15
	Motorcycles with or without side car	0.15
	Bicycles	0.15
	Automobile trailers	0.15
2	Light trucks with gross weight under 8,000 pounds	0.15
	Trailers towed by light truck	0.15
3	Heavy trucks with gross weight in excess of 8,000 pounds	0.30
	Buses (including all passenger vehicles with seating capacity of over 7 persons including driver)	0.30
	Horse-drawn vehicles, or horse and rider	0.30
4	Trailers towed by heavy trucks or buses	0.20
5	Pedestrians	0.05
6	Loads or vehicles not included in Classes 1 to 4 require special permit	Special Rates

Tickets

Class 1 and 2 tickets	10 for 1.00
Class 3 tickets	10 for 2.50

Source: Davenport Bridge Commission.

on the New Boston Ferry is 22 tons. As shown in Table II-4, page 40, passenger cars pay a ferry toll of \$1.50 with higher tolls for trucks.

The first fixed crossing south of Muscatine is the MacArthur Bridge at Burlington. Toll rates, which include a free return ticket if used prior to midnight of the day issued, are based on a rate of \$0.25 per passenger car and \$0.25 for a light truck. Considerably higher tolls are charged for trucks and buses.

### **Proposed Muscatine Bridge**

The proposed Muscatine Bridge would be a fixed structure constructed as a modern, two-lane toll facility with high design standards. Approach road grades, lane widths and radii would be designed to provide a high level of traffic service for all vehicle types.

Several alternate locations were studied to determine the bridge alignment which would serve to maximize toll revenues while still providing a high level of traffic service and an economical development cost. The two locations depicted in Figure 2, page 41, Cedar Street and Cypress Street, were selected for more detailed studies and are discussed in this report.

### **Previous Studies**

All available reports and other data relating to this project were assembled and reviewed. This included a recent analysis of the traffic and revenue potential of a new crossing in the Muscatine area.

TABLE II-4  
PRESENT TOLL SCHEDULE  
New Boston Ferry

<u>Vehicle Classification</u>	<u>Toll</u>
Automobile with passengers--oneway	\$1.50
Automobile with passengers--round trip	2.50
Single-Axle Trucks--Empty	1.50
Single-Axle Trucks--Loaded	2.50
Tandem-Axle Trucks (according to weight)	\$2.50 to 4.50
Single-Axle tractors with trailers: Schedule similar to single-axle trucks.	
Tandem-Axle tractors and trailers	4.50 <sup>(1)</sup>

(1) Maximum rate.

Source: New Boston Ferry Company.

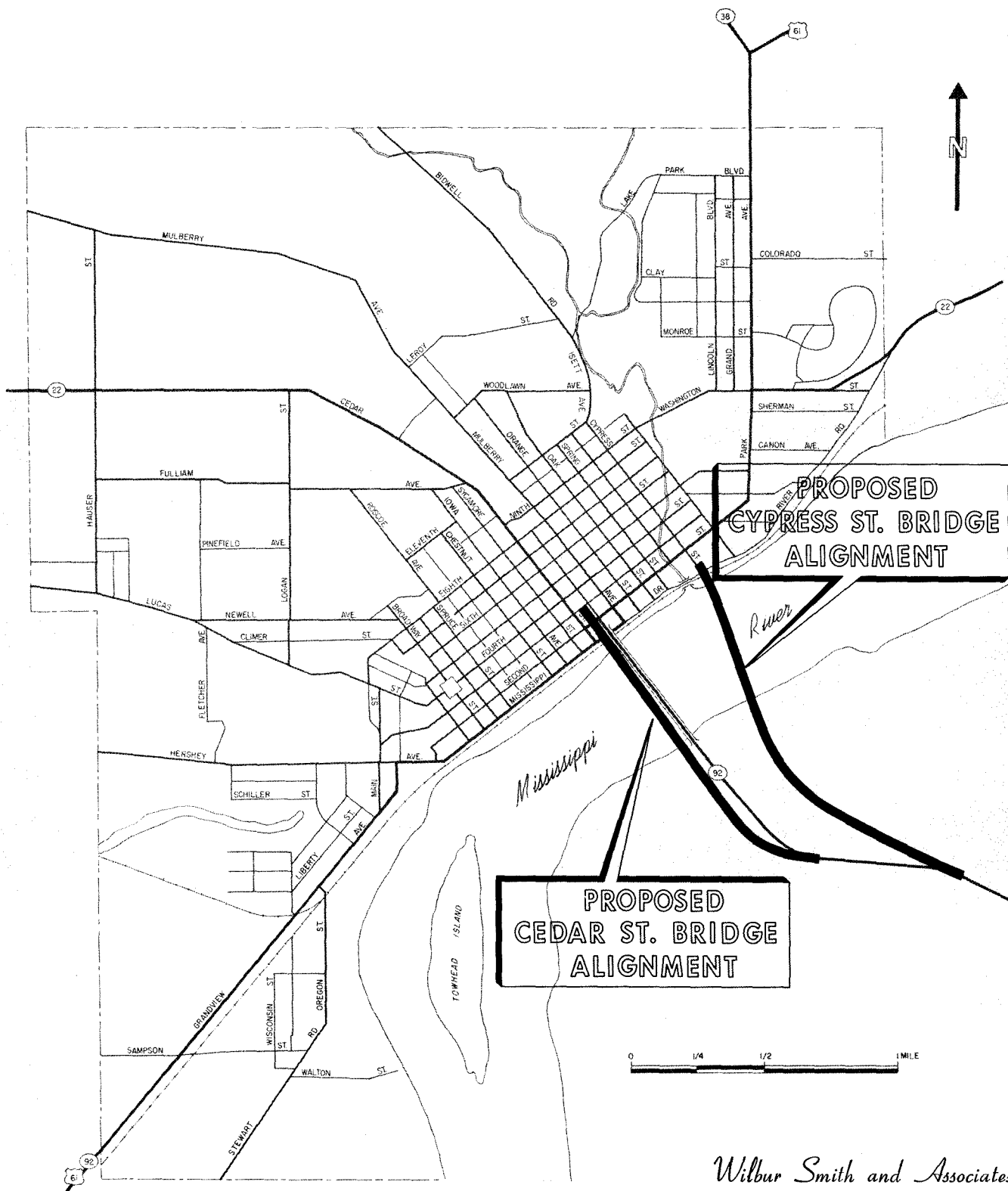


Figure 2  
**LOCATION MAP**

*Wilbur Smith and Associates*

## AREA GROWTH ANALYSIS

Several economic parameters were evaluated to determine levels and recent growth trends in the area which would be directly served by the proposed bridge. The 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 indicators of travel growth, were analyzed.

