# TRAFFIC AND REVENUES

# Proposed MUSCATINE BRIDGE

IOWA

*Wilbur Smith and Associates*

# TRAFFIC AND REVENUES
# PROPOSED MUSCATINE BRIDGE

Prepared for

**IOWA STATE HIGHWAY COMMISSION**

by

*Wilbur Smith and Associates*

NEW HAVEN, CONNECTICUT

**MAY, 1969**

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May 23, 1969

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

Dear Mr. Coupal:

We are pleased to submit this comprehensive financing report presenting estimated traffic and revenues for the proposed Muscatine Bridge.

The report is based upon analyses of extensive origin-destination and count data obtained specifically for the project. Programmed trans-river highway improvements in the travel corridor were recognized in traffic assignments to the bridge and projections of future growth. Several toll rates were studied to arrive at a recommended toll structure for the new facility.

The recommended toll schedule is based upon a rate of $0.25 per vehicle axle. First year toll revenues of $292,000 are estimated increasing to $406,000 in the fifteenth year of operation. Average annual toll revenues of $380,000 are estimated over the first thirty years of bridge operation.

Respectfully submitted,

Wilbur S. Smith

Reg. P.E.
# 4007

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# Chapter 1

# INTRODUCTION

Muscatine, Iowa, a city of 22,400 persons in 1967, was one of the first settlements west of the Mississippi River. As depicted in Figure 1, Muscatine is located on the Mississippi River between the Davenport-Rock Island-Moline area and Burlington.

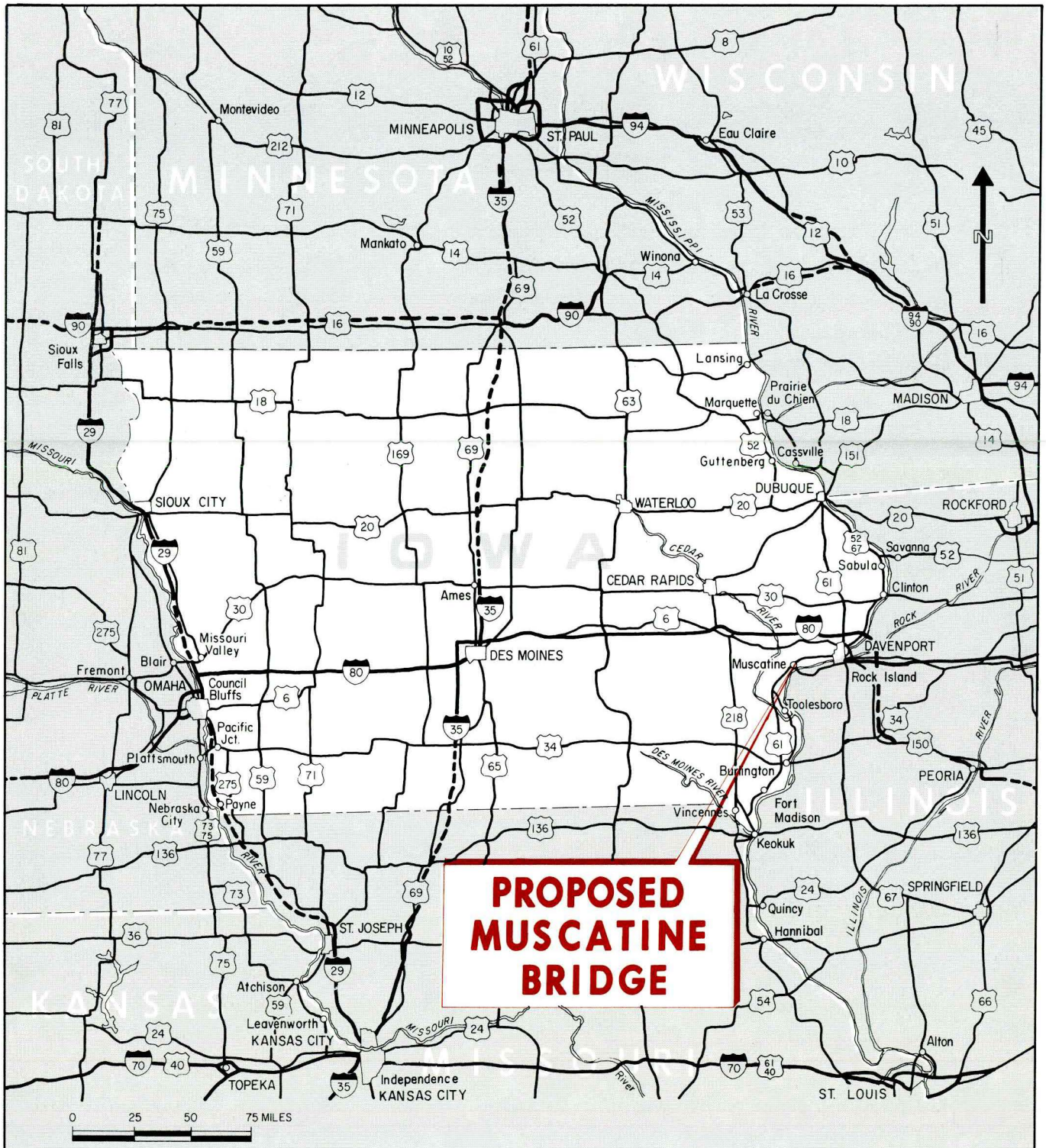
The city was originally largely dependent upon river commerce but in recent years has diversified its industrial and commercial base and has become an important trade and service center for an extensive area in both Iowa and Illinois. Due to its relative proximity to the Davenport-Rock Island-Moline area, there is considerable interchange between the two urban areas in terms of employment and industrial-commercial activity.

Muscatine is served by U.S. Route 61, which generally parallels the Mississippi River between Davenport and Burlington. The major east-west highway in the Muscatine area is Iowa Route 92-Illinois Route 92. The present Muscatine Bridge links these two facilities via a crossing at the Mississippi River. The crossing, built in 1890, consists of two narrow travel lanes. Large trucks are prohibited from using the bridge due to structural conditions.

## Authority and Purpose of Report

In October, 1968, the Iowa State Highway Commission authorized the preparation of a final traffic and revenue report for a new toll crossing to replace the present Muscatine Bridge. In addition to the development of annual estimates of traffic and revenues, a comprehensive report suitable for use in possible financing of the facility was to be prepared.

The report was to assume construction of a modern, two-lane, high level bridge connecting with Cypress Street in Muscatine. As shown in Figure 2, the bridge approach road in Illinois would be linked with Illinois Route 92.




## REGIONAL MAP

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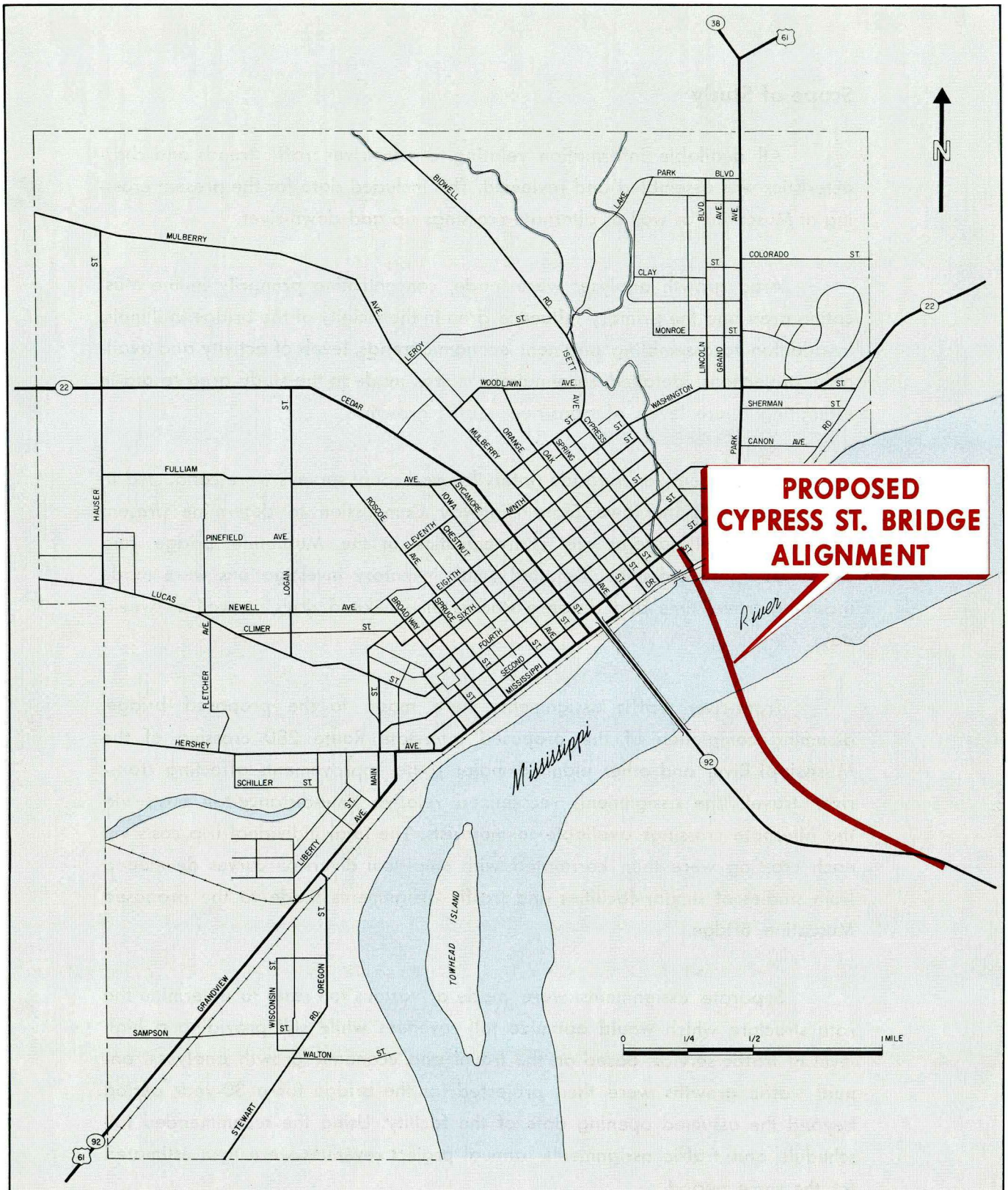
FIGURE 1




# LOCATION MAP

*Wilbur Smith and Associates*

FIGURE 2

## Scope of Study

All available information relating to trans-river traffic trends and characteristics was assembled and reviewed. This included data for the present crossing at Muscatine as well as alternate crossings up and down-river.

Area growth analyses were made, concentrating primarily in the Muscatine area and the primary influence area in the vicinity of the bridge in Illinois. In addition to assembling pertinent economic trends, levels of activity and available projections, detailed reconnaissance was made in the study area to aid in estimating future levels of trans-river traffic growth.

Comprehensive roadside interview and count surveys were conducted in cooperation with the Iowa State Highway Commission to determine present trans-river travel patterns and characteristics at the Muscatine Bridge and closest alternate crossings. Detailed route inventory investigations were made including travel time and distance studies on weekend days as well as weekdays.

Trans-river traffic assignments were made to the proposed bridge, assuming completion of the proposed Interstate Route 280 crossing of the Mississippi River and other planned major route improvements affecting trans-river travel. The assignments recognized relative time-distance-toll costs via the alternate crossings available to motorists. The total individual trip costs via each crossing were then correlated with empirical diversion curves developed from studies of similar facilities and traffic assignments made to the proposed Muscatine Bridge.

Separate assignments were made at various toll rates to determine the rate structure which would optimize toll revenues while still providing a high level of traffic service. Based on the travel and economic growth analyses, annual traffic growths were then projected for the bridge for a 30-year period beyond the assumed opening date of the facility. Using the recommended toll schedule and traffic assignments, annual project revenues were then estimated for the same period.

## Previous Studies

Considerable information was obtained from the preliminary feasibility study for a proposed bridge at Muscatine submitted to the Commission in April, 1968, by Wilbur Smith and Associates - Howard, Needles, Tammen & Bergendoff. Numerous other reports and data were also assembled and reviewed including information relating to the Comprehensive Transportation Study for the Muscatine area conducted by the Commission and Stanley Consultants, Inc. Several state and local agencies in both Iowa and Illinois also provided valuable data for this study.

# Chapter 2

# AREA GROWTH ANALYSIS

Detailed studies were made to determine a development profile for the primary influence area of the proposed bridge. Trends in numerous economic parameters were assembled to review the historic growth pattern of the area as an aid in projecting future growth. The growth projections developed also recognized estimates of future growth in various economic indices prepared by the Iowa State Highway Commission, the Illinois Department of Business and Economic Development and several local area groups and agencies.

## Study Area Characteristics

Muscatine, located on the west descending bank of the Mississippi River, is situated partially on the river bluffs and partly on the low land lying along the river. Most of the industrial area of the city and a portion of the central business district is located at an elevation below the Iowa bridgehead of the present Muscatine crossing.

Muscatine is served by the mainline of the Chicago, Rock Island and Pacific Railroad which operates maintenance and overhaul shops in the city. The proximity of the main navigational channel of the Mississippi River enables the city to enjoy the advantages of low-cost, bulk, water transportation for agricultural and mineral products, etc.

Muscatine, the county seat of Muscatine County, has embarked upon a progressive program of community improvement. An urban renewal project is underway for the downtown area and adjacent river-front. The renewal efforts will largely be directed towards downtown modernization.

*Residential Areas* — Family groups in detached units dominate the housing pattern of all neighborhoods in Muscatine. Income characteristics and population density of the five locally-known neighborhoods are shown in Table 1. While construction of multifamily units has been permitted in the Old

TABLE I

RESIDENTIAL NEIGHBORHOOD CHARACTERISTICS

Muscatine

| NEIGHBORHOOD | FAMILY INCOME GROUP (1966) UNDER $7,000 | $ 7,000 TO $10,000 | OVER $10,000 | TOTAL | PER CENT OF CITY POPULATION 1966 | 1975 | 1985 | ESTIMATED POPULATION GROWTH 1966-1985 |
|---|---|---|---|---|---|---|---|---|
| | | (per cent) | | | | | | (per cent) |
| Old Town | 62 | 24 | 14 | 100 | 25 | 19 | 16 | —1 |
| South End | 90 | 8 | 2 | 100 | 16 | 13 | 10 | —5 |
| East Hill | 61 | 21 | 18 | 100 | 19 | 17 | 20 | 60 |
| Mulberry (North-West) | 53 | 27 | 20 | 100 | 18 | 23 | 25 | 110 |
| West Hill | 54 | 23 | 23 | 100 | 22 | 28 | 29 | 108 |
| TOTAL CITY | 63 | 21 | 16 | 100 | 100 | 100 | 100 | |

SOURCE: "Comprehensive Plan, City of Muscatine, Report No. 2," by Stanley Consultants, Inc., 1968.

Town area for some time, there is no strong trend toward this type of housing. Family incomes are considerably lower in the Old Town, South End and East Hill areas than in the newer neighborhoods of Mulberry and West Hill. Currently, the Old Town area has the highest percentage of residences in the community. In the future, this pattern is expected to change with the newer neighborhoods containing far higher percentages of residences than the older, more established areas. Present residential land uses in the South End neighborhood is expected to gradually give way to increased industrial development.

For the most part, all neighborhoods are served by city water and separate sanitary sewers. A new eight million gallon per day sewage treatment plant was constructed in 1965, designed for a population of 27,500 persons in addition to heavy industrial waste use. The industrial load currently equals domestic use. Planning is underway for a new Mad Creek intercepter sewer and sewers to service anticipated development east of the city.

Generally, the quality of housing in Muscatine is good. Areas which need corrective work have been identified and efforts are underway to upgrade these areas. There is no identifiable minority group area. Muscatine's population is predominantly native with less than 10 per cent having foreign-born parents. There is relatively little difference in the number of persons residing per dwelling unit from one neighborhood to another.

*Commercial Area* — The commercial and retail area of Muscatine is concentrated in the vicinity of the present Muscatine Bridge. Aside from one section, the central business district has not measurably deteriorated and remains healthy and vibrant. The exception is a three-block area on Mississippi Drive which is currently undergoing urban renewal. Property acquisition is underway and demolition of buildings has begun. The main element of the renewal plan is increased parking facilities especially at ground level, which in the past has been subject to seasonal flooding. Upper portions of the structures will be devoted to retail trade activities, which will be on the same level as Second Avenue, one block away from the river. Private capital is also being infused into the general area of the renewal plan; a motel-hotel complex is under consideration which will include ground level parking. Other facets of the urban renewal program are being directed to improved code enforcement

and encouragement of improvements through private capital. As a result of this reconstruction, downtown Muscatine is expected to attract an even higher proportion of the total trade and services volume within its influence area in Iowa and Illinois, than it does presently.

*Industrial Areas* — Present industrial development in Muscatine is concentrated mainly in the Mad Creek Valley and in the southern part of the city between Muscatine Slough and the Mississippi River. Two views of present industrial areas are depicted in Figure 3.

The principal types of industry in Muscatine and their size in terms of employment are presented in Table 2. The city is in the enviable position of

TABLE 2

MAJOR INDUSTRIES AND PRESENT EMPLOYMENT

Muscatine

| TYPE OF MANUFACTURING | CURRENT EMPLOYMENT LEVEL | | | | | |
|---|---|---|---|---|---|---|
| | 1-25 | 25-50 | 50-100 | 100-200 | 200-500 | OVER 500 |
| | (persons) | | | | | |
| Manufacturing Machinery | 3 | | | | | |
| Machine Products | 2 | | 2 | 1 | | |
| Consumer Hardgoods | 6 | 5 | | | | |
| Building Materials and Allied Products | 9 | 2 | | | 1 | |
| Food Base Products | 3 | | 1 | | | 1 |
| Processed Foods | 2 | | | | 1 | |
| Agricultural Feeds and Chemicals | 4 | 1 | | 1 | | |
| Chemicals | 1 | | | 1 | | |
| Manufacturing Products | 3 | 1 | | | 1 | 1 |
| Furniture | | | | | 1 | |

SOURCE: Muscatine Chamber of Commerce.

HEAVY INDUSTRY IN SOUTHEND RAILROAD SHOPS
IN FOREGROUND AND CHEMICAL PLANTS DOWNSTREAM


INDUSTRIES ALONG U.S. ROUTE 61 LOOKING SOUTH
FROM CYPRUS STREET

# INDUSTRIAL AREAS

MUSCATINE

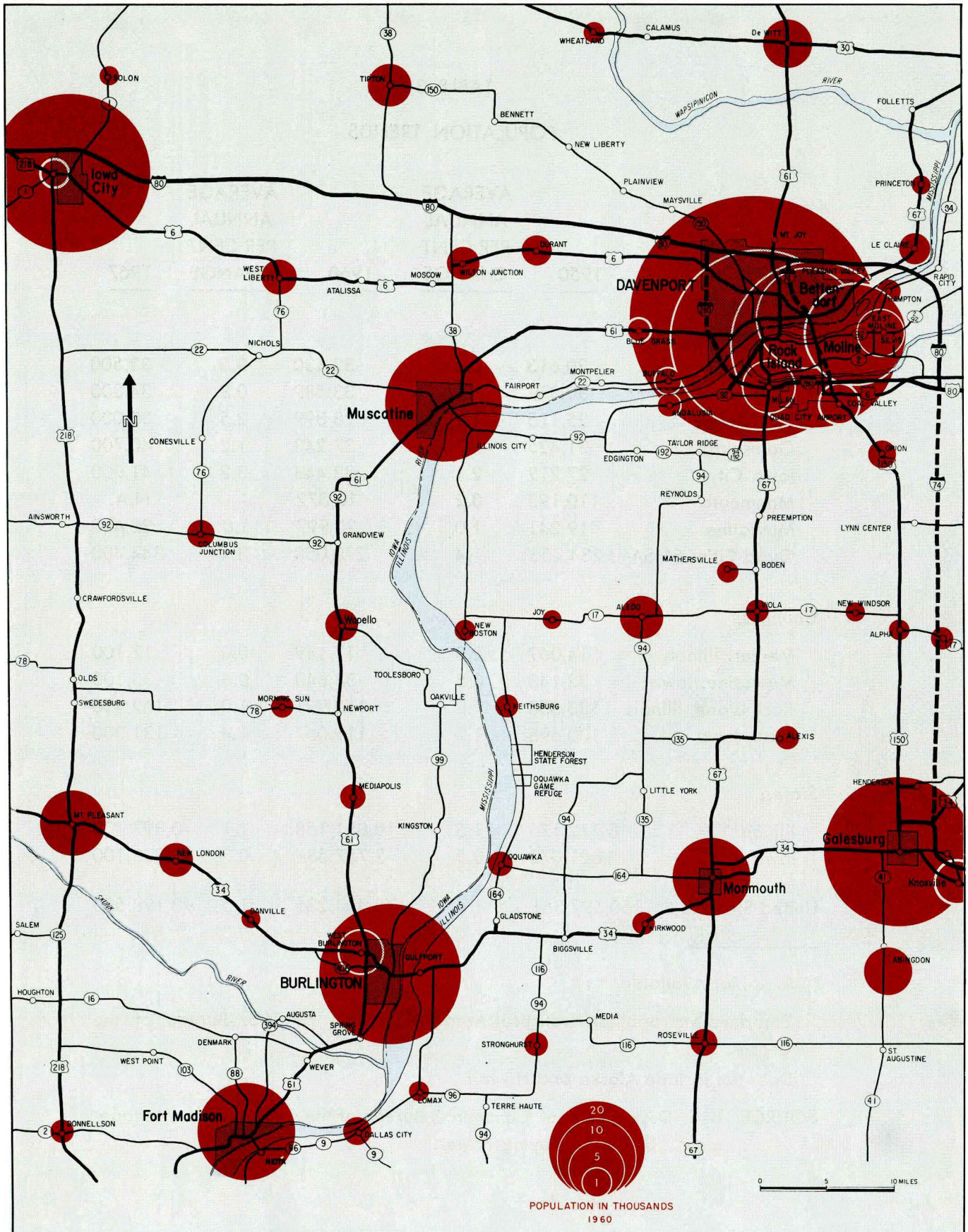
having a good diversification of industry resulting in a generally stable economic base. This has not always been the case. In early years, much of the industry in Muscatine was related to the availability of low-cost water transportation. In recent years, the nature of employment has changed from primarily hand labor-oriented industries to more sophisticated automated plant production. During this transition, sufficient new industry has been attracted to absorb job losses occurring as manufacturing skill requirements changed. The present employment level in Muscatine is approximately 10,500 persons. As shown in Table 2, there are two industries in the city employing 500 or more people. Four plants employ between 200 and 500 persons and three firms--100 to 200 people. The number of major firms is well diversified with no one type of manufacturing dominating the employment market.

*Illinois Portion of Study Area* — The area across the river in Illinois is mainly devoted to small farms. Some of the farm operators work part time in Muscatine and elsewhere to supplement their farm incomes. There is little population concentration in the Illinois portion of the bridge influence area and residents must travel to Muscatine, the Rock Island-Moline area, Monmouth or Galesburg for purchases beyond those items available in small local general stores.

## Population Trends

An indication of the importance of Muscatine to its area of influence and the scattered pattern of population concentration in Illinois is depicted in Figure 4. The illustration also shows the relative dominance of the Quad-Cities area in the region.

In 1950, Muscatine had a population of 19,041. By 1960, this had increased to 20,997 and in 1967, to 22,400. As shown in Table 3, this represented an average annual growth of 1.0 per cent during this period. Table 3 also shows the population trends of other selected cities in Iowa, both inland and river-oriented. Burlington, located about 45 miles south of Muscatine on the Mississippi River, and Clinton, situated along the Mississippi River north




# 1960 POPULATION DISTRIBUTION

*Wilbur Smith and Associates*

FIGURE 4

## TABLE 3

## POPULATION TRENDS

| AREA | 1950 | AVERAGE ANNUAL PER CENT CHANGE | 1960 | AVERAGE ANNUAL PER CENT CHANGE | 1967 |
|---|---|---|---|---|---|
| *Urban Areas* | | | | | |
| Burlington | 30,613 | 0.6 | 32,430 | 0.5 | 33,500 |
| Clinton | 30,379 | 1.0 | 33,589 | 0.3 | 34,300 |
| Fort Dodge | 25,115 | 1.2 | 28,399 | 2.5 | 30,000 |
| Galesburg | 31,425 | 1.7 | 37,243 | 1.2 | 40,700 |
| Iowa City | 27,212 | 2.1 | 33,443 | 3.2 | 41,900 |
| Monmouth | 110,193 | 0.2 | 10,372 | —— | N.A. |
| Muscatine | 19,041 | 1.0 | 20,997 | 1.0 | 22,400 |
| Quad Cities SMSA[1] | 234,256 | 1.4 | 270,058 | 3.4 | 344,400 |
| *Counties:* | | | | | |
| Mercer, Illinois | 14,069 | 2.0 | 17,149 | 0.0 | 17,100 |
| Muscatine, Iowa | 32,148 | 0.5 | 33,840 | 0.6 | 35,100 |
| Rock Island, Illinois | 133,558 | 1.2 | 150,991 | 1.0 | 162,400 |
| Scott, Iowa | 100,698 | 1.7 | 119,067 | 1.4 | 131,300 |
| *States:* | | | | | |
| Illinois | 8,712,176 | 1.5 | 10,081,158 | 1.1 | 10,897,400 |
| Iowa | 2,621,073 | 0.5 | 2,757,537 | 0.3 | 2,808,100 |
| United States[2] | 150,697,361 | 1.7 | 178,464,236 | 1.5 | 198,198,500 |

N.A. = Not Available.

[1] Standard Metropolitan Statistical Area as defined by U.S. Bureau of the Census.

[2] Does not include Alaska and Hawaii.

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

of the Quad-Cities area, have not experienced as high a population growth as Muscatine while Iowa City, an inland community located on newly opened Interstate Route 80, has had considerably higher growth.

The Davenport-Rock Island-Moline-Bettendorf (Quad-Cities) area realized an average annual growth of 1.4 per cent between 1950 and 1960. Between 1960 and 1967, the period during which several portions of Interstate Route 80 were completed, the average annual growth was 3.4 per cent.

Nominal population growths have occurred in Muscatine County since 1950 with average annual increases of 0.5 per cent between 1950 and 1960 and 0.6 per cent between 1960 and 1967. Mercer County recorded no growth between 1960 and 1967 after an increase averaging 2.0 per cent during the period 1950-60. The low growths in both counties appear to be due primarily to the continuing trend of farm mechanization and migration from rural to urban areas. While Muscatine County is a well developed agricultural area, the City of Muscatine accounted for 64 per cent of the total county population in 1967. As already indicated, Mercer County and the southwestern portion of Rock Island County are predominantly agricultural in nature. There is little other development in this area of Illinois within a 25-mile radius of Muscatine.

## Trends in Retail Sales

Retail sales in Muscatine remained generally stable between 1962 and 1967 after good growths in the period 1957-62. As shown in Table 4, an average annual growth af 3.5 per cent was experienced between 1957 and 1962 which decreased to 0.1 per cent per year during the next five years. By comparison, Muscatine County recorded an average increase of 0.8 per cent between 1962 and 1967, Mercer County--5.9 per cent, Rock Island County--9.8 per cent, Scott County--5.9 per cent and the Quad-Cities area--8.1 per cent. The statewide average annual increase in Iowa during this same period was 4.1, the growth in Illinois--6.1 per cent and the national growth--5.9 per cent.

TABLE 4

TRENDS IN RETAIL SALES

| AREA | 1957 | AVERAGE ANNUAL PER CENT CHANGE | 1962 | AVERAGE ANNUAL PER CENT CHANGE | 1967 |
|---|---|---|---|---|---|
| | | | (thousands) | | |
| *Urban Areas:* | | | | | |
| Burlington | $ 50,508 | 3.3 | $ 59,464 | 2.1 | $ 66,096 |
| Galesburg | 60,637 | 0.7 | 62,833 | 4.3 | 77,527 |
| Monmouth | 20,039 | —0.3 | 19,697 | — | N.A. |
| Muscatine | 34,359 | 3.5 | 40,793 | 0.1 | 41,030 |
| Quad Cities SMSA[1] | 337,639 | 5.5 | 441,802 | 8.1 | 652,768 |
| *Counties:* | | | | | |
| Mercer, Illinois | $ 15,229 | 5.5 | $ 19,967 | 5.9 | $ 26,683 |
| Muscatine, Iowa | 44,194 | 3.8 | 53,399 | 0.8 | 55,681 |
| Rock Island, Illinois | 177,492 | 1.7 | 193,683 | 9.8 | 308,893 |
| Scott, Iowa | 160,147 | 2.9 | 184,698 | 5.9 | 246,428 |
| *States:* | | | | | |
| Illinois | $ 12,574,669 | 3.2 | $ 14,747,492 | 6.1 | $ 19,860,018 |
| Iowa | 3,247,190 | 3.4 | 3,840,937 | 4.1 | 4,698,300 |
| United States[2] | $200,171,999 | 3.2 | $234,356,318 | 5.9 | $310,198,845 |

N.A. = Not Available.

[1] Standard Metropolitan Statistical Area as defined by U.S. Bureau of the Census.

[2] Does not include Alaska and Hawaii.

SOURCE: *Sales Management,* "Survey of Buying Power."

One method of measuring the trade effectiveness of a given retail center is the comparison of retail sales volume with resident population. Table 5 gives trends of retail sales per capita for Muscatine compared to other retail centers of similar size and the Quad-Cities area. In 1957, retail sales per capita in Muscatine averaged $1,204. By 1962, this had increased to $1,465 and in 1967, to $1,872. Burlington, a somewhat larger river-oriented community,

TABLE 5

RELATIVE GROWTHS IN BUSINESS ACTIVITY

| AREA | POPULATION 1967 | BUSINESS VOLUME PER RESIDENT[1] 1957 | 1962 | 1967 |
|---|---|---|---|---|
| *Urban Areas:* | | | | |
| Burlington | 33,500 | $1,345 | $1,803 | $2,339 |
| Clinton | 34,300 | 1,371 | 1,493 | 2,013 |
| Fort Dodge | 30,000 | 1,960 | 2,165 | 2,777 |
| Iowa City | 41,900 | 1,294 | 1,543 | 1,928 |
| MUSCATINE | 22,400 | 1,204 | 1,465 | 1,872 |
| Quad Cities SMSA | 344,400 | 1,264 | 1,335 | 1,895 |
| *Counties:* | | | | |
| Mercer, Illinois | 17,100 | $1,221 | $1,168 | $1,560 |
| Muscatine, Iowa | 35,100 | 1,315 | 1,557 | 1,586 |
| Rock Island, Illinois | 162,400 | 1,172 | 1,243 | 1,902 |
| Scott, Iowa | 131,300 | 1,280 | 1,447 | 1,885 |
| *States:* | | | | |
| Illinois | 10,897,400 | $1,302 | $1,412 | $1,822 |
| Iowa | 2,808,100 | 1,196 | 1,371 | 1,673 |
| United States[2] | 198,198,500 | $1,164 | $1,253 | $1,565 |

[1] Based on sales tax collections during the fiscal year ended June 30.

SOURCE: Muscatine Chamber of Commerce, "Retail Sales Report"; *Sales Management,* "Survey of Buying Power."

but without a nearby competitor such as the Quad-Cities area, exhibited a considerably higher volume of retail sales per capita than Muscatine. Clinton, another river community but located just north of the Quad-Cities area realized a per capita volume of sales more comparable to Muscatine. The inland communities of Fort Dodge and Iowa City, removed from the competition of a major urban area such as the Quad-Cities and unrestricted by any natural barrier such as the Mississippi River, also experienced higher per capita sales than Muscatine. The per capita sales in Muscatine, in 1967, were significantly higher than the statewide Iowa average and the national average. Recent studies indicate that as much as 35 per cent of the retail sales in Muscatine are derived from Illinois residents.

## Average Effective Buying Income Per Family Trends

Effective buying income for the average Muscatine family, in 1967, was slightly below the Iowa statewide average but above the national average. As shown in Table 6, the effective buying income for Muscatine was also above the county average, considerably higher than the average for Mercer County but well below the averages for Rock Island and Scott Counties.

Between 1957 and 1962, an average annual increase in buying income in Muscatine of 6.9 per cent was realized. This good rate of growth continued over the next five years with an average annual increase of 6.4 per cent. The growth experienced between 1962 and 1967 was equal to that which occurred in Burlington, above the growths recorded in Galesburg, Iowa and the nation but below the increases realized in the Quad-Cities area, the four counties in the bridge influence area and the statewide average for Illinois.

## Trends in Motor Vehicle Registrations

Trends in motor vehicle registration are indicative of travel growths and general economic levels. As shown in Table 7, Muscatine County had a registration of 15,122 vehicles in 1957. An average annual growth of 2.9 per

TABLE 6

AVERAGE EFFECTIVE BUYING INCOME PER FAMILY TRENDS

| AREA | 1957 | AVERAGE ANNUAL PER CENT CHANGE | 1962 | AVERAGE ANNUAL PER CENT CHANGE | 1967 |
|---|---|---|---|---|---|
| *Urban Areas* | | | | | |
| Burlington | $5,216 | 6.1 | $7,032 | 6.4 | $ 9,607 |
| Galesburg | 5,995 | 4.1 | 7,319 | 6.2 | 9,909 |
| Monmouth | 5,573 | 3.3 | 6,557 | —— | N.A. |
| MUSCATINE | 4,549 | 6.9 | 6,345 | 6.4 | 8,647 |
| Quad Cities SMSA[1] | 6,189 | 3.0 | 7,176 | 7.8 | 10,453 |
| *Counties:* | | | | | |
| Mercer, Illinois | $5,184 | —0.3 | $5,094 | 7.9 | $ 7,451 |
| Muscatine, Iowa | 4,537 | 5.8 | 6,032 | 7.2 | 8,551 |
| Rock Island, Illinois | 6,478 | 2.6 | 7,367 | 7.1 | 10,397 |
| Scott, Iowa | 5,809 | 5.7 | 7,662 | 8.4 | 11,468 |
| *States:* | | | | | |
| Illinois | $6,783 | 2.9 | $7,838 | 5.8 | $10,415 |
| Iowa | 5,015 | 4.4 | 6,224 | 7.7 | 9,022 |
| United States[2] | $5,921 | 1.0 | $6,227 | 5.8 | $8,246 |

N.A. = Not Available.