### Population Trends

Muscatine, Iowa, serves as an urban center for a considerable area in Muscatine County, Iowa, and in western Rock Island and Mercer Counties in Illinois. As shown in Table II-5, page 43, the 1966 population of Muscatine of 22,300 constituted over 60 per cent of Muscatine County's population of 35,300 and exceeded the population of 17,100 recorded in Mercer County, Illinois. However, Muscatine is considerably smaller in population than the urban complex of Davenport-Rock Island-Moline (the "Quad-Cities" area) which had a 1966 population of 291,300 persons.

The population growth trend for the City of Muscatine remained stable between 1950 and 1966, averaging 1.0 per cent per year throughout the period. Nearby rural New Boston in Illinois experienced a slight decline during the period 1950-1960 while the Davenport-Rock Island-Moline Metropolitan Area realized an average annual growth of 1.4 per cent between 1950 and 1960 and 1.3 per cent between 1960 and 1966.

The City of Muscatine experienced a more rapid population growth than did Muscatine County during the past 16 years; it also exceeded the growths realized statewide. Statewide population in Illinois increased somewhat more rapidly than the Muscatine growths over this same period, the national growth trend, in turn, was slightly higher than that of Illinois.



TABLE II-5  
POPULATION TRENDS

<u>Area</u>	<u>1950</u>	<u>Average Annual Per Cent Change</u>	<u>1960</u>	<u>Average Annual Per Cent Change</u>	<u>1966</u>
<u>Urban Areas:</u>					
Muscatine, Iowa	19,041	1.0	20,997	1.0	22,300
New Boston, Ill.	1,388	-1.0	1,238	—	N.A.(1)
Davenport-Rock Island-Moline SMSA(2)	234,256	1.4	270,058	1.3	291,300
<u>Counties:</u>					
Muscatine, Iowa	32,148	0.5	33,840	0.7	35,300
Mercer, Ill.	17,374	-0.1	17,149	0	17,100
Rock Island, Ill.	133,558	1.2	150,991	1.1	161,000
<u>States:</u>					
Iowa	2,621,073	0.6	2,797,537	0	2,813,600
Illinois	8,712,176	1.5	10,081,158	1.1	10,775,300
United States(3)	150,697,361	1.7	178,464,236	1.6	196,208,200

(1) N.A. denotes data not available.

(2) Standard Metropolitan Statistical Area as defined by U.S. Bureau of Census, 1960.

(3) Does not include Alaska and Hawaii.

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

### **Trends in Average Effective Buying Income Per Family**

During the ten-year period 1956-1966, average family income in Muscatine increased more rapidly than income levels for Muscatine County, the Davenport-Rock Island-Moline area, Mercer and Rock Island Counties, Iowa, Illinois and the nation. In 1956, the average Muscatine family had an effective buying income of \$4,596 per year. By 1966, average income had almost doubled to \$8,320. While excellent growths have occurred, the level of buying income for Muscatine in 1966 was below the \$9,250 recorded for the Davenport-Rock Island-Moline area, the statewide average of \$8,416 and the national average of \$8,532. The income average in Muscatine was, however, considerably higher than the average recorded for Muscatine County (\$8,123) and Mercer County (\$6,799), Illinois.

### **Retail Sales Trends**

Retail sales in the Muscatine area increased an average of 2.5 per cent per year between 1956 and 1961 and 1.5 per cent annually between 1961 and 1966. Sales in 1956 amounted to \$34,336,000 compared to \$41,801,000 in 1966. The sales growths recorded in Muscatine during the past decade were below those realized for the Davenport-Rock Island-Moline area, Muscatine, Mercer and Rock Island Counties, Iowa and Illinois and the nation. While Muscatine accounted for the bulk of retail sales in Muscatine County, 74 per cent, its sales volume of \$41,801,000 in 1966 was far overshadowed by the sales volume of \$652,532,000 recorded in the Quad-Cities area.

### **Motor Vehicle Registration Trends**

Motor vehicle registrations in Muscatine County increased from 14,827 in 1956 to 20,807 in 1966, an increase of over 40 per cent in 10 years. During the past five years, the average annual growth of 4.8 per cent recorded in the County exceeded the statewide growths of 3.5 and 3.6 per cent realized in Illinois and Iowa, respectively. The national increase in motor vehicle registrations between 1961 and 1966 was 4.4 per cent.

## **Trends in Motor Fuel Consumption**

Reflecting the increases in personal income and motor vehicle registrations over the past decade, personal travel, as measured by motor fuel consumption, has also shown good increases during the period 1956-1966. Motor fuel consumption in Iowa increased an average of 2.0 per cent per year between 1956 and 1961, this accelerated to an average annual growth of 2.5 per cent between 1961 and 1966. In 1966, 1,432,387,000 gallons of motor fuel were consumed in Iowa. Motor fuel consumption growths in Iowa during the past ten years were somewhat below those recorded in Illinois and for the nation.

## **Study Area Characteristics**

Muscatine serves as a trade and services center for a predominately agricultural region comprised of most of Muscatine County on the Iowa side and western portions of Rock Island and Mercer Counties in Illinois. In addition, Muscatine provides considerable industrial employment, estimated at about 4,000 jobs. Its role as a services center is limited by the proximity of the Davenport-Moline-Rock Island urban area about 30 miles east. Thus, Muscatine provides certain retail and professional service functions for its trade area, but is in competition with the larger metropolitan area for some shopping goods-retail trade as well as wholesale trade and more-concentrated professional and financial services.

## **Future Growth**

Recent trends in population and retail sales for the Muscatine area indicate a modest but continued growth has occurred. A recent report (1) indicates that the employment base in Muscatine had shifted over the last several years in response to changes in the economy of the area, but now showed signs of reaching a more stabilized growth pattern.

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(1) Background For Planning, Report No. 1, The Comprehensive Plan, City of Muscatine, Iowa, Stanley Consultants, 1967.

Projections indicate that the population of Muscatine will increase from 21,994 in 1965 to 34,000 in 1985, an average annual increase of 2.2 per cent. As shown in Table II-6, page 47, a population growth of 2.1 per cent per year is estimated for Muscatine County. Over the same 20-year period, employment in Muscatine is expected to increase an average of 2.5 per cent annually. As presented in Table II-6, a shift in employment type is anticipated with a decrease expected in agricultural employment and good growths in other employment areas such as manufacturing and service activities.

Recently, action was taken in Muscatine to undertake a Urban Renewal Project in the downtown area. This will act to strengthen the economy of the city and provide a more vital and attractive focal point for commercial, office and industrial development.

Thus, while it is not expected that Muscatine will dramatically change its role in the area's economy, there is evidence through local planning efforts that the community is aware of the need to take action to meet future needs and through implementation of these plans it should be able to obtain an even greater share of anticipated increased economic activity in the region.

TABLE II-6

EMPLOYMENT AND POPULATION PROJECTIONS  
Muscatine Urban Area

	<u>1965</u>	<u>Per Cent Of Total</u>	<u>Average An- nual Per Cent Growth 1965-1985</u>	<u>1985</u>	<u>Per Cent Of Total</u>
<u>Employment</u>	10,530	100	2.5	17,280	100
Manufacturing	3,850	36	3.2	7,280	42
Agriculture, Construction	1,590	15	-1.4	1,190	7
Wholesale and Retail Trade	1,980	19	2.2	3,070	18
Services, Gov't. and Other	3,110	30	3.1	5,740	33
<u>Population</u>					
Muscatine County	35,810	100	2.1	53,900	100
City of Muscatine	21,994	61	2.2	34,000	63

Source: Background For Planning, Report No. 1, The Comprehensive Plan,  
City of Muscatine, Iowa, Stanley Consultants, 1967.

## **TRAFFIC STUDIES**

Preliminary studies were made to evaluate the traffic potential of the alternate locations for the proposed Muscatine Bridge. These included analyses of magnitude and composition of traffic and travel patterns as well as quality of service provided by the existing bridge and competitive bridges to the north and south.

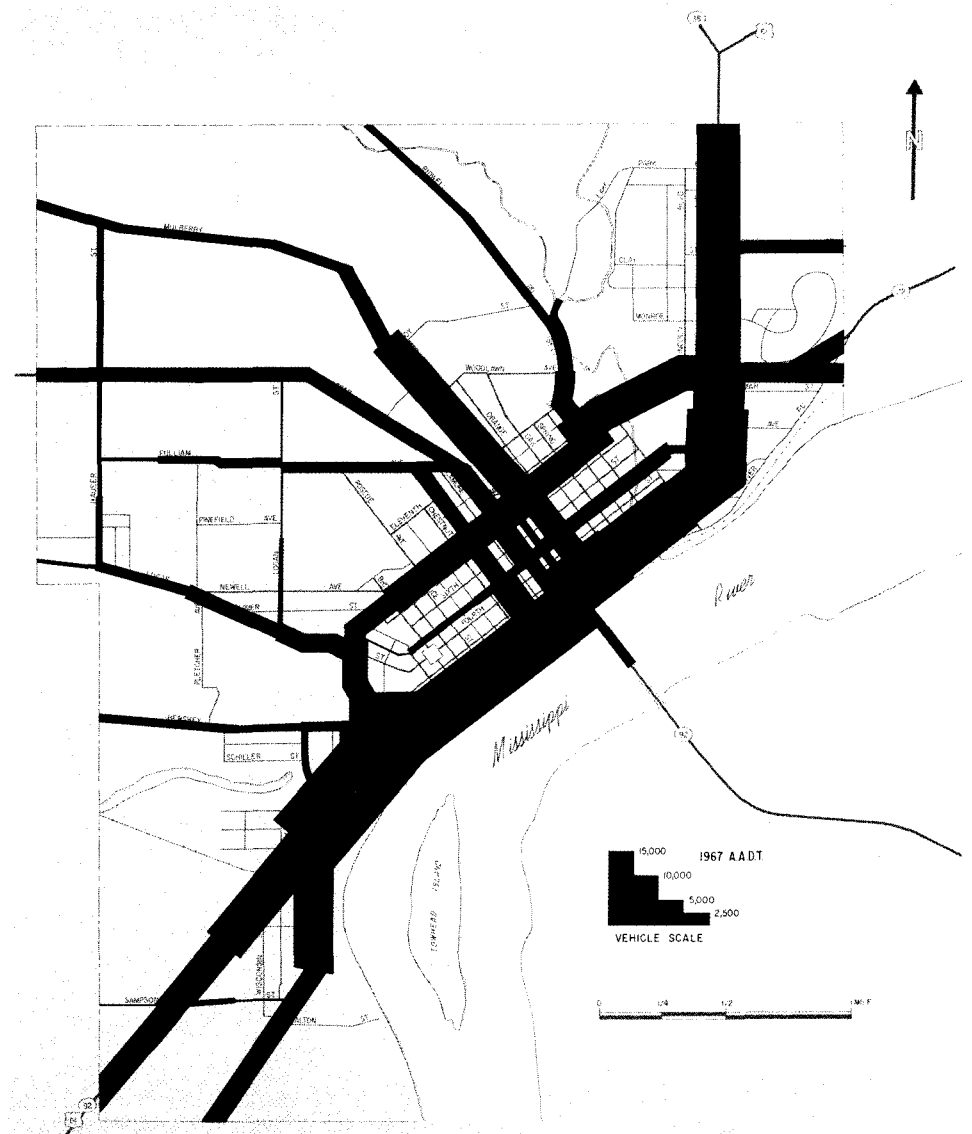
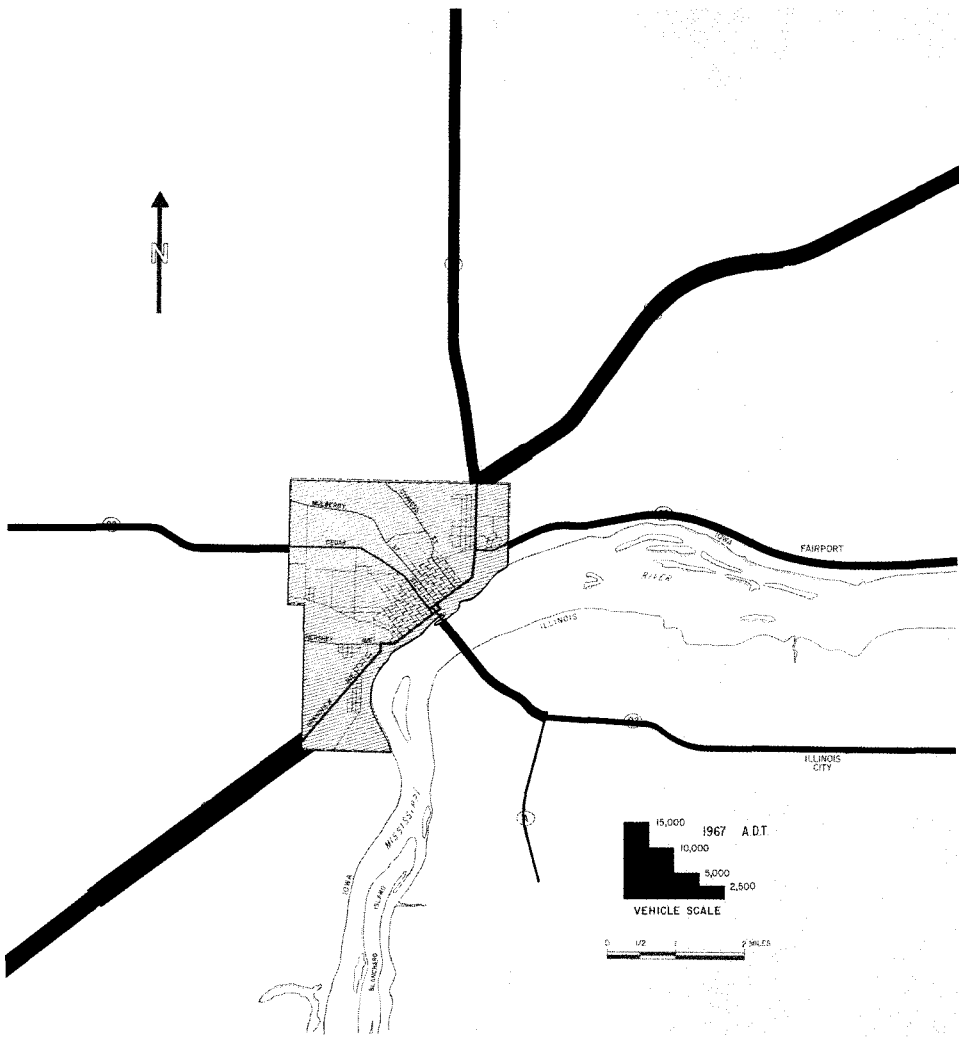
### **Present Highway System**