[1] Standard Metropolitan Statistical Area as defined by the U. S. Bureau of the Census.

[2] Does not include Alaska and Hawaii.

SOURCE: *Sales Management*, "Survey of Buying Power."

TABLE 7

TRENDS IN MOTOR VEHICLE REGISTRATIONS

| AREA | 1957 | AVERAGE ANNUAL PER CENT CHANGE | 1962 | AVERAGE ANNUAL PER CENT CHANGE | 1967 |
|---|---|---|---|---|---|
| *Counties:* | | | | | |
| Mercer, Illinois | 8,114 | 1.7 | 8,842 | 3.2 | 10,307 |
| Muscatine, Iowa | 15,122 | 2.9 | 17,423 | 4.8 | 22,012 |
| Rock Island, Illinois | 59,910 | 3.0 | 69,632 | 4.3 | 85,940 |
| Scott, Iowa | 48,927 | 3.8 | 58,911 | 5.4 | 77,074 |
| *States:* | | | | | |
| Illinois | 3,513,182 | 2.5 | 3,976,709 | 3.9 | 4,818,259 |
| Iowa | 1,220,088 | 2.8 | 1,401,066 | 3.2 | 1,649,941 |
| United States[1] | 67,131,071 | 3.2 | 78,689,615 | 4.2 | 96,542,252 |

[1] Does not include Alaska and Hawaii.

SOURCE: Iowa State Highway Commission, Division of Planning; Secretary of State, Illinois; U. S. Dept. of Transportation, Bureau of Public Roads.

cent occurred between 1957 and 1962, somewhat higher than increases realized in Iowa and Illinois, but slightly below the national trend of 3.2 per cent. During the next five years, the average annual growth in Muscatine County was 4.8 per cent, higher than statewide and national growths. In 1967, a total of 22,012 motor vehicles were registered in Muscatine County. By comparison, Mercer County in Illinois, recorded a registration of 10,307 vehicles; the number of registrations in the Quad-Cities counties were several times higher than those in Muscatine. Over the past five years, motor vehicle registrations in Muscatine County increased at a faster rate than in Mercer and Rock Island Counties but somewhat below the 5.4 per cent average annual increase recorded in Scott County.

## Motor Fuel Consumption Trends

Reflecting the increases in personal income and motor vehicle registration over the past decade, personal travel, as measured by motor fuel consumption, has also shown good increases during the period 1957 to 1967. Motor fuel consumption in Iowa increased an average of 2.6 per cent per year between 1957 and 1962. This increased to 3.8 per cent per year from 1962 to 1967. As shown in Table 8, this increase was slightly higher than that experienced in Illinois but somewhat below the national average annual growths of 2.9 and 4.4 per cent during the periods 1957-62 and 1962-67, respectively. Motor fuel consumption in Iowa is some 30 per cent higher per capita than the national average.

## Trends in Other Growth Parameters

While excellent increases have occurred in bank deposits and assets in Muscatine over the past decade, other indices of area growth reflect more

TABLE 8

MOTOR FUEL CONSUMPTION TRENDS

| | 1957 | AVERAGE ANNUAL PER CENT CHANGE | 1962 | AVERAGE ANNUAL PER CENT CHANGE | 1967 |
|---|---|---|---|---|---|
| | (Thousands Of Gallons) | | | | |
| Illinois | 3,204,866 | 2.0 | 3,543,653 | 3.9 | 4,301,634 |
| Iowa | 1,121,104 | 2.6 | 1,276,223 | 3.8 | 1,539,164 |
| United States[1] | 57,443,330 | 2.9 | 66,348,025 | 4.4 | 82,250,784 |

[1] Does not include Alaska and Hawaii.

SOURCE: Highway Statistics, U. S. Department of Commerce, Bureau of Public Roads.

nominal increases. As show in Table 9, bank credits and assets have been increasing far more rapidly than the population or income statistics would indicate. However, trends in electric, gas and water meter installations are considerably lower indicating relatively low levels of building activity. Electric consumption annual growths have been high since 1958 reflecting increased industrial as well as residential use.

## Future Growth

Recent trends in population and economic activity indicate relatively modest growths have occurred in the Muscatine area. Available population and employment estimates project a continuation of this trend into the foreseeable

TABLE 9

GROWTH IN BUSINESS ACTIVITY PARAMETERS

| ITEM | SEPT. 1958 | AVERAGE ANNUAL PER CENT CHANGE | SEPT. 1963 | AVERAGE ANNUAL PER CENT CHANGE | SEPT. 1968 |
|---|---|---|---|---|---|
| Bank Credits | $ 21,278,960 | 3.3 | $ 24,980,127 | 14.2 | $ 57,914,282 |
| Bank Assets | $ 32,526,463 | 5.3 | $ 42,185,911 | 9.6 | $ 66,568,596 |
| Electric Meters | 8,340 | 0.0 | 8,347 | 0.8 | 8,665 |
| Electric Consumption (KWH) | 7,999,720[1] | 12.3 | 14,839,700[1] | 9.7 | 24,011,030[1] |
| Water Meters | 6,483 | 0.8 | 6,728 | 1.0 | 7,092 |
| Water Consumption (Gal.) | 178,754,390[1] | 9.2 | 278,642,740[1] | 4.9 | 381,380,427[1] |
| Gas Meters | 5,521 | 3.7 | 6,603 | 2.2 | 7,345 |
| Telephones, including Rural | 10,288 | 3.9 | 12,531 | 4.1 | 15,140 |

[1] Thirty-day period.

SOURCE: Muscatine Chamber of Commerce.

future. As shown in Table 10, the Iowa State Highway Commission, Division of Planning, estimates that the population of Muscatine will increase an average of 1.0 per cent per year between 1960 and 1980 with Muscatine County expected to increase an average of 0.5 per cent per year. By comparison, Scott County is projected to experience a growth of 1.9 per cent annually. In Illinois, the Illinois Department of Business and Economic Development forecasts average annual growths of 1.1 and 1.6 per cent, respectively, for Mercer and Rock Island Counties.

TABLE 10
AVAILABLE POPULATION PROJECTIONS

| AREA | 1960 CENSUS | AVERAGE ANNUAL PER CENT CHANGE | 1980 |
|---|---|---|---|
| *Municipalities:* | | | |
| Andalusia | 560 | 7.0 | 2,300 |
| Atalissa | 212 | 4.8 | 559 |
| Buffalo | 1,088 | 3.8 | 2,344 |
| Conesville | 248 | — 0.2 | 236 |
| Fairport | 250 | — 0.3 | 236 |
| MUSCATINE | 20,997 | 1.0 | 25,706 |
| Nichols | 329 | — 0.8 | 281 |
| West Liberty | 2,042 | 0.9 | 2,429 |
| Wilton Junction | 1,750 | 1.6 | 2,438 |
| *Counties:* | | | |
| Mercer, Illinois | 17,149 | 1.1 | 21,350 |
| Muscatine, Iowa | 33,840 | 0.5 | 37,400 |
| Rock Island, Illinois | 150,991 | 1.6 | 207,650 |
| Scott, Iowa | 119,067 | 1.9 | 172,240 |
| *States:* | | | |
| Illinois | 10,081,158 | 1.4 | 13,337,150 |
| Iowa | 2,787,537 | 0.7 | 3,192,000 |

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

Comparisons of population trends and projections for several river and inland cities in Iowa with those for Muscatine are shown in Table 11. With the exception of Burlington, each of the cities indicated are expected to experience more rapid population growths than Muscatine. Employment and population projections for the Muscatine urban area, prepared by Stanley Consultants, are shown in Table 12. The population of Muscatine is forecast to increase an average of 2.2 per cent per year between 1965 and 1985 and that of the county--2.1 per cent. The recent trend to increased manufacturing employment is expected to continue. Manufacturing as a percentage of total employment is expected to increase from 36 per cent in 1965 to 42 per cent in 1985 with agriculture-construction decreasing from 15 per cent of total employment in 1965 to 7 per cent in 1985. Total employment is projected to grow an average of 2.5 per cent per year during the 20-year forecast period.

TABLE 11

COMPARISON OF POPULATION
TRENDS AND PROJECTIONS FOR COMPARABLE AREAS

| AREA | 1950 CENSUS | AVERAGE ANNUAL PER CENT CHANGE | 1960 CENSUS | AVERAGE ANNUAL PER CENT CHANGE | 1980 |
|---|---|---|---|---|---|
| *Municipalities:* | | | | | |
| Burlington | 30,613 | 0.6 | 32,430 | 0.7 | 37,238 |
| Clinton | 30,379 | 1.0 | 33,589 | 1.4 | 44,432 |
| Fort Dodge | 25,115 | 1.2 | 28,399 | 1.3 | 36,890 |
| Galesburg | 31,425 | 1.7 | 37,243 | 2.0 | 55,600 |
| Iowa City | 27,212 | 2.1 | 33,443 | 2.4 | 54,495 |
| Monmouth | 10,193 | 0.2 | 10,372 | 1.2 | 13,100 |
| MUSCATINE | 19,041 | 1.0 | 20,997 | 1.0 | 25,706 |
| *Counties:* | | | | | |
| Des Moines, Iowa | 42,056 | 0.6 | 44,605 | 0.7 | 51,340 |
| Muscatine, Iowa | 32,148 | 0.5 | 33,840 | 0.5 | 37,400 |

SOURCE: Iowa State Highway Commission, Division of Planning.

TABLE 12

EMPLOYMENT AND POPULATION PROJECTIONS

Muscatine Urban Area

| | 1965 | PER CENT OF TOTAL | AVERAGE ANNUAL PER CENT GROWTH 1965-1985 | 1985 | PER CENT OF TOTAL |
|---|---|---|---|---|---|
| *Employment* | | | | | |
| 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 |
| TOTAL | 10,530 | 100 | 2.5 | 17,280 | 100 |
| *Population* | | | | | |
| Muscatine County | 35,810 | 100 | 2.1 | 53,900 | 100 |
| City of Muscatine | 21,994 | 61 | 2.2 | 24,000 | 68 |

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

*Estimated Population Projections* — While it is not expected that Muscatine will dramatically change its role in the areas' economy, there is evidence that through local planning efforts and promotion that the community is aware of the need to implement an effective program of growth.

The current urban renewal project in the downtown area is expected to provide an effective stimulus to growths in all facets of the Muscatine economy. As a result, the city should continue to increase in importance as the commercial and services center for its area of influence in Iowa and Illinois.

Completion of the proposed Interstate Route 280 Mississippi River crossing and approach highways will serve to more closely integrate the commercial and industrial activities of Muscatine with the rapidly growing Quad-Cities area. The expected continuation of rural to urban migration and shifts in agricultural to manufacturing employment will enhance the future growth of Muscatine.

As shown in Table 13, it is estimated that the population of Muscatine will increase an average of 1.5 per cent per year between 1960 and 1985 to a total of 30,340 persons in the later year. During this same period, the population of Muscatine County is projected to increase an average of 1.0 per

TABLE 13

ESTIMATED POPULATION PROJECTIONS

| AREA | 1960 CENSUS | AVERAGE ANNUAL PER CENT CHANGE | 1985 |
|---|---|---|---|
| *Municipalities:* | | | |
| Andalusia | 560 | 8.4 | 4,200 |
| Atalissa | 212 | 5.9 | 890 |
| Buffalo | 1,088 | 4.1 | 2,970 |
| Conesville | 248 | 0.3 | 270 |
| Fairport | 250 | 2.0 | 410 |
| MUSCATINE | 20,997 | 1.5 | 30,340 |
| Nichols | 329 | 0.5 | 370 |
| West Liberty | 2,042 | 1.4 | 2,890 |
| Wilton Junction | 1,750 | 2.0 | 2,870 |
| *Counties:* | | | |
| Mercer, Illinois | 17,149 | 0.9 | 21,260 |
| Muscatine, Iowa | 33,840 | 1.0 | 43,450 |
| Rock Island, Illinois | 150,991 | 1.8 | 235,550 |
| Scott, Iowa | 119,067 | 1.9 | 197,500 |

SOURCE: Wilbur Smith and Associates.

cent annually to 43,450 persons in 1985. Higher growths are estimated for some of the smaller communities within the Muscatine influence area. For example, Andalusia is expected to experience a population increase averaging 8.4 per cent per year between 1960 and 1985, Atalissa--5.9 per cent, Buffalo --4.1 per cent, Fairport--2.0 per cent, West Liberty--1.4 per cent and Wilton Junction--2.0 per cent.

As population grows, economic activity is expected to increase at an even faster pace. These growths, together with increased prosperity and leisure time will act to greatly increase travel in the region. Many of these motorists will be making trans-river trips or movements between the rural area of Illinois and Muscatine for work, business, shopping or recreational purposes; others will be moving between Muscatine and the important commercial and industrial area of Rock Island-Moline. A high proportion of these trips will be potential to the proposed Muscatine Bridge.

# Chapter 3

# TRAFFIC STUDIES

Detailed studies were undertaken to determine present trans-river travel patterns and other traffic characteristics. Origin-destination and count surveys were made in cooperation with the Iowa State Highway Commission, Division of Planning. Route reconnaissance investigations were conducted on all present trans-river crossings and on major streets and highways serving the Muscatine area. The studies included an inventory of present physical conditions, predominant roadside culture and travel speeds. All available traffic trend count data were assembled for the present Mississippi River crossings and connecting highways. Information on planned highway improvements which would affect trans-river travel was obtained.

## Present Highway System

The present Muscatine Bridge serves as a portion of State Route 92 in Iowa and Illinois. The route is an east-west highway following an alignment from central Illinois, passing just south of Rock Island and then through Muscatine and southern Iowa to Council Bluffs. From Milan, Illinois, to Muscatine, it has a pavement width of 16 feet, with 8-foot shoulders. It is posted for 55 miles per hour through most of this length except for some short sections in built-up areas. There are also numerous collector-feeder type county roads in the Illinois portion of the study area which carry local traffic as well as motorists destined to or from Muscatine. These are, for the most part, well maintained farm-to-market type roads.

Travel to or through Muscatine from the Rock Island-Moline area can also be accomplished by crossing either of two toll bridges, the Centennial Bridge or Memorial Bridge, into Davenport and then continuing west on U.S. Route 61 to Muscatine, 27 miles away. Both of these crossings are relatively new structures and provide a reasonably good level of traffic service. During certain periods of the day, travelers can also cross the Mississippi River in

Davenport via the free Government Bridge, an old and narrow structure primarily serving the Rock Island Arsenal. Twelve miles further upriver, the Interstate Route 80 Bridge provides an excellent east-west-oriented through traffic function. U.S. Route 6, which crosses the Mississippi via the Memorial Bridge, served as the primary through east-west highway prior to the completion of Interstate Route 80.

Southeast of the Quad-Cities, Interstate Routes 74 and 80 intersect. From this point westerly to a crossing of the Mississippi River and then northerly to an interchange with Interstate Route 80, a limited-access circumferential highway is under construction, designated Interstate Route 280. The Quad-Cities regional airport is located adjacent to Interstate Route 280 near Moline. West of the airport, U.S. Route 67 from Monmouth and points south crosses Illinois Route 92 in Milan and then continues northerly through Rock Island. The route crosses the Mississippi River via the Centennial Bridge, into Davenport where it joins U.S. Route 61.

In Davenport, U.S. Route 61 is a four-lane highway from the Centennial Bridge to just beyond Iowa Route 22. From this point to Muscatine, the route is a well-maintained, modern two-lane highway with good sight distance and frequent passing opportunities. Within the city limits of Muscatine, U.S. Route 61 is a four-lane, undivided highway with curb parking permitted. At Mad Creek, a levee has been constructed to control high water. During times of severe flooding, the levee is closed and traffic cannot use this section of U.S. Route 61. Continuing southerly through Muscatine, the highway follows a Second Street, Mississippi Drive, Hershey Avenue and Grandview Avenue routing. South of Muscatine, U.S. Route 61 is an important, north-south highway connecting Burlington and Fort Madison, Iowa and points south.