The present Muscatine Bridge serves as the connecting link between Iowa Route 92 and Illinois Route 92. Illinois Route 92 is an east-west route and is the primary highway in Illinois between the Davenport-Rock Island-Moline area and Muscatine. West of the bridge, Iowa Route 92 joins U.S. Route 61 to Grandview, where the highway takes an east-west alignment across the State of Iowa to Council Bluffs.

The major north-south route in the Muscatine area is U.S. Route 61, which enters Iowa on the north at Dubuque and continues south to Keokuk, passing through the downtown area of Muscatine. Iowa Route 22 traverses the Muscatine Metropolitan Area on a generally east-west alignment, commencing in the Davenport-Rock Island-Moline area, east of Muscatine to a connection with U.S. Route 6 in Iowa City. Iowa Route 38, enters the Muscatine area from the north and is the principal connection to Interstate Route 80 from the west.

These routes are primarily two-lane facilities in generally fair to good condition. The U.S. designated highways are, for the most part, constructed to higher standards permitting higher travel speeds. The importance of these routes and the major streets in Muscatine, in terms of traffic volume served, is depicted in Figure 3, page 49.

As shown in the illustration, the most heavily traveled highway approaching Muscatine is U.S. Route 61 with average daily traffic in 1967 of 5,290 vehicles at the north city limits, and 4,670 vehicles at the south



*Wilbur Smith and Associates*

**Figure 3  
TRAFFIC FLOW MAP**



TABLE II-7

ANNUAL TRAFFIC AND REVENUE TRENDS  
Muscatine Bridge

<u>Year</u> <sup>(1)</sup>	<u>Annual Traffic</u>	<u>Per Cent Change</u>	<u>Annual Revenue</u>	<u>Per Cent Change</u>
1959-60	557,010		205,106	
		1.7		1.4
1960-61	566,581		208,082	
		-2.2		-2.4
1961-62	554,111		203,129	
		4.1		4.0
1962-63	576,686		211,274	
		1.8		1.2
1963-64	587,287		213,732	
		-7.6		-7.3
1964-65 <sup>(2)</sup>	542,561		198,089	
		5.5		5.5
1965-66	572,477		209,018	
		6.2		5.6
1966-67	608,004		220,756	
<u>Average Annual Change:</u>				
1959-60 to 1966-67		1.3		1.1

(1) Fiscal year June 1-May 31.

(2) Bridge closed April 23-May 11.

Source: Muscatine Bridge Commission Annual Report.

city limits. Traffic volumes on State Route 22 ranged from 1,320 vehicles a day at the east city limits to approximately 1,200 vehicles per day at the west limits of Muscatine.

Within the city of Muscatine, Park Avenue, Second Street, Mississippi Drive and Grandview Avenue represent the most heavily traveled north-south streets through the Central Business District and Muscatine proper. Mulberry Avenue, Cedar Street and Iowa Avenue also serve as principal traffic arteries to and through the Central Business District.

### **Traffic and Revenue Trends**

Annual traffic and revenue trends for the Muscatine Bridge were assembled and reviewed. Traffic trends on the closest competitive crossings were also obtained and evaluated.

**Annual Traffic and Revenue Trends--Muscatine Bridge** - As shown in Table II-7, page 50, annual traffic on the bridge has increased from 557,010 vehicles in fiscal 1959-1960 to 608,004 vehicles in fiscal 1966-1967. This represents an average annual increase of 1.3 per cent. The most significant increase occurred between the 1965-1966 and 1966-1967 fiscal years, 6.2 per cent. A sharp decline in traffic occurred between the fiscal periods 1963-1964 and 1964-1965, -7.6 per cent, when the bridge was temporarily closed for a period due to the high water.

Annual revenue experience has followed much the same pattern. Revenues increased from \$205,106 in fiscal 1959-1960 to \$220,756 for the fiscal period ending May 31, 1967. This represented an annual average increase in revenues of 1.1 per cent.

**Annual Traffic Trends--Trans-River Crossings** - The relationship of traffic volumes carried on the Muscatine Bridge on an average day compared to the closest competitive crossings is given in Table II-8, page 52. In 1966, the average daily traffic on the Muscatine Bridge of 1,650 compared to 5,600 on the MacArthur Bridge in Burlington, and 17,100, 19,200 and 22,500 on the Centennial, Government and Memorial Bridges, respectively, in the Davenport-Rock Island-Moline area.

TABLE II-8

ANNUAL TRAFFIC TRENDS  
Trans-River Crossings

<u>Year</u>	<u>Memorial Bridge</u>	<u>Centennial Bridge</u>	<u>Government Bridge</u>	<u>Muscatine Bridge</u>	<u>MacArthur Bridge</u>
(Annual Average Daily Traffic)					
1956	11,500	12,000	19,000	1,700	3,600
1959	11,700	12,900	17,200	1,560	4,200
1962	15,200	12,600	18,700	1,550	4,750
1965	20,700	15,700	19,700	1,550	5,100
1966	22,500	17,100	19,200	1,650	5,600
<u>Average Annual Change</u>					
1956- 1966	6.9	3.6	0.1	-0.3	4.5

Source: Illinois Department of Public Works and Buildings, Division of Highways, Bureau of Planning.

On a calendar year basis, traffic on the Muscatine Bridge decreased an average of 0.3 per cent per year between 1956 and 1966; average annual growths of 4.5, 0.1, 3.6 and 6.9 per cent occurred on the MacArthur, Government, Centennial and Memorial Bridges, respectively, during this same period.

**Monthly Traffic Variations--Muscatine Bridge** - Monthly variations in traffic using the Muscatine Bridge during 1966 indicate August and September were the peak traffic months -17 and 12 per cent above the average month, respectively. January was the low month of bridge use with volumes 33 per cent below the average month.