Iowa Route 22 begins on the east at U.S. Route 61 and is a four-lane, divided highway from this point westerly for approximately six miles to the Davenport city limits. Continuing westerly to Muscatine, it is a two-lane highway with an 18-22-foot pavement and three-foot untreated shoulders. The route serves several small communities which reduces overall travel speeds. There are several large industries located along the riverside of the highway including

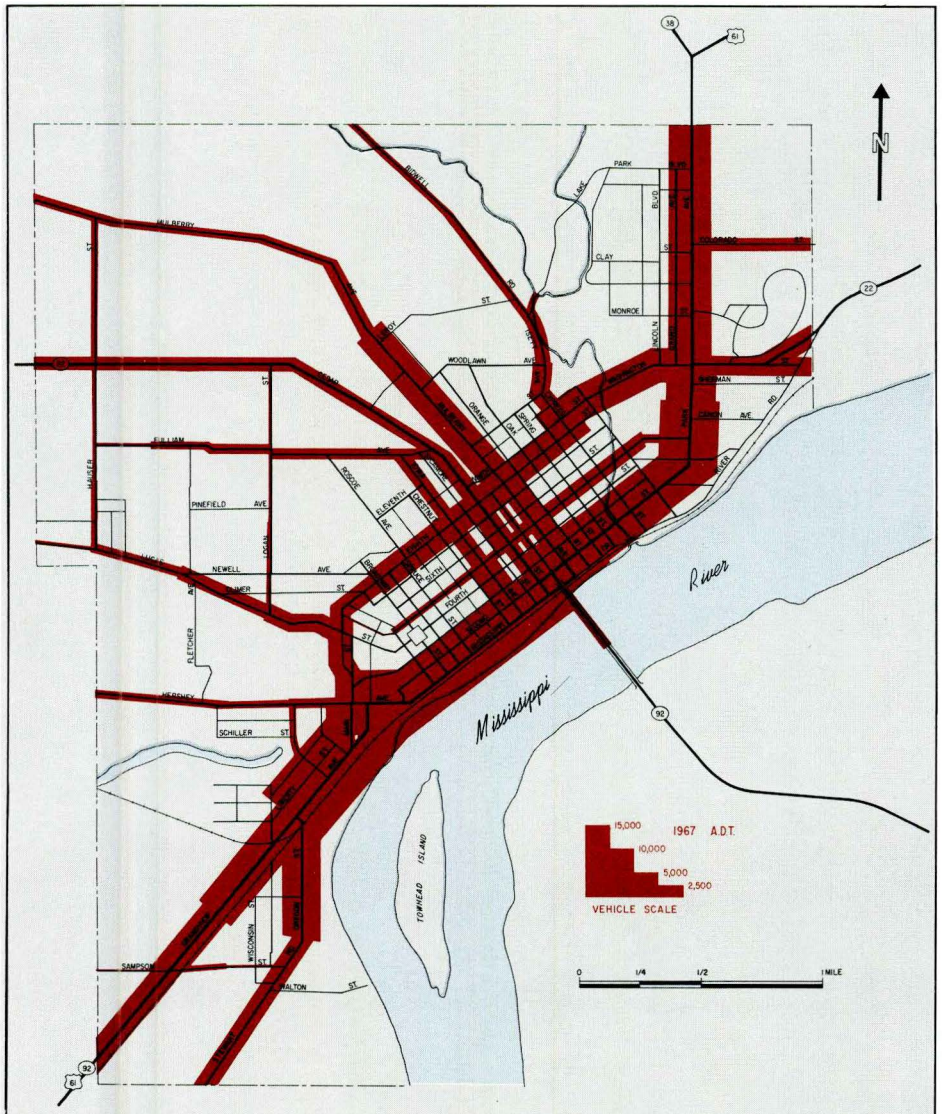
feed processing mills, a Portland Cement Plant and large electric generating facilities. West of Muscatine, Iowa Route 22 passes through predominantly rural farmland, and is a good two-lane highway maintained in a good to excellent condition.

Iowa Route 38 provides a direct connection between Muscatine and Interstate Route 80 to the north. It is a two-lane rural highway in generally good condition. South of Muscatine, in the Burlington area, U.S. Route 34 is an important east-west highway which connects the important Illinois cities of Monmouth and Galesburg with Iowa City and via Interstate Route 80, points west.

Iowa Route 22, east of Muscatine and Illinois Route 92 are both designated as part of the Great River Road System extending from Canada to the Gulf of Mexico. The System is comprised of scenic highways generally paralleling the Mississippi River. It is attracting increasing numbers of vacationing motorists as knowledge of the facility is disseminated.

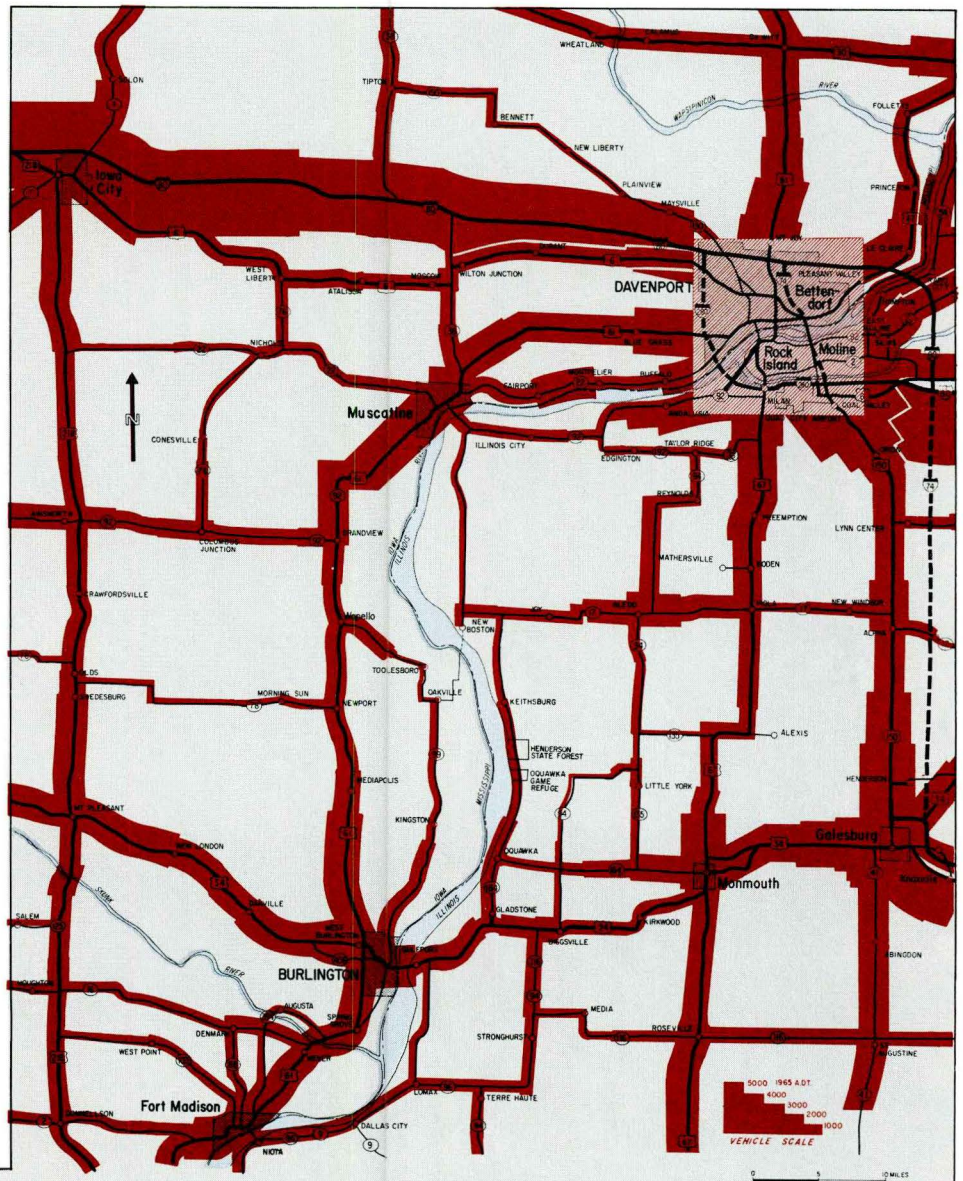
*Present Traffic Volumes* — The relative importance of the regional highway and Muscatine street systems, in terms of volume of traffic carried, is depicted in Figure 5. East-west regional traffic is accommodated primarily on five routes--Interstate Route 80, U.S. Route 6, U.S. Route 61--Illinois Route 22, --Illinois Route 92 and U.S. Route 34. The most important highway is Interstate Route 80 which carried an estimated 7,600 vehicles daily in 1965 at a point east of Iowa Route 38. To the south, U.S. Route 6 served an estimated 2,000 vehicles per day, west of Iowa Route 38. West of Muscatine, Iowa Route 22 accommodated approximately 1,300 vehicles daily while Iowa Route 92 served an estimated 1,600 vehicles per day, west of U.S. Route 61. U.S. Route 34, west of Burlington carried close to 3,000 vehicles daily.

North-south traffic in the region primarily uses U.S. Routes 61, 67 and 150. North of Iowa Route 92, U.S. Route 61 carried an estimated 3,900 vehicles per day in 1965. U.S. Routes 67 and 150 served 3,100 and 3,000 vehicles daily, respectively, north of Illinois Route 17. U.S. Route 61 is the primary traffic artery approaching Muscatine. Counts taken just beyond the urbanized




## MUSCATINE

1967 AVERAGE DAILY TRAFFIC




## REGION

1965 AVERAGE DAILY TRAFFIC

# TRAFFIC FLOW MAP

*Wilbur Smith and Associates*

FIGURE 5

portion of the city indicate 2,900 vehicles daily to the south and 3,000 vehicles to the north or east. Iowa Route 38, north of Muscatine, served an estimated 1,300 vehicles per day in 1965 while another 1,300 vehicles daily were found on Iowa Route 22, east of Muscatine. Illinois Route 92, east of Illinois City served approximately 1,200 vehicles per day while between 500 and 600 vehicles daily used the county roads in Illinois connecting Illinois Routes 92 and 17.

The significance of urban areas on traffic volumes is clearly shown on the regional map in Figure 5. Very heavy traffic is indicated on the highways eminating from the Quad-Cities area and to a lesser extent in the vicinity of Muscatine and Burlington. Within Muscatine, the predominant traffic flow is along U.S. Route 61--Park Avenue, Second Street, Mississippi Drive, Hershey Avenue and Grandview Avenue. As illustrated in Figure 5, Mulberry Avenue, Cedar Street and Iowa Avenue are also important traffic arteries in Muscatine.

## Present Muscatine Bridge

The present bridge at Muscatine is a cantilevered through truss structure built in 1890. It has a roadway width of 16 feet-8 inches with a four-foot sidewalk cantilevered outside the truss on the downstream side of the structure. The horizontal clearance over the main navigational channel is 427.6 feet; the vertical clearance is 67.4 feet.

In 1956, an approach span on the Illinois side collapsed under traffic. Although structural repairs were made, weight restrictions were placed in effect prohibiting use by heavy trucks. This, of course, reduced subsequent truck use of the facility but perhaps more importantly, passenger car usage also decreased, apparently due to the psychological affect of the bridge collapse.

The posted speed limit on the bridge is 20 miles per hour. A weight limitation of eight tons was posted in October, 1968. Tandem-axle trucks are prohibited from using the bridge and two loaded trucks are not permitted on

the bridge simultaneously. These restrictions are enforced by the toll collector at the Iowa approaches and since October, 1963, by a 24-hour guard on the Illinois approach. As a result, actual bridge usage is considerably below the roadway capacity of the structure even with its narrow lanes.

In Muscatine, the bridge connects with Second Street between Mulberry Avenue and Cedar Street near 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 good with no alignment or grade problems. Views of the bridge and approaches are depicted in Figure 6.

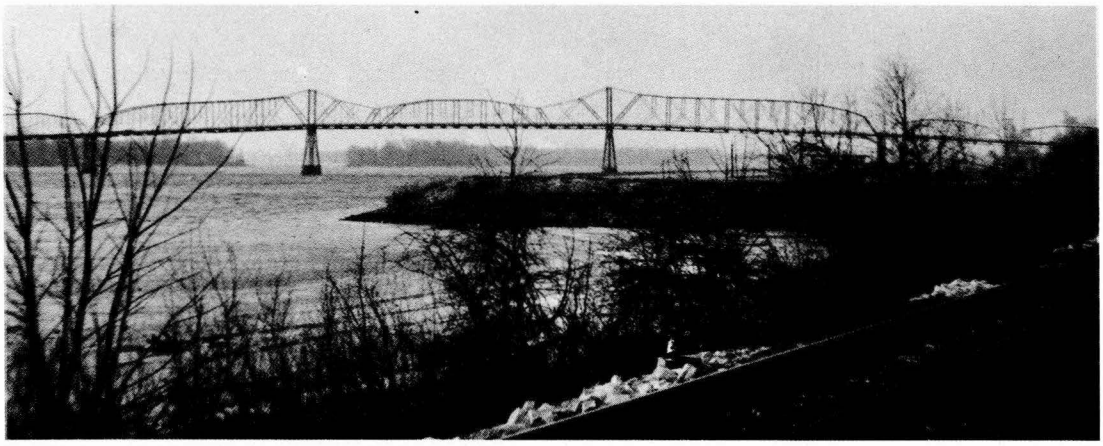
The present toll schedule for use of the Muscatine Bridge is given in Table 14. The toll for a passenger car or two-axle, four-tire truck is $0.35. Trucks within the bridge weight limitation are assessed considerably higher rates. For example, the three-axle truck toll is $0.85. The present toll schedule has been in effect since January 2, 1958.

TABLE 14

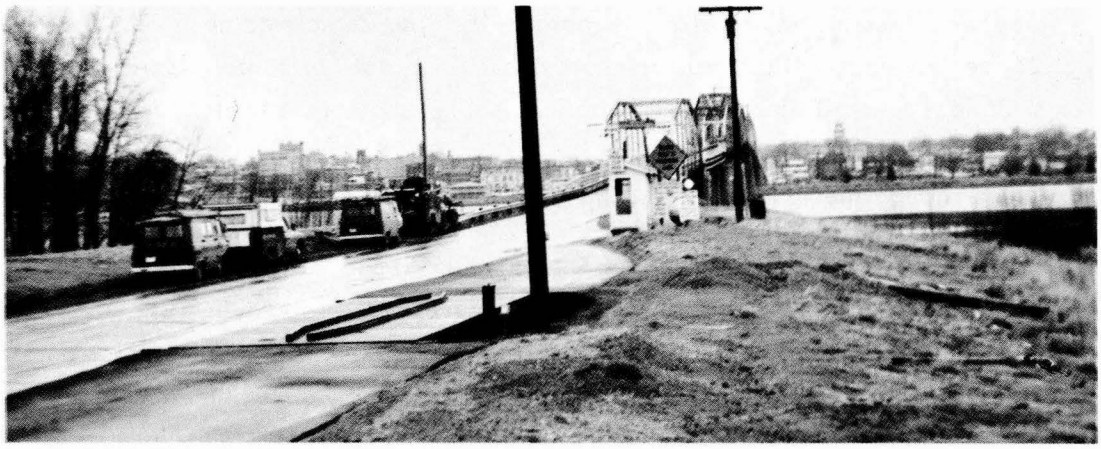
PRESENT TOLL SCHEDULE
Muscatine Bridge

| TOLL CLASS | TOLL |
|---|---|
| Bicycle (or pedestrian) | $0.10 |
| Motorcyle | 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.



NAVIGATION SPAN AS SEEN FROM
PROPOSED MUSCATINE BRIDGE IOWA BRIDGEHEAD



ILLINOIS APPROACH

# PRESENT MUSCATINE BRIDGE

## Alternate River Crossings

Several alternate crossings of the Mississippi River are available for longer distance trips destined to, from or through Muscatine. They include free bridges, toll bridges and ferries and range in location from the Interstate Route 80 Bridge, northeast of the Quad-Cities area, to the MacArthur Bridge in Burlington.

*Interstate Route 80 Bridge* — The Interstate Route 80 Bridge at LeClair was opened to traffic in late 1966. It is a modern, toll-free, high-level structure serving predominantly through, longer distance traffic. The bridge is a four-lane facility with cross-state expressway connections in both Iowa and Illinois. The first interchange in Iowa is at U.S. Route 67 and in Illinois, at Illinois Route 84.

*Iowa-Illinois Memorial Bridge* — The Memorial Bridge, serving Davenport and Moline is a modern, well-maintained toll facility consisting of twin, two-lane bridges. The original bridge, completed in 1935, has a 20-foot roadway and four-foot sidewalk. The parallel bridge, completed in 1960, has a 24-foot roadway. The structures provide a 710-foot horizontal clearance and a 66-foot vertical clearance. The toll schedule, shown in Table 15, provides for a one-way cash toll for passenger cars of $0.15 with ticket books available which reduce the toll to $0.10. The toll for all heavy trucks is $0.30.

*Government Bridge* — The Government Bridge is a low-level, swing-span, combination railroad-highway bridge which was built in 1896 to provide military access to Arsenal Island from Davenport. It is available for general public use for trans-river trips on a limited basis only in combination with the Sylvan Slough Bridge which links Arsenal Island with Moline. Vehicular traffic is accommodated below the railroad tracks on a 25-foot roadway which is limited by an 11.5-foot vertical clearance which restricts usage by large trucks. During the navigation season, the swing-span opens frequently for river barge traffic causing considerable delay to highway traffic.

*Rock Island Centennial Bridge* — This four-lane toll structure was completed in 1940 and has been maintained in good condition. It is located some 27 miles upstream from Muscatine and serves the Davenport-Rock Island area.

TABLE 15

PRESENT TOLL SCHEDULE

IOWA — ILLINOIS MEMORIAL BRIDGE

| TOLL CLASS | DESCRIPTION | TOLL |
|---|---|---|
| 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 Rate |

*Tickets*

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

SOURCE: Danvenport Bridge Commission.

As shown in Table 16, the present passenger car toll is $0.10. Tolls for trucks are proportionately higher with the largest vehicles, six-axle trucks, assessed $0.45. The bridge, which carries the U.S. Route 67 designation, provides a 66-foot vertical clearance and a 515-foot horizontal clearance. Two, 22-foot roadways are separated by a raised median and flanked by five-foot sidewalks.

*Muscatine Ferry* — The Muscatine Ferry is a privately-owned facility which operates on a contract basis during the harvest season for transport of farm products from Illinois to local canning facilities in Muscatine. It is not available for public use and exists primarily because of the load limitations on the present Muscatine Bridge.

TABLE 16

PRESENT TOLL SCHEDULE
Rock Island Centennial Bridge

| TOLL CLASS | DESCRIPTION | TOLL |
|---|---|---|
| 1 | Pedestrians — Use sidewalk turnstile | $0.05 |
| 2 | Motorcycles, bicyles, 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: Rock Island Centennial BridgeCommission.

*New Boston Ferry*—The New Boston Ferry is a seasonal, privately-owned service which operates a single vessel between its headquarters terminal at New Boston, Illinois, and a ferry landing near Oakville, Iowa. It is located some 17 highway miles south of the Muscatine Bridge travelling in Illinois, or about 30 miles when travelling in Iowa. As shown in Table 17, the one-way toll for automobiles is $1.50; a $2.50 round-trip fare is also available. The one-way toll for tandem-axle trucks ranges from $2.50 to $4.50. Service is normally provided "on call" between April 15 and October 15 and between the hours of 7:00 A.M. and 7:00 P.M. Vessel capacity is eight passenger automobiles or a limit of 22 tons.

*MacArthur Bridge* — The nearest Mississippi River bridge downriver from Muscatine is 52 miles to the south at Burlington. This high-level, toll structure

TABLE 17

PRESENT TOLL SCHEDULE

New Boston Ferry

| TOLL CLASS | TOLL |
|---|---|
| Automobile with passengers — one-way | $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[1] |

[1] Maximum rate.

SOURCE: New Boston Ferry Company.

was constructed in 1917. As shown in Table 18, passenger cars are charged a toll of $0.25; the toll receipt can be turned in the same day for free return passage. Tolls for heavy trucks vary between $1.00 and $2.25 dependent upon weight. The MacArthur Bridge, operated by the City of Burlington, has a 22-foot roadway with a four-foot sidewalk. There are no restrictions on use of the bridge although the approaches are somewhat difficult for larger vehicles to negotiate. At times of extreme high water, the Illinois approaches become inundated; in 1965, the bridge was closed for 73 days.

TABLE 18

PRESENT TOLL SCHEDULE
MacArthur Bridge
Burlington, Iowa

| TOLL CLASS | TOLL |
|---|---|
| Pedestrians | $0.05[1] |
| Motorcycle — motor bike | 0.15[1] |
| Automobile | 0.25[1] |
| Pickup and panel truck | 0.25 |
| Trucks under 8,600 lbs. | 0.80 |
| Trucks 8,600 lbs. and under 16,500 lbs. | 1.00 |
| Trucks 16,500 lbs. and under 18,500 lbs. | 1.25 |
| Trucks 18,500 lbs. and under 20,500 lbs. | 1.50 |
| Trucks 20,500 lbs. and under 22,500 lbs. | 1.75 |
| Trucks 22,500 lbs. and under 24,500 lbs. | 2.00 |
| Trucks 24,500 lbs. and under 25,500 lbs. | 2.25 |
| Each additional thousand pounds | 0.25 |
| Mobile home 26 feet and under | 0.25 |
| Mobile home over 26 feet | 0.75 |
| Small farm tractor | 0.50 |
| Large farm tractor | 1.00 |
| U-haul and camp trailers under 500 lbs. | 0.10 |
| U-haul and camp trailers over 500 lbs. | 0.25 |

[1] Receipt can be turned in the same day for free return passage.

SOURCE: City of Burlington.

## Trans-River Traffic Trends

Trans-river traffic trend data were assembled for the reach of the Mississippi River from the Quad-Cities area to Burlington. Annual trends in usage were obtained for each river crossing. More detailed information, including monthly and daily traffic was obtained for the Muscatine Bridge.

*Annual Trends-Muscatine Bridge* — Annual traffic trends on the Muscatine Bridge for passenger cars and trucks are shown on Table 19. In fiscal 1959-60, an average of 1,526 vehicles per day used the Muscatine Bridge. This increased to a peak of 1,665 daily vehicles in 1966-67 and then decreased to an estimated 1,548 in 1968-69. Annual changes varied considerably from a decrease of 4.2 per cent between 1967-68 and 1968-69 to a growth of 6.2 per cent between 1965-66 and 1966-67. The very low overall growth averaging 0.1 per cent per year between 1959-60 and 1968-69 is largely attributed to the progressively, more severe restrictions placed on heavy truck usage of the facility. However, trucks not passenger cars, have accounted for what little growth the bridge has experienced. While passenger car volumes in 1968-69 were just about identical to those recorded in 1959-60, trucks increased an average of 1.7 per cent per year. A much higher average annual growth of 6.7 per cent occurred between 1959-60 and 1966-67, prior to implementation of the February, 1968, heavy truck prohibition. The psychological impact of the bridge failure has apparently been a significant factor in passenger car use of the facility.

Annual revenue trends for the bridge have closely followed traffic usage since no changes have been made in the toll schedule. As shown in Table 20, in 1959-60, toll revenues of $205,106 were realized increasing to $220,756 in 1966-67 and then decreasing to an estimated $200,200 in 1968-69. The sizeable decreases in revenues during the past two years was largely the result of the loss of large trucks, the heavy revenue producers for the bridge.

*Annual Trends-Alternate Crossings* — Annual traffic trends on the Muscatine Bridge, compared with those of alternate crossings, are shown in Table 21. Annual traffic on the MacArthur Bridge in Burlington has increased an average of 3.9 per cent between 1959 and 1968; the growth over the period

TABLE 19

ANNUAL TRAFFIC TRENDS

Muscatine Bridge

| YEAR[1] | PASSENGER CARS | PER CENT CHANGE | TRUCKS | PER CENT CHANGE | TOTAL | PER CENT CHANGE |
|---|---|---|---|---|---|---|
| | (average daily traffic) | | | | | |
| 1959-60 | 1,373 | | 153 | | 1,526 | |
| | | 0.0 | | 15.5 | | 0.1 |
| 1960-61 | 1,375 | | 177 | | 1,552 | |
| | | — 1.5 | | — 7.3 | | — 2.3 |
| 1961-62 | 1,354 | | 164 | | 1,518 | |
| | | 2.3 | | 17.0 | | 4.0 |
| 1962-63 | 1,388 | | 192 | | 1,580 | |
| | | 1.2 | | 7.8 | | 1.8 |
| 1963-64 | 1,402 | | 207 | | 1,609 | |
| | | — 4.2 | | 9.2 | | — 2.5 |
| 1964-65[2] | 1,342 | | 226 | | 1,568 | |
| | | —0.4 | | 1.8 | | 0.0 |
| 1965-66 | 1,338 | | 230 | | 1,568 | |
| | | 6.5 | | 4.8 | | 6.2 |
| 1966-67 | 1,424 | | 241 | | 1,665 | |
| | | — 2.4 | | — 4.8 | | — 2.8 |
| 1967-68[3] | 1,390 | | 229 | | 1,619 | |
| | | —1.4 | 178 | | 1,548 | |
| 1968-69[3] [4] | 1,370 | | | —22.2 | | — 4.2 |
| AVERAGE ANNUAL PER CENT CHANGE | | | | | | |
| 1959-60 to 1968-69 | | 0.0 | | 1.7 | | 0.1 |
| 1964-65 to 1968-69 | | 0.5 | | — 0.6 | | 0.3 |

[1] Fiscal Year Ending May 31.

[2] Bridge Closed April 23 to May 11 due to floods.

[3] Bridge load limit of 16,000 lbs. implemented February 21, 1968, together with prohibition of tandem-axle vehicles.

[4] Estimated based on first eight months of fiscal 1968-69.

SOURCE: Muscatine Bridge Commission.

TABLE 20

ANNUAL REVENUE TRENDS

Muscatine Bridge

| YEAR[1] | ANNUAL REVENUE | PER CENT CHANGE |
|---|---|---|
| 1959-60 | $205,106 | |
| | | 1.4 |
| 1960-61 | 208,082 | |
| | | — 2.4 |
| 1961-62 | 203,129 | |
| | | 4.0 |
| 1962-63 | 211,274 | |
| | | 1.1 |
| 1963-64 | 213,732 | |
| | | — 7.8 |
| 1964-65[2] | 198,089 | |
| | | 5.5 |
| 1965-66 | 209,018 | |
| | | 5.6 |
| 1966-67[3] | 220,756 | |
| | | — 2.5 |
| 1967-68[4] | 215,231 | |
| | | — 7.5 |
| 1968-69[5] | 200,200 | |
| AVERAGE ANNUAL PER CENT CHANGE | | |
| 1959-60 to 1968-69 | | — 0.3 |
| 1964-65 to 1968-69 | | 0.2 |

[1] Fiscal year ending May 31.

[2] Bridge closed April 23-May 11 due to Floods.

[3] Bridge load limit of 16,000 lbs. implemented February 21, 1968, together with prohition of tandem-axle vehicles, in addition to previous tandem-axle restriction.

[4] Estimated based on first eight months of fiscal 1968-69.

SOURCE: Muscatine Bridge Commission.

## TABLE 21

### ANNUAL TRANS-RIVER TRAFFIC TRENDS

Alternate Crossings

| YEAR | MAC-ARTHUR BRIDGE (BURLING-TON) | NEW BOSTON FERRY | MUSCA-TINE[1] BRIDGE | CENTEN-NIAL BRIDGE (DAVEN-PORT) | MEMORIAL BRIDGE (DAVEN-PORT) |
|---|---|---|---|---|---|
| 1959 | 4,200 | N.A. | 1,652 1560 | 12,387 | 11,593 |
| 1960 | 4,331 | N.A. | 1,526 | 12,343 | 12,622 |
| 1961 | 4,434 | N.A. | 1,552 | 11,722 | 13,545 |
| 1962 | 4,750 | N.A. | 1,518 1550 | 12,582 | 14,918 |
| 1963 | 4,929 | 25 | 1,580 | 12,223 | 16,203 |
| 1964 | 5,045 | 28 | 1,609 | 14,489 | 18,214 |
| 1965 | 5,004 | N.A. | 1,568 1550 | 16,125 | 20,334 |
| 1966 | 5,610 | 36 | 1,568 1650 | 20,473[2] | 22,581[2] |
| 1967 | 5,726 | 34 | 1,665 | 27,166[2] | 19,904[2] |
| 1968 | N.A. | 34 | 1,619 | 18,589[2] | 18,038[2] |
| AVERAGE ANNUAL PER CENT CHANGE | | | | | |
| 1959 to 1968 | 3.9 | N.A. | — 0.2 | 4.5 | 4.9 |
| 1963 to 1968 | 3.8 | 6.2 | 0.4 | 8.7 | 2.2 |

N.A. = Not Available.

[1] Fiscal year ending May 31.

[2] Government Bridge closed to through traffic September 23, 1966, to November 3, 1967. Interstate Route 80 Bridge opened October 27, 1966.

SOURCE: City of Burlington, Iowa; New Boston Ferry Company; Muscatine Bridge Commission; Rock Island-Centennial Bridge Commission; Davenport Bridge Commission.

1963-1968 averaged 3.8 per cent annually. Usage of the New Boston Ferry has increased but still remains very low due to the nature of the service and high toll rates. While traffic on the Muscatine Bridge has declined since 1959, the Centennial Bridge and Memorial Bridge in Davenport have realized good growths. Over the past decade, an average annual growth of 4.5 per cent occurred on the Centennial Bridge while use of the Memorial Bridge increased an average of 4.9 per cent. The high average annual growth of 8.7 per cent recorded on the Centennial Bridge over the past five years, in some measure, reflects closure of the Muscatine Bridge to heavy truck use. The decrease in traffic on the Memorial Bridge over the past two years resulted primarily from opening of the Interstate Route 80 crossing in October, 1966.

*Monthly Traffic Variations-Muscatine Bridge* — Monthly traffic variations on the Muscatine Bridge during 1968 are shown on Table 22. August was, by

TABLE 22

MONTHLY TRAFFIC VARIATIONS

Muscatine Bridge — 1968

| MONTH | AVERAGE DAILY CROSSINGS | INDEX |
|---|---|---|
| January | 1,128 | 72 |
| February | 1,315 | 84 |
| March | 1,430 | 90 |
| April | 1,519 | 97 |
| May | 1,581 | 101 |
| June | 1,737 | 110 |
| July | 1,762 | 112 |
| August | 2,014 | 128 |
| September | 1,865 | 118 |
| October | 1,636 | 104 |
| November | 1,535 | 97 |
| December | 1,364 | 87 |
| ANNUAL AVERAGE | 1,569 | 100 |

SOURCE: Muscatine Bridge Comission.

far, the peak travel month with volumes 28 per cent above the average month. January was the low month of usage--28 per cent below average. Traffic during the period May through October exhibited above average monthly volumes while April and November were close to the average month.

*Daily Traffic Variations-Muscatine Bridge* — Daily traffic variations on the Muscatine Bridge during all of 1968, in August--the peak traffic month and in January--the low month of usage are shown in Table 23. For the full year, weekend travel was most predominant with volumes on Sunday--21 per cent above the average day, on Friday--15 per cent above average and on Saturday--11 per cent above average. The remaining days all recorded below average daily traffic.

In January, weekend day traffic decreased significantly in importance although it still accounted for the peak days of usage. August daily traffic exhibited a high weekend peak with Sunday, the peak day with traffic 27 per cent above the average day.

TABLE 23

DAILY TRAFFIC VARIATIONS

Muscatine Bridge

1968

| DAY | ANNUAL | JANUARY | AUGUST |
|---|---|---|---|
| | | (per cent) | |
| Sunday | 121 | 102 | 127 |
| Monday | 91 | 93 | 87 |
| Tuesday | 86 | 97 | 93 |
| Wednesday | 84 | 91 | 82 |
| Thursday | 92 | 97 | 86 |
| Friday | 115 | 114 | 109 |
| Saturday | 111 | 106 | 116 |
| AVERAGE DAY | 100 | 100 | 100 |

SOURCE: Muscatine Bridge Commission.

## Interview and Count Surveys

Roadside interview and count surveys were conducted at a series of seven survey stations to determine present trans-river traffic patterns and vehicle composition. Interviews were obtained on both weekend days as well as weekdays at key locations. The surveys were made by the Division of Planning of the Iowa State Highway Commission. The location of the interview stations, date and day of survey, hours of interview and number of interviews obtained are indicated in Table 24. Due to the present heavy truck prohibition on the Muscatine Bridge, interviews were made with all trucks using Interstate Route 80 at the truck weighing station west of Iowa Route 38. Survey stations were also operated on U.S. Route 61, Iowa Route 22, the Muscatine Bridge, the New Boston Ferry, the Burlington Bridge (U.S. Route 34, East of Gulfport) and the Muscatine Ferry.

During the interview survey, motorists were asked their trip origin, destination, purpose and frequency. In addition, hour of interview, state of registration and vehicle type were noted. A total of 25,375 interviews were obtained.

Concurrent with the roadside interview survey, hourly volume and classification counts were obtained at each survey location. The volume counts were made continuously over a seven-day period while hourly classification counts were conducted for a 24-hour period on selected interview days. Although only trucks, required to stop at the Interstate Route 80 weighing station, were interviewed at Station 1, the classification count was expanded to include all vehicles passing the survey station.