**Daily Traffic Variations--Muscatine Bridge** - Weekend use of the bridge, in 1966, was substantially higher than weekdays. Sunday recorded traffic 27 per cent above the average day with Friday and Saturday also above average days by 14 and 9 per cent, respectively. Wednesday was the lowest traffic day with volumes 18 per cent below the average day.

### **Origin and Destination Studies**

In the Spring of 1966, the Planning Division of the Iowa State Highway Commission conducted field surveys to obtain travel pattern data for an Origin and Destination Traffic Report for the Muscatine Metropolitan Area. As part of the study, roadside interview stations were conducted on all primary and secondary routes on a cordon line at the Muscatine Metropolitan Area boundary including the Muscatine Bridge. These interview data were then expanded to an average spring weekday in 1966.

On an average spring weekday in 1966, 78,713 vehicle-trips were found in the Muscatine study area. Of this total, 1,404 trips used the Muscatine Bridge. A total of 452 bridge trips were destined to or from the Muscatine Central Business District, 569 to other areas within the city limits and 383 were passing through Muscatine enroute to or from external origins or destinations.

### **Vehicle Classification Counts**

A summary of vehicle classification counts on routes approaching the Muscatine city limits, including the Muscatine Bridge, on an average day in 1965, are shown in Table II-9, page 54. On the Muscatine Bridge, 87.6 per cent of all traffic was in the passenger car class. Due to load limit restrictions very few heavy trucks were recorded.

The heaviest traveled route through Muscatine, U.S. Route 61, showed the highest volume of heavy trucks. Five axle trucks represented 3.1 per cent of the average daily traffic at the north city limits and 3.9 per cent at the southern city limits.

TABLE II-9

SUMMARY OF VEHICLE CLASSIFICATION COUNTS  
1965 Average Daily Traffic

<u>Location</u>	<u>T R U C K S</u>					<u>Total Vehicles</u>
	<u>Passenger Cars</u>	<u>Two- Axle</u>	<u>Three- Axle</u>	<u>Four- Axle</u>	<u>Five- Axle</u>	
Muscatine Bridge Per Cent	1,401 87.6	141 8.8	31 1.9	7 .4	20 1.3	1,600 100.0
U.S. Route 61-North Muscatine City Limit Per Cent	5,557 78.2	1,126 15.8	107 1.5	98 1.4	222 3.1	7,110 100.0
U.S. Route 61-South Muscatine City Limit Per Cent	3,430 76.6	720 16.1	73 1.6	81 1.8	176 3.9	4,480 100.0
Iowa Route 22-East Muscatine City Limit Per Cent	1,690 81.6	301 14.5	30 1.4	2 .1	47 2.4	2,070 100.0
Iowa Route 22-West Muscatine City Limit Per Cent	814 72.7	172 15.4	46 4.1	27 2.4	61 5.4	1,120 100.0

Source: Volume of Traffic on Primary Road System, Iowa State Highway Commission, Traffic and Highway Planning Department, Division of Planning.

### **Trip Termini Distribution**

The distribution of Muscatine Bridge trips by their point of origin or destination in Iowa, on an average day in 1966 is depicted in Figure 4, page 56. The area of the circles shown in the illustrations is proportional to the number of origins or destinations in each of the traffic zones delineated for the travel pattern study.

The Central Business District of Muscatine was the major trip end of bridge users. A total of 527 motorists, on an average day in 1966 indicated the CBD as either an origin or destination. Other important Muscatine trip generators were Zone 5 (east of the CBD), Zone 4 (north of the CBD), Zone 36 (along Cedar Street, northwest of downtown) and Zone 16 (along Hershey Avenue, southwest of downtown).

U.S. Route 61, south of Muscatine, recorded the highest volume of through trips entering the Muscatine area. The next most important external trip corridors were along Iowa Route 38 and Iowa Route 22.

### **Planned Highway Improvements**

The Five Year Primary Road Construction Program, 1968 through 1972, prepared by the Iowa State Highway Commission indicates a major construction program in Muscatine County for Iowa Route 38. This includes reconstruction of Iowa Route 38 north of U.S. Route 61 to south of U.S. Route 6, a total of 8.0 miles. Grading and drainage for the portion of the project in Muscatine is scheduled for 1971 and 1972.

The proposed Interstate Route 280 bridge in the Davenport-Rock Island-Moline area is expected to have a considerable impact on the traffic potential of the proposed new bridge at Muscatine. Present plans call for completion of the Interstate Bridge prior to January 1, 1971.

Another highway improvement consideration important to the new Muscatine Bridge is the present Iowa Toll Bridge Program study, which includes the Muscatine facility as one project. Comparable studies are



also underway for the Davenport-Rock Island-Moline area, the Toolesboro-New Boston area and in Burlington. Construction of one or more new fixed crossings at any of these locations could measurably affect the traffic estimates for the proposed Muscatine Bridge. For purposes of this report, no new crossings have been assumed, aside from the Interstate Route 280 Bridge in any of these areas.

#### **Typical Time-Distance Relationships**

Representative time-distance relationships for several travel movements which could use either the proposed Muscatine Bridge, the closest crossing to the east or north (the new Interstate Route 280 Bridge) or the Burlington Bridge are shown in Table II-10, page 58. On a trip between Galesburg, Illinois, and Muscatine, the new bridge would save 12 miles and 28 minutes over use of the MacArthur Bridge, but would be six miles and one minute longer than the proposed I-280 bridge. A trip between Aledo, Illinois, and Muscatine via the proposed Muscatine Bridge would be 23 miles and 26 minutes shorter than the I-280 Bridge routing. Between Rock Island and Muscatine, a new bridge routing would be two miles longer but two minutes shorter than using the I-280 Bridge. On a trip between Fairport and Monmouth, Illinois, use of the proposed bridge would be shorter in mileage but longer in travel time than an I-280 routing.



TABLE II-10

TYPICAL TIME - DISTANCE RELATIONSHIPS

<u>Between</u>	<u>Via</u>	<u>Distance</u> (Miles)	<u>Travel Time</u> (Min.)	<u>Average Speed</u> (MPH)	<u>Savings Via Proposed Muscatine Bridge</u>	
					(Miles)	(Min.)
Muscatine and Galesburg, Ill.	Proposed Muscatine Bridge	72	95	46		
	Proposed I-280 Bridge	66	94	43	-6	-1
	Burlington Bridge	84	123	41	12	28
Aledo, Ill.	Proposed Muscatine Bridge	33	48	41		
	Proposed I-280 Bridge	56	74	46	23	26
Rock Island, Ill.	Proposed Muscatine Bridge	32	43	45		
	Proposed I-280 Bridge	30	45	39	-2	2
Fairport and Monmouth, Ill.	Proposed Muscatine Bridge	63	92	41		
	Proposed I-280 Bridge	66	80	46	3	-12

## **ESTIMATED TRAFFIC AND REVENUES**

Estimated traffic and revenues for the proposed Muscatine Bridge alternate alignments were based upon the number of motorists now using the present bridge and additional traffic who would be attracted to the new facility from the nearest crossings to the north (or east) and south. In addition, the new facility is expected to generate additional usage of an induced nature.