*Vehicle Composition* — The number of vehicles, by type, counted at each interview station is summarized in Table 25. The percentage of passenger cars measured at each survey location ranged widely from no passenger cars on the Muscatine Ferry (Station 7) to 100 per cent passenger cars on the New Boston Ferry (Station 5). Approximately 73 per cent of the traffic on Interstate Route 80 (Station 1) was passenger cars compared to 92 per cent on the Muscatine Bridge (Station 4). A very high proportion of the total traffic on Interstate Route 80 was heavy or three-or-more-axle trucks--22.3 per

TABLE 24

LOCATION AND OPERATION OF SURVEY STATIONS[1]

August, 1968

| STATION | LOCATION | DATE | DAY | INTERVIEW PERIOD | NUMBER OF INTERVIEWS |
|---|---|---|---|---|---|
| 1 | Interstate Route 80 W. of Iowa Route 38[2] | 8/15 | Thr. | 6 A.M.-12 P.M. | 2,219 |
| | | 8/16 | Fri | 12 P.M.- 6 A.M. | 665 |
| 2 | U.S. Route 61 S. of Iowa Route 38 | 8/13 | Tue. | 6 A.M.-12 P.M. | 6,770 |
| | | 8/14 | Wed. | 12 P.M.- 6 A.M. | 412 |
| | | 8/18 | Sun. | 6 A.M.- 7 P.M. | 3,758 |
| 3 | Iowa Route 22, E. of Muscatine | 8/14 | Wed. | 6 A.M.-12 P.M. | 1,780 |
| | | 8/15 | Thr. | 12 P.M.- 6 A.M. | 93 |
| 4 | Muscatine Bridge | 8/15 | Thr. | 6 A.M.-12 P.M. | 1,606 |
| | | 8/16 | Fri. | 12 P.M.- 6 A.M. | 57 |
| | | 8/17 | Sat. | 6 A.M.-12 P.M. | 2,099 |
| | | 8/18 | Sun. | 12 P.M.- 6 A.M. | 160 |
| 5 | New Boston Ferry | 8/13 | Tue. | 7 A.M.- 7 P.M. | 21 |
| 6 | U.S. Route 34, E. of Gulfport | 8/16 | Fri. | 6 A.M.-12 P.M. | 5,353 |
| | | 8/17 | Sat. | 12 P.M.- 6 A.M. | 343 |
| 7 | Muscatine Ferry (Private) | 8/14 | Wed. | 8 A.M.- 4 P.M. | 39 |
| | TOTAL | | | | 25,375 |

[1] All stations operated in both travel directions.

[2] Wilton Junction Truck Weighing Station; Truck Interviews only.

TABLE 25

SUMMARY OF VEHICLE CLASSIFICATION COUNTS

August, 1968

| STATION[1] | DATE | DAY | PASSENGER CARS | TRUCKS AND VEHICLE COMBINATIONS[2] Two-Axle | Three-Axle | Four-Axle | Five-Axle | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1 | 8/15 | Thr. | 10,672 | 716 | 887 | 332 | 2,048 | 14,655 |
| 2 | 8/17 | Sat. | 9,058 | 968 | 176 | 27 | 163 | 10,392 |
| 3 | 8/15 | Thr. | 1,472 | 303 | 17 | 6 | 75 | 1,873 |
| 4 | 8/18 | Sun | 2,376 | 157 | 51 | 12 | 1 | 2,597 |
| 5 | 8/13 | Tue. | 22 | — | — | — | — | 22 |
| 6 | 8/16 | Fri. | 6,483 | 619 | 100 | 38 | 136 | 7,376 |
| 7 | 8/14 | Wed. | — | 34 | 4 | — | 1 | 39 |

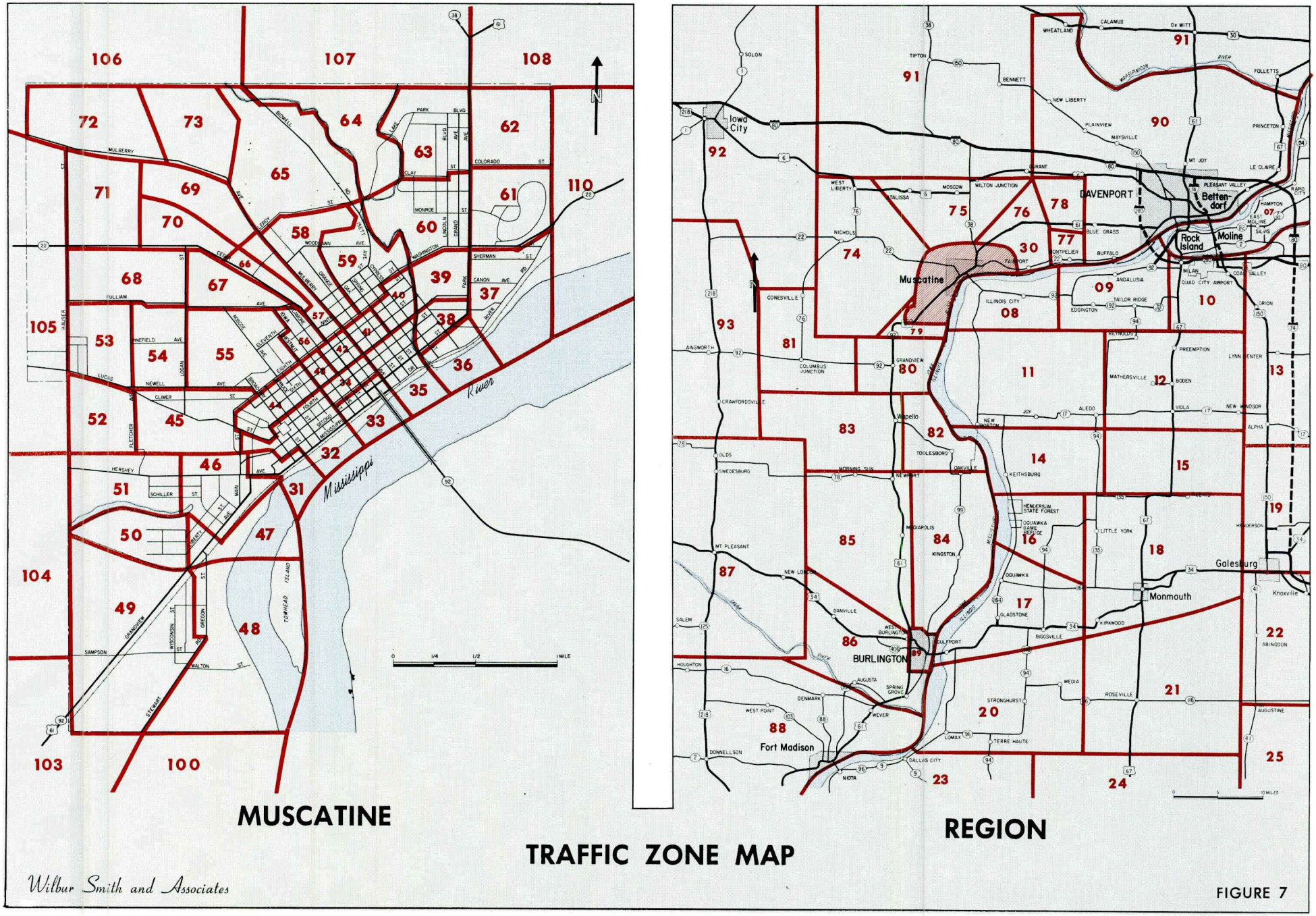
[1] See Table 24 for survey station location.

[2] Includes vehicles pulling trailers.

cent with five-axle vehicles alone accounting for 14.0 per cent of all traffic. In contrast, only 2.5 per cent of all traffic using the Muscatine Bridge was in the three-or-more-axle category with most of these travelling empty in order to meet the weight limitations on the bridge.

## Trans-River Travel Desires

The origin and destination data were coded to a pattern of geographic traffic zones. As shown in Figure 7, more detailed zoning was delineated in Muscatine and the four counties comprising the primary bridge influence area. Groups of counties and states making up general travel corridors were defined beyond the study area.


MUSCATINE
REGION
TRAFFIC ZONE MAP
Wilbur Smith and Associates
FIGURE 7
Muscatine
Iowa City
Davenport
Bettendorf
Rock Island
Moline
Galesburg
Monmouth
Burlington
Fort Madison
Wapello
Mississippi River
Illinois River

The coded interview data were then transposed to statistical tapes. Using the monthly, daily and hourly counts at each survey station, the interview data were then adjusted to reflect volumes representing an average day in 1968, weighting the relative interview sample size obtained during each hour of interview by vehicle class. The estimated 1968 average daily traffic on the Muscatine Bridge was 1,580, on U.S. Route 61, south of Iowa Route 38--8,290, on Iowa Route 22, east of Muscatine--1,770, and on U.S. Route 34, east of Gulfport (Burlington Bridge)--5,830. Use of the New Boston Ferry in 1968 was estimated to average 34 vehicles daily and the average daily truck traffic on Interstate Route 80, west of Iowa Route 38 was estimated at 2,670 vehicles per day. During its seasonal period of operation, the Muscatine Ferry accommodated an average of about 40 trucks per day; this was converted to an average daily traffic level, for 1968, of five vehicles.

Using the adjusted interview data, numerous computer tabulations were then prepared giving origin and destination trip information or travel desires by vehicle type for each survey station. In addition, tabulations relating travel desires to trip purpose and trip frequency were developed.

The travel desire patterns of motorists crossing the Mississippi River, considered in some measure potential to a crossing at Muscatine, are shown in Figure 8. The width of the flow bands illustrated represent the relative traffic volume between each zone pair on an average day in 1968. The volume bands or desire lines, depict airline distance as a straight line between trip termini rather than following actual travel routes. The largest travel desires depicted are relatively short or local movements between Muscatine and the immediate areas across the river in Illinois. These are largely the movements now using the present bridge. Significant longer distance trips are also illustrated. However, relatively few of these trips are now using the Muscatine Bridge. Upon construction of a new crossing, a higher proportion of these through movements would possibly find it attractive to follow a trans-river routing through Muscatine.

Trans-river movements using the present Muscatine Bridge on an average day in 1968, are summarized in Table 26. Travel between Muscatine and the Moline-Rock Island area accounted for 5.7 per cent of all bridge traffic. Travel


# TRANS-RIVER TRAVEL DESIRES

## TOTAL POTENTIAL TRAFFIC IN MUSCATINE CORRIDOR

### 1968 AVERAGE DAILY TRAFFIC

*Wilbur Smith and Associates*

FIGURE 8

between Muscatine and the area in Illinois within a radius of 17 miles of the bridge represented 33 per cent of all traffic with other movements from Muscatine to Illinois accounting for another 19.2 per cent. Through trips or those with neither an origin nor destination in Muscatine comprised a total of 19.4 per cent with miscellaneous movements of small magnitude accounting for the remaining 22.7 per cent. In summary, approximately 60 per cent of the trips now using the Muscatine Bridge had Muscatine as one trip terminus.

TABLE 26

TRANS-RIVER TRAVEL MOVEMENT SUMMARY
Present Muscatine Bridge
1968

| MOVEMENT BETWEEN | AVERAGE DAILY TRAFFIC | PER CENT OF TOTAL |
|---|---|---|
| Muscatine and Moline Rock Island | 90 | 5.7 |
| and Illinois rural (within a 17-mile radius of the bridgehead) | 521 | 33.0 |
| and area immediately east of Mississippi River and 25 miles south of the bridge | 207 | 13.1 |
| and Rural area immediately south of Rock Island and west of I-74 | 96 | 6.1 |
| and Eastern United States | 161 | 10.2 |
| Western United States and Moline-Rock Island | 57 | 3.6 |
| and Eastern United States | 88 | 5.6 |
| Miscellaneous trips | 360 | 22.7 |
| TOTAL | 1,580 | 100.0 |

## Trip Purpose Distribution

Trip purposes of motorists interviewed at the survey stations are summarized in Table 27. Since only trucks were surveyed on Interstate Route 80, trip purpose is not indicated for that location. Due to the month of survey, August, a high proportion of trips were of a recreational or social nature. This was the primary purpose of 40.2 per cent of the motorists intercepted at U.S. Route 61 (Station 2), 34.7 per cent at U.S. Route 22 (Station 3), 39.7 per cent at the Muscatine Bridge and 32.6 per cent at the Burlington Bridge. Recreation was also the primary purpose of motorists using the New Boston Ferry while all users of the Muscatine Ferry were truck drivers. Work was the next most important trip purpose of Muscatine Bridge users--13.8 per cent, followed by shopping--13.6 per cent and "during work"--13.4 per cent.

The trip purpose distribution of several representative movements using the Muscatine Bridge is shown in Table 28. On the movement between Muscatine and the area in Illinois immediately adjacent to the bridge, 26.5 per cent of the motorists were on recreational-social trips, 23.7 per cent on shopping trips, 21.5 per cent on trips to or from work and 13.6 per cent on personal business trips. A significantly higher percentage of work and "during work" trips combined were found for the movement between Muscatine and the Moline-Rock Island area.

## Trip Frequency Distribution

A relatively low percentage of daily trips were recorded on the Muscatine Bridge. As shown in Table 29, only 15.2 per cent of all motorists indicated a trip frequency of six or more trips per week with another 26.9 per cent saying they made the trip on which they were interview between one and six times per week and the remaining 57.9 per cent made the trip less than once a week. The percentage of commuter or daily use of the Burlington Bridge was just slightly higher--15.6 per cent with few of the motorists on the New Boston Ferry or Interstate Route 80 indicating daily usage. Most of the users of the Muscatine Ferry made daily trips.

TABLE 27

DISTRIBUTION OF TRIP PURPOSE

Interview Survey Stations
1968 Average Daily Traffic

| TRIP PURPOSE | SURVEY STATIONS | | | | | |
|---|---|---|---|---|---|---|
| | U.S. Route 61 | Iowa Route 22 | Muscatine Bridge | New Boston Ferry | Burlington Bridge | Muscatine Ferry |
| Work | | | | | | |
| Number | 1,338 | 448 | 217 | 6 | 1,566 | — |
| Per Cent | 16.4 | 25.4 | 13.8 | 17.6 | 27.1 | — |
| Personal Business | | | | | | |
| Number | 666 | 130 | 185 | — | 419 | — |
| Per Cent | 8.1 | 7.4 | 11.7 | — | 7.2 | — |
| During Work | | | | | | |
| Number | 1,340 | 324 | 212 | — | 751 | 39 |
| Per Cent | 16.3 | 18.4 | 13.4 | — | 13.0 | 100.0 |
| Medical-Dental | | | | | | |
| Number | 109 | 13 | 80 | — | 173 | — |
| Per Cent | 1.3 | .7 | 5.1 | — | 3.0 | — |
| School | | | | | | |
| Number | 28 | 3 | 5 | — | 19 | — |
| Per Cent | 1.3 | .2 | .3 | — | .3 | — |
| Recreation-Social | | | | | | |
| Number | 3,322 | 611 | 628 | 28 | 1,886 | — |
| Per Cent | 40.2 | 34.7 | 39.7 | 82.4 | 32.6 | — |
| Eat | | | | | | |
| Number | 96 | 26 | 20 | — | 95 | — |
| Per Cent | 1.1 | 1.5 | 1.3 | — | 1.6 | — |
| Shopping | | | | | | |
| Number | 1,248 | 154 | 215 | — | 804 | — |
| Per Cent | 15.2 | 8.7 | 13.6 | — | 13.9 | — |
| Serve Passengers | | | | | | |
| Number | 89 | 52 | 18 | — | 78 | — |
| Per Cent | 1.1 | 3.0 | 1.1 | — | 1.3 | — |
| TOTAL | 8,236 | 1,761 | 1,580 | 34 | 5,791 | 39 |
| PER CENT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

(1) See Table 24 for location of survey stations.

## TABLE 28

### TRIP PURPOSE OF SELECTED TRANS-RIVER MOVEMENTS

Present Muscatine Bridge

1968 Average Daily Traffic

| TRIP PURPOSE | MOVEMENT BETWEEN MUSCATINE AND: Area within 7 miles of Illinois Bridgehead | Andalusia-Edgington Area | New Boston-Joy Area | Viola Area | Keithsburg Area | Moline-Rock Island |
|---|---|---|---|---|---|---|
| Work | | | | | | |
| Number | 60 | 6 | 28 | 12 | 47 | 17 |
| Per Cent | 21.5 | 8.6 | 16.4 | 20.7 | 22.8 | 18.9 |
| Personal Business | | | | | | |
| Number | 38 | 10 | 17 | 6 | 27 | 17 |
| Per Cent | 13.6 | 14.3 | 9.9 | 10.4 | 13.2 | 18.9 |
| During Work | | | | | | |
| Number | 18 | 5 | 46 | 11 | 18 | 22 |
| Per Cent | 6.5 | 7.1 | 26.9 | 18.9 | 8.7 | 24.5 |
| Medical-Dental | | | | | | |
| Number | 16 | 4 | 8 | 3 | 12 | 11 |
| Per Cent | 5.7 | 5.7 | 4.7 | 5.2 | 5.8 | 12.2 |
| School | | | | | | |
| Number | 1 | — | — | — | 1 | — |
| Per Cent | 0.3 | — | — | — | 0.4 | — |
| Recreation-Social | | | | | | |
| Number | 74 | 26 | 29 | 16 | 53 | 6 |
| Per Cent | 26.5 | 37.2 | 16.9 | 27.6 | 25.6 | 6.7 |
| Eat | | | | | | |
| Number | 3 | 1 | 2 | 1 | 2 | 2 |
| Per Cent | 1.1 | 1.4 | 1.2 | 1.7 | 0.9 | 2.2 |
| Shop | | | | | | |
| Number | 66 | 16 | 39 | 8 | 45 | 9 |
| Per Cent | 23.7 | 22.8 | 22.8 | 13.8 | 21.7 | 9.9 |
| Serve Passengers | | | | | | |
| Number | 3 | 2 | 2 | 1 | 2 | 6 |
| Per Cent | 1.1 | 2.9 | 1.2 | 1.7 | 0.9 | 6.7 |
| TOTAL | 279 | 70 | 171 | 58 | 207 | 90 |
| PER CENT | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

## TABLE 29

## DISTRIBUTION OF TRIP FREQUENCY

Interview Survey Stations

1968 Average Daily Traffic

| | TRIPS PER WEEK | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | One or Less | | More Than One, Less Than Six | | Six or More | | TOTAL | |
| STATION[1] | Number | Per Cent of Total | Number | Per Cent of Total | Number | Per Cent of Total | Number | Per Cent |
| 1[2] | 1,469 | 55.4 | 1,038 | 39.1 | 147 | 5.5 | 2,654 | 100.0 |
| 2 | 4,528 | 55.1 | 2,611 | 31.6 | 1,097 | 13.3 | 8,236 | 100.0 |
| 3 | 689 | 39.1 | 659 | 37.4 | 414 | 23.5 | 1,762 | 100.0 |
| 4 | 916 | 57.9 | 425 | 26.9 | 239 | 15.2 | 1,580 | 100.0 |
| 5 | 26 | 76.5 | 5 | 14.7 | 3 | 8.8 | 34 | 100.0 |
| 6 | 2,735 | 47.2 | 2,155 | 37.2 | 901 | 15.6 | 5,791 | 100.0 |
| 7 | 2 | 5.1 | 1 | 2.6 | 36 | 92.3 | 39 | 100.0 |

[1] See Table 24 for interview station location.