### **Basic Assumptions**

Estimates of traffic and revenues for the proposed Muscatine Bridge alternates are predicated on the following assumptions:

1. The facility will be opened to traffic on January 1, 1971.
2. The Interstate Route 280 Bridge will be open to traffic on or before January 1, 1971.
3. The bridge will be constructed on one of the alignments discussed in this report. The toll schedule and collection system recommended will be adopted.
4. No new crossings aside from the proposed I-280 Bridge will be constructed across the Mississippi River between the Davenport-Rock Island-Moline area and the MacArthur Bridge in Burlington.
5. The present Muscatine Bridge will be demolished upon opening of the new facility.
6. The Bridge will be adequately maintained efficiently operated and effectively signed.

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 and Toll Schedule** - Tolls would be collected from all motorists using the proposed bridge at a toll booth located between the two travel lanes on the western approach span of the facility. One attendant would be necessary to collect tolls from both travel directions. However, provisions should be made in initial design and construction of the booth to ultimately provide for two toll attendants, one handling each direction of travel.

Several toll rates were analyzed to determine the best toll structure for the proposed Muscatine Bridge. These studies indicated that the preliminary toll schedule, shown in Table II-11, page 60, would produce optimum revenues for the proposed facility while maintaining a high level of traffic service. A higher toll would discourage usage to the point where total revenues would be less than those estimated under the recommended schedule. Conversely, a lower toll rate would increase usage but not sufficiently to produce higher revenues than those projected.

TABLE II-11

RECOMMENDED TOLL SCHEDULE

<u>Toll Class</u>	<u>Description</u>	<u>Toll</u>
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, motorists driving passenger cars and other two-axle vehicles would pay a \$0.40 toll for each crossing of the bridge. Larger vehicles similarly would pay a toll based on number of axles i.e., a four-axle vehicle or vehicle combination would pay \$0.80.

The recommended per-axle toll schedule will provide maximum control and auditing benefits. In addition, it would have the advantage of being easily understood by bridge users. While the passenger car rate is \$0.05 higher than that now charged on the present bridge, truck tolls would be less than are now assessed. The advantages of the new bridge in terms of wider travel lanes, better approaches, etc., would far outweigh the additional toll payment for passenger car motorists.

#### **Estimated Base Year (1966) Traffic Assignments**

The number of motorists who would use the proposed Muscatine Bridge alternate alignments at 1966 base year levels was estimated based upon relative trip costs via the closest fixed crossings to the north (or east) (Interstate Route 280) and south (MacArthur Bridge) versus the new facility.

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

The travel time and distance studies made during the field phases of this project were used as the basis for assigning times and distances via the alternate bridge crossings. In addition to mileage and time costs, tolls were also added, where appropriate, to arrive at total trip costs.

The travel patterns determined from the origin and destination studies conducted by the Iowa State Highway Commission were used to determine trans-river crossing distribution assuming the proposed Muscatine Bridge were constructed. The cost studies indicated that all of the motorists now using the present bridge would divert to a new crossing upon demolition of the existing bridge and implementation of the recommended toll schedule. For purposes of this preliminary study, it was assumed that none of the motorists now using the New Boston Ferry would be potential to the new crossing at Muscatine. The toll on the ferry is several times higher than the present and proposed tolls at Muscatine; the ferry appears to be carrying only local traffic between the New Boston and Toolesboro areas.

**Alternate Bridge Alignments** - Due to the distance from Muscatine to the nearest bridges in the Davenport-Rock Island-Moline area on the east and to Burlington to the south and the close proximity of the two alternate Muscatine Bridge alignments, the traffic assignments and toll revenues for either alternate, would be basically the same. There are, however, certain traffic service advantages which would favor the Cedar Street location over the Cypress Street alignment.

The distribution of trans-river trip ends in the Muscatine area, shown in Figure 4, page 56, favor the Cedar Street locations. As shown in Table II-12, page 63, 1966 vehicle-miles, as measured from each zone centroid to the two alternate bridgehead locations, would total 4,200 for the Cedar Street alignment and 4,500 for the Cypress Street location. Selection of the Cedar Street project would result in less bridge-oriented travel on city streets in Muscatine.

A considerable volume of bridge traffic was found moving between the bridge and U.S. Route 61 south. If the Cypress Street location were selected this would mean several blocks of city street travel through downtown Muscatine for this movement. Since the Cedar Street alignment is closer to U.S. Route 61 south, less city street travel would be incurred with this project. The Cedar Street alternate would also have the advantage of being located within the tentative limits of the proposed urban

renewal area in Muscatine which could result in providing both better access to the bridge and possibly lower costs of land acquisition for the project.

TABLE II-12

VEHICLE-MILE ANALYSES<sup>(1)</sup>  
Cedar vs. Cypress Bridge Alternates

<u>Alternate Location</u>	<u>1966 Vehicle-Miles</u>
Cedar Street	4,200
Cypress Street	4,500

<sup>(1)</sup> Based on approximate vehicle-miles of travel from zone centroids in Iowa to Iowa alternate bridgehead locations--1966 Average Daily Traffic.

TABLE II-13

ESTIMATED IMPACT OF NEW BRIDGE  
AND INTERSTATE ROUTE 280 BRIDGE

<u>Condition</u>	<u>1966 Average Daily Traffic</u>
Present Muscatine Bridge	1,636
Proposed Muscatine Bridge <sup>(1)</sup>	1,784
Proposed Muscatine Bridge <sup>(1)</sup> assuming completion of I-280 Bridge	1,354

<sup>(1)</sup> Assumes removal of present Muscatine Bridge.

**Impact of U.S. Route 61 Bypass** - There has been considerable discussion about possible construction of a U.S. Route 61 circumferential bypass which would follow an alignment through the western portion of Muscatine. Since funds have not been programmed for this improvement, it has not been considered in developing assignments to the proposed Muscatine Bridge. However, construction of the bypass would have an adverse impact on estimated revenues for the bridge.

**Estimated Base Year (1966) Assignments—New Muscatine Bridge Assuming No I-280 Crossing** - Presently, heavy trucks are prohibited from use of the existing Muscatine Bridge. In addition, the physical characteristics of the structure do not encourage maximum use by smaller vehicles. Occasionally, traffic is stopped in the opposing direction to allow passage of a large vehicle thereby causing delays and inconvenience to motorists. A new facility would serve all types of vehicles and would be more attractive to passenger car and light truck drivers.

As shown in Table II-13, page 63, it is estimated that a new crossing at Muscatine would have carried 1,784 vehicles per day, at 1966 levels rather than the 1,636 vehicles actually accommodated. A majority of this new traffic would be heavy trucks. An indication of the effect of the new bridge on specific traffic movements is shown in Table II-14, page 65. While no additional traffic would accrue to a new crossing from the movements between Muscatine and Aledo, Joy and New Boston, additional traffic would be generated from movements between Muscatine and East Moline, Milan, Moline, Rock Island and points east of Henry County.

**Estimated Impact of I-280 Bridge** - While it is estimated that a new structure at Muscatine would carry more traffic than the present facility, completion of the proposed I-280 bridge at Davenport-Rock Island-Moline will act to divert traffic from a Muscatine crossing. A good proportion of the traffic now using the Muscatine Bridge has the Rock Island-Moline area as a trip termini. The new Interstate Bridge will provide a higher level of traffic service to this movement than the present Rock Island-Moline area crossings. As shown in Table II-13, page 63, the net effect of the free Interstate Route 280 bridge would be to decrease traffic volumes estimated

TABLE II-14

IMPACT OF NEW MUSCATINE BRIDGE  
AND INTERSTATE ROUTE 280 BRIDGE  
ON TRANS-RIVER TRAFFIC

<u>Illinois Trip End</u>	<u>Existing Muscatine Bridge</u> (1)	<u>Proposed Muscatine</u> (2) <u>Bridge</u>	<u>Interstate Route 280</u> (3)
(1966 Average Daily Traffic)			
Aledo	58	58	58
Joy	41	41	41
New Boston	176	176	176
East Moline	9	19	13
Milan	61	68	45
Moline	120	128	86
Rock Island	395	404	272
Area east of Henry County	164	179	89

(1) Existing Muscatine Bridge without I-280 Bridge .

(2) Proposed Muscatine Bridge without I-280 Bridge .

(3) Proposed Muscatine Bridge with I-280 Bridge .

TABLE II-15

BASE YEAR (1966) DIVERTED TRAFFIC

<u>Vehicle Toll Class</u>	<u>Description</u>	<u>Average Daily Traffic</u>
1	Two-axle vehicles	1,284
2	Three-axle vehicles and vehicle combinations	17
3	Four-axle vehicles and vehicle combinations	18
4	Five-axle vehicles and vehicle combinations	<u>35</u>
	TOTAL	1,354



for the proposed Muscatine crossing from 1,784 vehicles per day at 1966 levels to 1,354 vehicles. Table II-14, page 65, indicates that movements between Muscatine and the Rock Island and Moline areas will be most affected by the new Interstate crossing. For example, it is estimated that the movement between Muscatine and Rock Island of 404 vehicles assuming a new Muscatine Bridge would decrease to 272 vehicles upon completion of the I-280 bridge. The Interstate crossing is estimated to have little adverse impact on trips now moving between Muscatine and such places as Aledo, Joy and New Boston.

The 1966 traffic assignments, by vehicle curve, for the proposed Muscatine Bridge are given in Table II-15, page 65. Of the total average daily traffic of 1,354 vehicles indicated, 1,284 would be two-axle vehicles, 17--three-axle vehicles, 18--four-axle vehicles and 35--five-axle vehicles.

#### **Estimated Annual Bridge Traffic Growth**

Annual growth in use of the proposed Muscatine Bridge was estimated based on normal increases in trans-river usage which might be anticipated over the next several years and on generated and development traffic. Generated traffic consists of additional trips made by motorists now traveling the bridge corridor, solely due to the convenience and attractiveness of the facility. Development growth is growth in residential, commercial and industrial activity, resulting from the location and access advantages afforded by and directly attributed to the proposed bridge.

Normal corridor growth was based upon trends in use of the present Muscatine Bridge, competitive river crossings and annual traffic growths on the routes approaching the bridge area, particularly U.S. Route 61 in Iowa. Trends and projected increases in economic activity in the bridge study area were also considered in developing the normal growth estimates.

Following a slight decrease in traffic between 1966 and 1967 and barring any additional restrictions in present bridge use by the Muscatine

Bridge Commission, it is estimated that traffic will grow approximately 2.0 per cent per year between 1967 and 1969. This is estimated to increase to 2.5 per cent from 1970 to 1975, decreasing to 2.0 per cent between 1975 and 1980 and to 1.5 per cent annually between 1980 and 1985, the fifteenth year of operation. For purposes of conservatism, no normal growth has been projected beyond 1985 although some increase in traffic is anticipated.

Induced or generated and development growth, was estimated based on experience during the early years of operation of similar facilities. The development potential of the bridge study area was also evaluated. An induced growth of 5.0 per cent is estimated during the first full year of operation of the new Muscatine Bridge.

#### **Estimated Annual Traffic and Toll Revenues**

In 1971, the assumed first full year of operation of the proposed Muscatine Bridge, preliminary toll revenues of \$235,000 are estimated. As shown in Table II-16, page 68, this is estimated to increase to \$260,000 in 1975, the fifth year of operation, to \$287,000 in 1980 and to \$309,000 in 1985, the fifteenth year of operation. Average annual toll revenues over the first five years of operation are estimated at \$247,000, increasing to \$262,000 over the first ten years. Average annual toll revenues for a 28-year earning period assuming a 30-year earning period are estimated at \$290,000.

First year, 1971, average daily traffic of 1,520 vehicles is estimated. This will increase to an estimated 2,000 vehicles daily in 1985.

The estimates indicated are preliminary and are intended to show the 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 effecting bridge usage at that time.

TABLE II-16

ESTIMATED ANNUAL TRAFFIC AND REVENUES

<u>Year</u>	<u>Average Daily Traffic</u>	<u>Gross Revenues</u>
1971	1,520	\$235,000
1972	1,560	241,000
1973	1,600	247,000
1974	1,640	253,000
1975	1,680	260,000
1976	1,720	265,000
1977	1,750	270,000
1978	1,780	276,000
1979	1,820	281,000
1980	1,860	287,000
1981	1,880	291,000
1982	1,910	295,000
1983	1,940	300,000
1984	1,970	304,000
1985	2,000	309,000
Annually Thereafter	2,000	\$309,000
 <u>AVERAGE ANNUAL REVENUES</u>		
First Five Years		\$247,000
First Ten Years		\$262,000
Twenty-eight Years		\$290,000

## **PRELIMINARY PROJECT FEASIBILITY**

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

### **Estimated Annual Net Revenues**

Estimated annual net revenues for the proposed Muscatine Bridge are presented in Table II-17, page 70. In 1971, the first year of operation, net revenues of \$175,000 are estimated, increasing to \$207,000 in 1985, the fifteenth year of operation.