[2] Truck interviews only.

Approximately 21.9 per cent of the motorists using the Muscatine Bridge on movements between Muscatine and the bridgehead area in Illinois recorded six or more trips per week with another 44.6 per cent indicating one to six trips per week. Of the selected movements shown in Table 30, motorists moving between Muscatine and the New Boston--Joy area generated the highest proportion of daily trips---38.6 per cent.

TABLE 30

TRIP FREQUENCY OF SELECTED TRANS-RIVER MOVEMENTS

Present Muscatine Bridge

| MOVEMENT BETWEEN MUSCATINE AND: | 1968 AVERAGE DAILY TRAFFIC | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | One or Less | | Less Than Six More Than One, | | Six or More | | TOTAL | |
| | Number | Per Cent of Total | Number | Per Cent of Total | Number | Per Cent of Total | Number | Per Cent |
| Area within 7 miles of Illinois bridgehead | 93 | 33.3 | 125 | 44.8 | 61 | 21.9 | 279 | 100.0 |
| Andalusia-Edgington area | 40 | 57.2 | 25 | 35.7 | 5 | 7.1 | 70 | 100.0 |
| New Boston-Joy area | 44 | 25.7 | 61 | 35.7 | 66 | 38.6 | 171 | 100.0 |
| Viola area | 31 | 53.5 | 19 | 32.8 | 8 | 13.7 | 58 | 100.0 |
| Keithsburg area | 73 | 35.3 | 80 | 38.6 | 54 | 26.1 | 207 | 100.0 |
| Moline-Rock Island | 54 | 60.0 | 24 | 26.6 | 12 | 13.4 | 90 | 100.0 |

# Chapter 4

# ESTIMATED TRAFFIC AND REVENUES

Estimates of traffic and revenues for the proposed Muscatine Bridge were based upon the number of motorists now using the present bridge and additional traffic which would be attracted to the new facility from alternate crossings. The proposed facility is also expected to induce a measure of additional traffic resulting primarily from elimination of the heavy truck embargo in effect on the present structure. The adverse psychological effect of the bridge failure in the minds of passenger car motorists will also be overcome through construction of the new bridge.

## Proposed Muscatine Bridge

The proposed Muscatine Bridge would be a high level, fixed structure designed as a modern, two-lane toll facility. The bridge would have a 32-foot, curb-to-curb roadway cross-section enabling smooth, efficient and safe passage for all vehicle types. Approach road grades and radii would meet present day design standards to permit adequate access and egress to the bridge structure.

The bridge, as depicted in Figure 2, will connect with Cypress and Second Streets in Muscatine. In Illinois, a direct connection would be provided with Illinois Route 92.

## Planned Highway Improvements

The Five-Year Primary Road Construction Program, prepared by the Iowa State Highway Commission for the period 1968-1972, indicates major improvements are planned for Iowa Route 38 in Muscatine County. 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 sub-structure contract for the Interstate Route 280 bridge across the Mississippi River is scheduled for letting in early 1969. The crossing is expected to be completed and open to traffic prior to January 1, 1971. Upon completion, the Interstate Route 280 crossing and approaches will form a portion of an Interstate Highway circumferential loop around the Quad-Cities area. As shown in Figure 8, Interstate Route 280 will ultimately connect with Interstate Route 74 near the Quad-Cities Airport and then follow a westerly orientation across the Mississippi River to U.S. Route 61. From this point, the highway would turn north and then terminate at Interstate Route 80 northwest of Davenport. In Illinois, a new expressway is planned which will connect the Centennial Bridge with Interstate Route 280 and Illinois Route 92.

Another major route improvement scheduled for 1969 which will affect trans-river traffic is completion of portions of Interstate Route 74 to the south and within the Moline area. This will include reconstruction in the vicinity of the Memorial Bridge in Moline in preparation for its incorporation as part of Interstate Route 74. Right-of-way acquisition is scheduled for other sections of the route in Moline during 1969. Eventually, Interstate Route 74 will connect Interstate Route 280, near the Quad-Cities Airport with Interstate Route 80, north of Davenport.

In Muscatine, consideration is being given by the Iowa State Highway Commission to the relocation of U.S. Route 61 to eliminate the occasional flooding created by high water in Mad Creek. The new alignment would, in effect, be a continuation of Mississippi Drive, and include a new bridge over Mad Creek. As part of the reconstruction, alignment and intersection improvements may be made in the vicinity of Hershey Avenue, just south of downtown Muscatine. Construction of the proposed Muscatine Bridge may permit raising of the railroad tracks in Muscatine to an elevation above the flood stage, an improvement under consideration for several years.

## Typical Time and Distance Relationships

Typical travel time and distance relationships for several movements which could use either the proposed Muscatine Bridge or alternate crossings,

including the new Interstate Route 280 Bridge, are shown in Table 31. The travel times indicated are based on both weekday and weekend day speed-delay studies and represent average driving times rather than the fastest time that could be achieved between the various trip termini indicated.

On a trip between Muscatine and Moline, use of a Muscatine Bridge routing would involve the same mileage but would save three minutes in travel time over use of the new Interstate Route 280 Bridge. On a trip between Muscatine and Keithsburg, Illinois, the proposed Muscatine Bridge would save 47 miles and 69 minutes compared to a Burlington Bridge routing. Travel between Milan and Muscatine would be 4 miles and 4 minutes longer via the Centennial Bridge than the Muscatine Bridge; upon completion of the new Interstate Route 280 Bridge, use of this crossing would make the trip mileage equal to that via the proposed Muscatine Bridge and save some three minutes.

For a longer trip between Monmouth and Iowa City, the proposed Muscatine crossing would save 8 miles and 11 minutes over use of the Burlington Bridge. However, the new Interstate Route 280 Bridge would reduce this savings to 7 miles and would actually be 8 minutes shorter in travel time than the Muscatine Bridge.

## Basic Assumptions

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

1. The facility will be opened to traffic on July 1, 1971.
2. The Interstate Route 280 Bridge will be opened to traffic on or before July 1, 1971.
3. The New Muscatine Bridge would be constructed on the Cypress Street alignment, as discussed in this report.
4. The toll schedule and collection system recommended in this report will be adopted.

## TABLE 31

## TYPICAL TIME AND DISTANCE RELATIONSHIPS

| BETWEEN | VIA | DISTANCE (miles) | TRAVEL TIME (min.) | AVERAGE SPEED (mph) | SAVINGS VIA PROPOSED MUSCATINE BRIDGE (miles) | SAVINGS VIA PROPOSED MUSCATINE BRIDGE (min.) |
|---|---|---|---|---|---|---|
| Muscatine and Moline | Proposed Muscatine Bridge | 34 | 45 | 44 | | |
| | Proposed Interstate Route 280 Bridge | 34 | 42 | 48 | — | -3 |
| Muscatine and Keithsburg | Proposed Muscatine Bridge | 26 | 44 | 36 | | |
| | Burlington Bridge | 73 | 113 | 39 | 47 | 69 |
| Muscatine and Milan | Proposed Muscatine Bridge | 26 | 36 | 43 | | |
| | Centennial Bridge | 30 | 40 | 46 | 4 | 4 |
| | Proposed Interstate Route 280 Bridge | 26 | 33 | 47 | — | -3 |
| Monmouth and Iowa City | Proposed Muscatine Bridge | 92 | 129 | 43 | | |
| | Burlington Bridge | 100 | 140 | 43 | 8 | 11 |
| | Centennial Bridge | 109 | 135 | 54 | 17 | 6 |
| | Proposed Interstate Route 280 Bridge | 99 | 121 | 49 | 7 | -8 |

5. No new crossings, aside from the proposed Interstate Route 280 Bridge, will be constructed across the Mississippi River between the Quad-Cities area and the MacArthur Bridge in Burlington.
6. The present Muscatine Bridge will be closed upon opening of the new facility ond the Muscatine Ferry will cease operation.
7. The bridge will be adequately maintained, efficiently operated and effectively signed to encourage maximum usage.
8. The present general trend in economic activity in the bridge study area will continue and no national emergency will arise which will abnormally restrict the use of motor vehicles.

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

## Recommended Method of Toll Collection

Tolls would be collected from all motorists using the proposed bridge at a toll booth located between the two travel lanes on the western approaches to the facility. The toll collection plaza should be located at a distance from Second Avenue which will permit adequate vehicle storage during peak-hour usage.

Initially, only one attendant would be necessary to collect tolls from both travel directions. Provision should, however, be made in the initial design and construction of the toll booth to ultimately provide for two toll attendants, one handling each direction of travel.

## Recommended Toll Schedule

Several toll rates were studied to determine the optimum toll structure for the proposed Muscatine Bridge. In addition to different cash toll rates, consideration was given to possible reduced fare, frequent-user or commutation rates. Separate traffic assignments were made to the proposed crossing at the various toll levels recognizing differential rates by vehicle class.

As depicted in Figure 9, the assignments and resulting toll revenues indicate that project revenues continue to increase as tolls are increased. While resistance to higher tolls is reflected in the total traffic curve which exhibits a downward slope, the traffic loss is not sufficient to affect higher aggregate revenues even at a passenger car toll rate of $0.80. While the toll curve does not produce an optimum rate peak, a change in slope is discernible at about a $0.50 rate. The toll curve for two-axle vehicles is considerably more sensitive to rate changes than that for three-or-more-axle vehicles. This is a result of the higher operating costs used in the traffic assignments for trucks as opposed to passenger cars which serves to moderate the impact of increased tolls.

Since a high proportion of present bridge users are making local or short distance trips between Muscatine and the bridgehead area in Illinois, a high toll rate would impose a substantial financial burden on these motorists who have no reasonable alternate river crossing choice other than travelling a substantial distance to the north or south. Therefore, an optimum toll rate of $0.50 or $0.25 per vehicle axle is recommended for the proposed Muscatine Bridge. While more revenues could be gained through a higher toll, it is estimated that the overall economic impact to Muscatine and the area immediately cross-river would, under a lower rate, ultimately offset the immediate toll revenue gains with a higher schedule.

Under the recommended toll schedule shown in Table 32, two-axle vehicles would pay $0.50 for one-way passage across the bridge. Tolls for larger

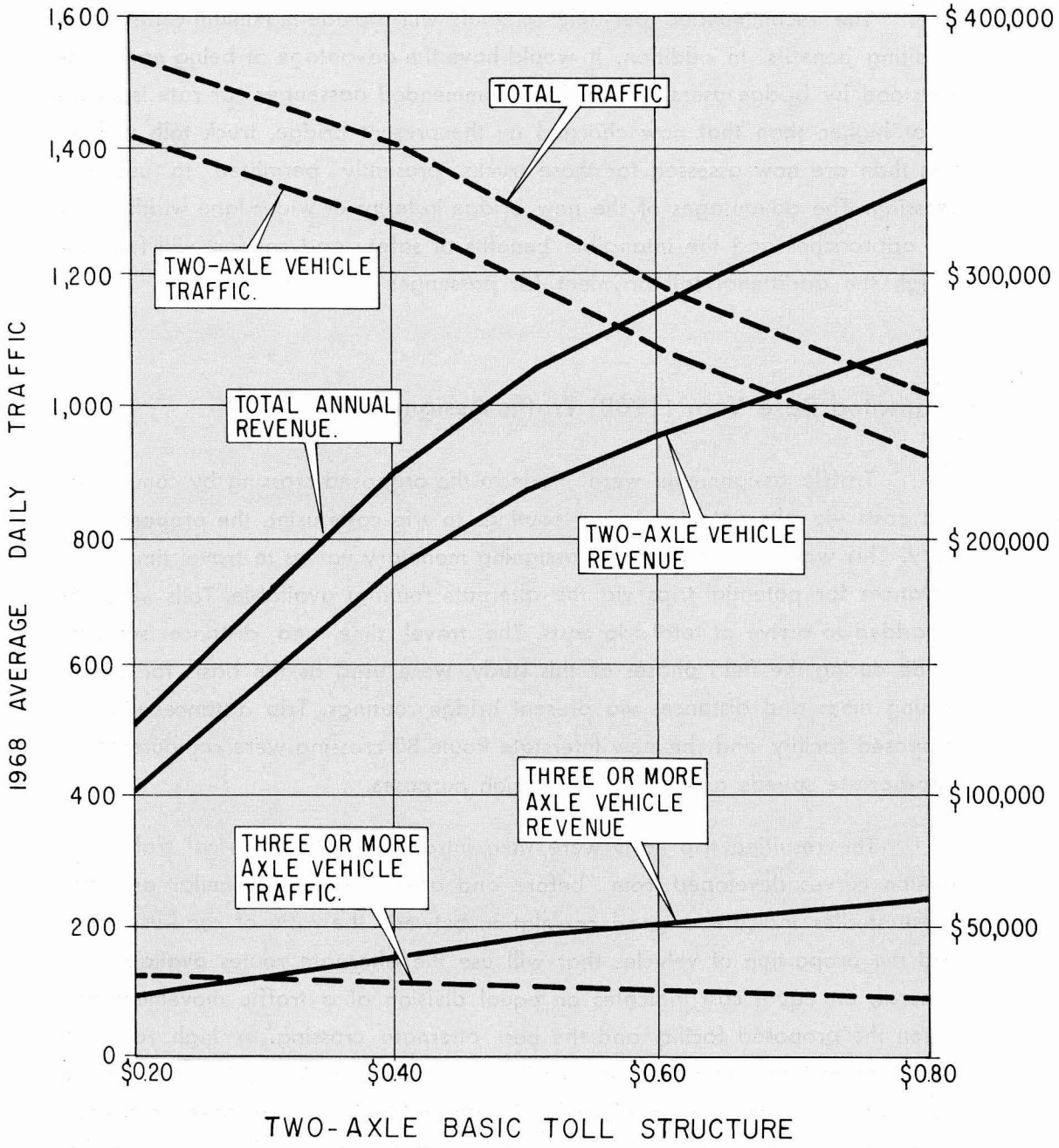
TABLE 32

RECOMMENDED TOLL SCHEDULE

Present

Prelim Rpt

| TOLL CLASS | DESCRIPTION | TOLL | |
|---|---|---|---|
| .35 PC up to .70-6 tire / .85 1 | Two-axle Vehicles | $0.50 | 0.40 |
| 2 | Three-axle Vehicles and Vehicle Combination | 0.75 | 0.60 |
| 3 | Four-axle Vehicles and Vehicle Combinations | 1.00 | 0.80 |
| 4 | Five-axle Vehicles and Vehicle Combinations | 1.25 | 1.00 |
| | Each Additional Axle | 0.25 | 0.20 |




## OPTIMUM TOLL CURVE

*Wilbur Smith and Associates*

FIGURE 9

vehicles are based on a rate of $0.25 per axle. For example, four-axle trucks and vehicle combinations would be assessed $1.00.

The recommended per-axle schedule will provide maximum control and auditing benefits. In addition, it would have the advantage of being easily understood by bridge users. While the recommended passenger car rate is somewhat higher than that now charged on the present bridge, truck tolls will be less than are now assessed for those trucks presently permitted to use the crossing. The advantages of the new bridge in terms of wider lane widths, better approaches and the intangible benefits of safety and comfort will far outweigh the additional toll payment for passenger car motorists.

## Estimated Base Year (1968) Traffic Assigments

Traffic assignments were made to the proposed crossing by comparing trip costs via alternate trans-river routings to trip costs using the proposed facility. This was accomplished by assigning monetary values to travel times and distances for potential trips via the alternate routings available. Tolls were also added to arrive at total trip costs. The travel time and distance surveys, made during the field phases of this study, were used as the basis for determining times and distances via present bridge routings. Trip distances via the proposed facility and the new Interstate Route 80 crossing were computed and appropriate speeds assumed for diversion purposes.