Average annual net revenues over the first five years of operation are estimated at \$181,000 increasing to \$188,000 over the first ten years. During a 28-year earning period, net revenues would average \$200,000 annually.

### **Preliminary Project Feasibility**

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

TABLE II-17

ESTIMATED ANNUAL NET REVENUES

<u>Year</u>	<u>Gross Total Revenues</u>	<u>Maintenance and Operation Costs(1)</u>	<u>Net Revenues</u>
1971	\$235,000	\$ 60,000	\$175,000
1972	241,000	63,000	178,000
1973	247,000	66,000	181,000
1974	253,000	69,000	184,000
1975	260,000	72,000	188,000
1976	265,000	75,000	190,000
1977	270,000	78,000	192,000
1978	276,000	81,000	195,000
1979	282,000	84,000	197,000
1980	287,000	87,000	200,000
1981	291,000	90,000	201,000
1982	295,000	93,000	202,000
1983	300,000	96,000	204,000
1984	304,000	99,000	205,000
1985	309,000	102,000	207,000
Next 13 years annually	\$309,000	\$102,000	\$207,000

AVERAGE ANNUAL REVENUES

First Five Years	\$181,000
First Ten Years	\$188,000
Twenty-Eight Years	\$200,000

(1) Estimated by Howard, Needles, Tammen and Bergendoff

As a measure of feasibility, financial interests normally assure 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 greater than 1.50 is normally considered indicative of financial feasibility.

The feasibility computations shown in Table II-18 were developed for each alternate bridge location, assuming a bond interest rate of 5.5 per cent and for a bond term of 30 years. Based on project costs developed by Howard, Needles, Tammen & Bergendoff, it is estimated that a bond issue of \$6,054,000 would be required for the Cedar Street Bridge alignment and \$5,364,000 for the Cypress Street project. The escalation from project costs to bond issue includes such financing items as bond discount, legal and financing fees, capitalized interest during construction, etc. Based on the relationship of project costs to bond issue size of several comparable projects which were financed, a factor of 1.2 was applied to project cost to determine a preliminary bond issue.

Considering the Cedar Street alternate, first year net revenues would cover first year interest 0.51 times. Average annual net revenues would cover 28 year level debt service 0.45 times.

Slightly better coverages are indicated for the Cypress Street location. First year net revenues would provide a 0.59 coverage of maximum interest. Average annual net revenues would cover 28 year level debt service 0.53 times.

It should be emphasized that the above computations were developed only as a guide and that a final determination of project feasibility should be made by financial advisors selected for this purpose. The coverages indicate, however, that some subsidy will be required to finance the proposed facility. For all intents and purposes, the coverages for both alternate bridge locations are identical. From a traffic service standpoint, we would recommend the Cedar Street location be selected.

TABLE II-18

PRELIMINARY PROJECT FEASIBILITY

<u>Item</u>	<u>Bridgehead</u>	
	<u>Cedar Street</u>	<u>Cypress Street</u>
Bond Term	30 Years	
Bond Earning Period	28 Years	
Bond Interest Rate	5.5 Per Cent	
Preliminary Project Costs(1)	\$5,045,000	\$4,470,000
Estimated Bond Issue(2)	6,054,000	5,364,000
First Year Interest	333,000	295,000
Level Debt Service:		
28 Years	445,000	380,000
Estimated First Year Net Revenues	175,000	175,000
Estimated Average Annual Net Revenues	200,000	200,000
28 Years	200,000	200,000
<u>Coverages</u>		
First Year Interest by:		
First Year Net Revenues	0.51	0.59
Level Debt Service by:		
Average Annual Net Revenues		
28 Years	0.45	0.53

(1) Estimated by Howard, Needles, Tammen & Bergendoff.

(2) Assumes ratio of project cost to Bond Issue of 1.0 to 1.2.

### **Relationship Between Level Debt Service and Net Revenues**

Some indication of the relative amount of subsidy necessary to supplement net revenues, in order to meet level debt service, is shown in Table II-19. The computations were developed assuming a 30-year bond term and an earning period of 28 years.

Assuming the bonds carried an interest rate of 5.5 per cent, the Cedar Street project would require a total subsidy of \$6,870,000 to meet level debt service requirements over the bond term. The total subsidy necessary for the Cypress Street location is estimated at \$5,050,000.



TABLE II-19

RELATIONSHIP BETWEEN LEVEL DEBT SERVICE  
AND NET REVENUES  
Assuming 30-Year Bond Issue

<u>Year</u>	<u>Net Revenues</u>	<u>Level Debt Service</u>		<u>Net Revenues To Level Debt Service Deficit</u>	
		<u>Cedar Street</u>	<u>Cypress Street</u>	<u>Cedar Street</u>	<u>Cypress Street</u>
1971	\$175,000	\$445,000	\$380,000	\$ 270,000	\$ 205,000
1972	178,000	445,000	380,000	267,000	202,000
1973	181,000	445,000	380,000	264,000	199,000
1974	184,000	445,000	380,000	261,000	196,000
1975	188,000	445,000	380,000	257,000	192,000
1976	190,000	445,000	380,000	255,000	190,000
1977	192,000	445,000	380,000	253,000	188,000
1978	195,000	445,000	380,000	250,000	185,000
1979	197,000	445,000	380,000	248,000	183,000
1980	200,000	445,000	380,000	245,000	180,000
1981	201,000	445,000	380,000	244,000	179,000
1982	202,000	445,000	380,000	243,000	178,000
1983	204,000	445,000	380,000	241,000	176,000
1984	205,000	445,000	380,000	240,000	175,000
1985	207,000	445,000	380,000	238,000	173,000
1986	207,000	445,000	380,000	238,000	173,000
1987	207,000	445,000	380,000	238,000	173,000
1988	207,000	445,000	380,000	238,000	173,000
1989	207,000	445,000	380,000	238,000	173,000
1990	207,000	445,000	380,000	238,000	173,000
1991	207,000	445,000	380,000	238,000	173,000
1992	207,000	445,000	380,000	238,000	173,000
1993	207,000	445,000	380,000	238,000	173,000
1994	207,000	445,000	380,000	238,000	173,000
1995	207,000	445,000	380,000	238,000	173,000
1996	207,000	445,000	380,000	238,000	173,000
1997	207,000	445,000	380,000	238,000	173,000
1998	207,000	445,000	380,000	<u>238,000</u>	<u>173,000</u>
TOTAL				\$6,870,000	\$5,050,000

# **APPENDIX**

Iowa Senate File 131

**The General Bridge Act**

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 RE-CONSTRUCT, 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 bridge 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 interstate 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 depositories 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 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 duties 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 indemnity 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, covenants, 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 precincts 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 re-funding 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.

## GENERAL BRIDGE AUTHORITY

*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, 63 Stat. 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 subpoena 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.



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