The resulting trip costs were then introduced into empirical traffic diversion curves developed from "before and after" studies of similar projects. These studies indicate a good correlation between the ratio of road-user cost and the proportion of vehicles that will use the alternate routes available. In general, an equal cost indicates an equal division of a traffic movement between the proposed facility and the best alternate crossing. A high ratio of road-user cost for use of the new facility to cost via the best alternate routing indicates a low percentage of traffic is assignable to the proposed crossing. Conversely, a low ratio of road-user cost using the new facility to cost via the most competitive alternate routing indicates that a high percentage of traffic is divertable.

Base year, 1968, traffic assignments to the proposed Muscatine Bridge are given in Table 33 and illustrated in Figure 10. Of the total assignment of 1,305 vehicles per day, 1,198 were two-axle vehicles, 21--three-axle, 12--four-axle and 74--five-axle. The importance of local or shorter distance trip movements assigned to the bridge is clearly indicated in Figure 10 by the heavy flow bands shown eminating from Muscatine to the area in Illinois tributary to the bridgehead. The flow bands are to scale with the width proportionate to the volume of trips assigned. The heaviest single movement is that between Muscatine and the area in Illinois within a radius of 17 miles of the bridgehead--an estimated 477 trips per day. The next largest movement is significantly smaller--195 trips daily moving between Muscatine and the area immediately adjacent to the Mississippi River including the communities of Keithsburg and New Boston as well as the Henderson State Forest and Oquawka Game Refuge. An estimated 71 vehicles per day were assigned to the bridge from the movement between Muscatine and Rock Island-Moline. The largest longer-distance movement assigned was between Muscatine and the area east of the Quad-Cities which also accounted for the most significant heavy truck assignment. Compared to the total trans-river corridor potential, illustrated in Figure 8, very little through traffic was considered assignable to the proposed Muscatine crossing; 77 per cent of the traffic assigned to the bridge had Muscatine as one trip terminus. One major reason for the low assignment of through or long distance traffic was the competition afforded by the present Interstate Route 80 crossing and more importantly, by the proposed Interstate Route 280 Bridge. The lack of U.S. Route designated highways in Illinois, directly serving the bridge, also influenced the through traffic potential of the proposed Muscatine Bridge.

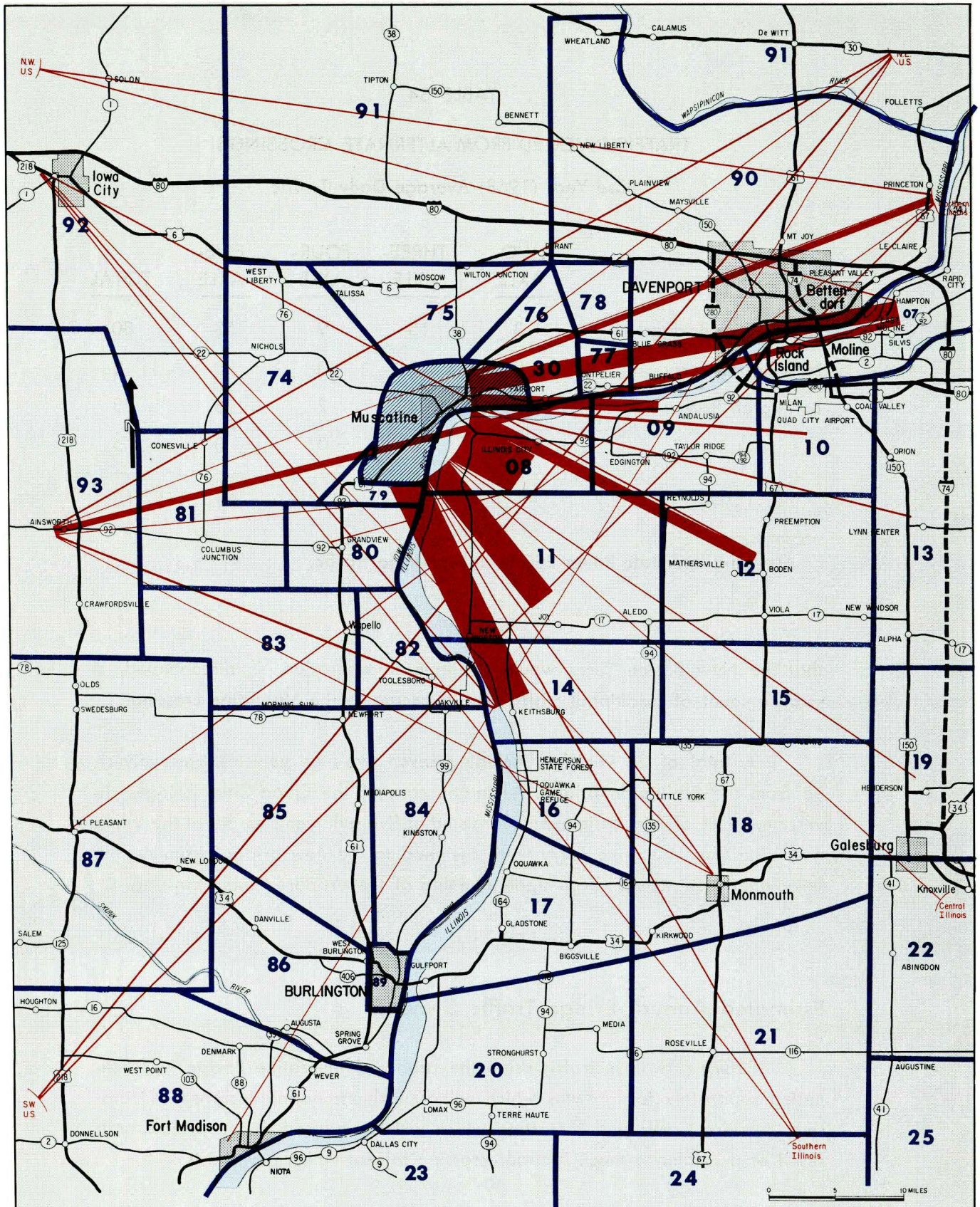
The bulk of the traffic assigned to the proposed bridge already uses the present crossing. As shown in Table 34, a total of 113 trips per day, at 1968 levels, were considered assignable to the bridge from alternate crossings. The majority of these vehicles are estimated to be the large trucks which are now prohibited from using the existing crossing. A total of 80 vehicles were diverted from the Quad-Cities crossings of which only three were two-axle vehicles. No traffic was assigned from the New Boston Ferry since present ferry users are largely captive to the immediate vicinity of the ferry or use the facility for pleasure-driving purposes. For purposes of this study, it was assumed

TABLE 33

BASE YEAR (1968) TRAFFIC ASSIGNMENT

Proposed Muscatine Bridge

| MOVEMENT BETWEEN | | | AVERAGE DAILY TRAFFIC Two-Axle | Three-Axle | Four-Axle | Five-Axle | TOTAL |
|---|---|---|---|---|---|---|---|
| Rock Island-Moline | and | Muscatine | 62 | 3 | 1 | 5 | 71 |
| | and | Western Iowa and points west | 39 | 2 | 0 | 2 | 43 |
| Area east of the Quad-Cities | and | Muscatine | 111 | 3 | 4 | 31 | 149 |
| | and | Western Iowa and points west | 61 | 2 | 3 | 16 | 82 |
| Illinois Rural (within a 17-mile radius of bridgehead) | and | Muscatine | 473 | 2 | 1 | 1 | 477 |
| | and | Southeastern Iowa | 57 | — | — | — | 57 |
| Area immediately east of Mississippi River extending 25 miles south of the bridge | and | Muscatine | 194 | 1 | — | — | 195 |
| | and | Southeastern Iowa | 15 | 1 | — | — | 16 |
| Rural Area immediately south of Rock Island and west of I-74 | and | Muscatine | 66 | 1 | 1 | — | 68 |
| | and | Western Iowa and points west | 36 | — | — | 1 | 37 |
| Central Illinois | and | Muscatine | 16 | 1 | — | 1 | 118 |
| | and | Western Iowa and points west | 8 | 1 | 1 | 8 | 18 |
| Southeast Ill. and Southeast U. S. | and | Muscatine | 16 | 3 | — | 2 | 21 |
| | and | Western Iowa and points west | 13 | 1 | 1 | 7 | 22 |
| Other trips | | | 31 | — | — | — | 31 |
| TOTAL | | | 1,198 | 21 | 12 | 74 | 1,305 |
| | | | Prelim Rpt-'66 Base yr 1284 | 17 | 18 | 35 | 1354 |




# TRANS-RIVER TRAVEL DESIRES

## TRIPS ASSIGNED TO PROPOSED MUSCATINE BRIDGE

### 1968 AVERAGE DAILY TRAFFIC

*Wilbur Smith and Associates*

FIGURE 10

TABLE 34

TRAFFIC DIVERTED FROM ALTERNATE CROSSINGS

Base Year (1968) Average Daily Traffic

| CROSSING | TWO-AXLE | THREE-AXLE | FOUR-AXLE | FIVE-AXLE | TOTAL |
|---|---|---|---|---|---|
| Quad-Cities Bridges[1] | 3 | 15 | 9 | 53 | 80 |
| New Boston Ferry | 0 | 0 | 0 | 0 | 0 |
| Burlington Bridge | 7 | 4 | 2 | 15 | 28 |
| Muscatine Ferry | 5 | 0 | 0 | 0 | 5 |
| TOTAL | 15 | 19 | 11 | 68 | 113 |

[1] Assuming Interstate Route 280 Bridge open to traffic.

that the New Boston Ferry would continue in operation; if discontinued, a small amount of additional traffic would accrue to the Muscatine crossing.

A total of 28 vehicles, including seven two-axle vehicles, were diverted from the Burlington Bridge. As in the case of the Quad-Cities bridges diversion, most of the assignment consisted of five-axle vehicles. All of the trucks now using the Muscatine Ferry were assigned to the new bridge assuming the ferry operation would cease upon opening of the proposed fixed crossing.

## Estimated Annual Bridge Traffic Growths

Future growth in traffic using the proposed Muscatine Bridge was estimated separately for growths which will occur due to normal increases in trans-river corridor traffic and for usage which will be induced to the project as a result of providing a much superior crossing to that which now exists.

Normal annual corridor growth was estimated based upon past trends in trans-river usage at Muscatine and economic and travel trends and characteristics of development in the bridge study area. Growths in usage of competitive unrestricted trans-river crossings nearby and annual traffic growths on highways within the study area, particularly U.S. Route 61 in Iowa, were also considered. Projected increases in population, employment and other economic parameters also influenced projections of future bridge traffic.

While little growth has occurred in use of the present Muscatine Bridge over the past decade, this has been greatly influenced by the structural condition of the crossing. The bridge failure some years ago, has had an adverse psychological impact on bridge use after reconstruction. The prohibition of heavy trucks also affected historical trends on the facility. The population of Muscatine, which serves as the origin or destination for a high percentage of bridge traffic, is estimated to increase an average of 1.5 per cent per year through 1985. Trans-river travel growths are expected to be substantially higher based on the relationship of personal and business travel increases to population growths which have occurred historically and are projected for the future. Continued prosperity and increased leisure time will alone account for a sizeable increment in future trans-river travel growth.

As shown in Table 35, no growth in bridge corridor travel is projected between 1968 and 1969. An increase of 1.0 per cent is estimated during the following year increasing to 2.0 per cent between 1970 and 1971. This growth is estimated to increase to 2.5 per cent per year during the period 1971 (opening of the new bridge) to 1976 and then decrease to 2.0 per cent annually thereafter through 1985. For purposes of conservatism, no normal growth in traffic is projected beyond 1985, although some increase will likely occur.

Induced traffic consists of generated and development growths. Generated usage is additional trips made by motorists now moving in the travel corridor as a result of the attractiveness, convenience and safety of the new facility. Development growth is increased usage resulting from the location and access advantages afforded by a new bridge thereby enhancing the development potential of the area it directly serves. This development can take the form

TABLE 35

ESTIMATED ANNUAL PER CENT TRAFFIC GROWTH

| FISCAL[1] YEAR | NORMAL GROWTH | INDUCED GROWTH |
|---|---|---|
| 1968 | — 2.0 | |
| 1969 | 1.0 2.0 | |
| 1970 | 2.0 | 8.0 5.0 |
| 1971 | 2.5 | 3.0 0 |
| 1972 | 2.5 | |
| 1973 | 2.5 | |
| 1974 | 2.5 | |
| 1975 | 2.5 | |
| 1976 | 2.0 | |
| 1977 | 2.0 | |
| 1978 | 2.0 | |
| 1979 | 2.0 | |
| 1980 | 2.0 | |
| 1981 | 2.0 | |
| 1982 | 2.0 | |
| 1983 | 2.0 | |
| 1984 | 2.0 | |
| 1985 | | |

[1] Twelve-month period beginning July 1.

of residential, commercial or industrial activity. With the return of heavy truck usage to the Muscatine crossing, commercial and industrial development will be encouraged. An induced growth of 8.0 per cent is estimated for the first full year of bridge operation decreasing to 3.0 per cent in the second year of operation.

Dec 31, 1972

## Estimated First Year Traffic and Revenues

Toll revenues of $291,700 are estimated for the first full year of operation of the proposed Muscatine Bridge, the twelve-month period beginning July 1, 1971. Of this amount, $243,300, or 83 per cent, is anticipated from two-axle vehicles using the facility. As shown in Table 36, five-axle vehicles are expected to contribute another $37,400, three-axle vehicles and vehicle combinations — $6,300 and four-axle vehicles and vehicle combinations — $4,700.

TABLE 36

ESTIMATED FIRST YEAR TRAFFIC AND REVENUES
JULY 1, 1971 — JUNE 30, 1972

| TOLL CLASS | DESCRIPTION | ANNUAL TRAFFIC | ANNUAL REVENUES |
|---|---|---|---|
| 1 | Two-axle vehicles | 486,600 | $243,300 |
| 2 | Three-axle vehicles and vehicle combinations | 8,400 | 6,300 |
| 3 | Four axle vehicles and vehicle combinations | 4,700 | 4,700 |
| 4 | Five-axle vehicles and vehicle combinations | 29,900 | 37,400 |
| | TOTAL | 529,600 | $291,700 |

A total of 529,600 vehicles are projected to use the bridge in the first year of operation. Two-axle vehicles far overshadow other toll classes accounting for 486,600 trips followed by 29,900, five-axle vehicle trips.

## Estimated Annual Traffic and Revenues

Estimated annual traffic and revenues for the proposed Muscatine Bridge over a thirty-year period are shown in Table 37. First year revenues of $292,000 are anticipated to increase to $332,000 in fiscal 1975. By fiscal 1985, annual revenues of $406,000 are projected. During this period, daily traffic on the bridge is estimated to grow from 1,450 vehicles in fiscal 1971 to 2,020 in 1985.

## TABLE 37

## ESTIMATED ANNUAL TRAFFIC AND REVENUES

| FISCAL YEAR[1] | Prelim Rpt | AVERAGE DAILY TRAFFIC | Prelim Rpt (1,000) | ANNUAL TOLL REVENUES |
|---|---|---|---|---|
| 1971 | 1520 | 1,450 | 235 | $292,000 |
| 1972 | 1560 | 1,530 | 241 | 308,000 |
| 1973 | 1600 | 1,570 | 247 | 316,000 |
| 1974 | 1640 | 1,610 | 253 | 324,000 |
| 1975 | 1680 | 1,650 | 260 | 332,000 |
| 1976 | 1720 | 1,690 | 265 | 340,000 |
| 1977 | 1750 | 1,720 | 270 | 347,000 |
| 1978 | 1780 | 1,760 | 276 | 354,000 |
| 1979 | 1820 | 1,790 | 281 | 361,000 |
| 1980 | 1860 | 1,830 | 287 | 368,000 |
| 1981 | 1880 | 1,870 | 291 | 375,000 |
| 1982 | 1910 | 1,900 | 295 | 383,000 |
| 1983 | 1940 | 1,940 | 300 | 391,000 |
| 1984 | 1970 | 1,980 | 304 | 398,000 |
| 1985 | 2000 | 2,020 | 309 | 406,000 |
| Next 15 Years Annually | 2000 | 2,020 | 309 | 406,000 |
| AVERAGE ANNUAL REVENUES | | | | |
| First-Five Years | | | 247,000 | $314,000 |
| First Ten Years | | | 262,000 | 334,000 |
| Thirty Years | | 28 yrs. | 290,000 | 380,000 |

[1] Twelve-month period beginning July 1.

Average annual revenues of $314,000 are estimated over the first five years of operation, increasing to $334,000 annually over the first ten years. Average annual revenues of $380,000 are projected over the 30-year earning period.

These estimates 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 traffic and revenues might be higher or lower than those indicated depending upon economic conditions and other local factors affecting bridge usage at that time.

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AND ASSOCIATES