DAVENPORT - ROCK ISLAND - MOLINE
URBANIZED AREA TRANSPORTATION STUDY

COMPREHENSIVE PLAN REPORT

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS
CHICAGO

DAVENPORT-ROCK ISLAND-MOLINE

URBANIZED AREA TRANSPORTATION STUDY

COMPREHENSIVE PLAN REPORT

Prepared for

CITY OF DAVENPORT
CITY OF BETTENDORF
TOWN OF RIVERDALE
CITY OF ROCK ISLAND
CITY OF MOLINE
CITY OF EAST MOLINE
CITY OF SILVIS
VILLAGE OF CARBON CLIFF
VILLAGE OF HAMPTON
VILLAGE OF MILAN
SCOTT COUNTY
ROCK ISLAND COUNTY

BI-STATE METROPOLITAN PLANNING COMMISSION
IOWA STATE HIGHWAY COMMISSION
ILLINOIS DIVISION OF HIGHWAYS

in cooperation with the

UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
BUREAU OF PUBLIC ROADS

FEBRUARY 1970

Prepared by:

DE LEUW, CATHER & COMPANY
Consulting Engineers · Chicago

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Chapter I

INTRODUCTION

Increasing ownership and usage of motor vehicles over the past 25 years has had a profound effect on the nation's metropolitan areas. The officials responsible for planning highways and public transportation facilities in the 1930's could not have foreseen a threefold increase in vehicle registrations since the end of World War II. The resulting problems, intensified by rapid growth of population in urban areas, has emphasized the need for a flexible transportation planning process subject to periodic revision as conditions change.

The United States Congress recognized the need for comprehensive transportation planning in the Federal-Aid Highway Act of 1962. Section 9 of this Act states, in part:

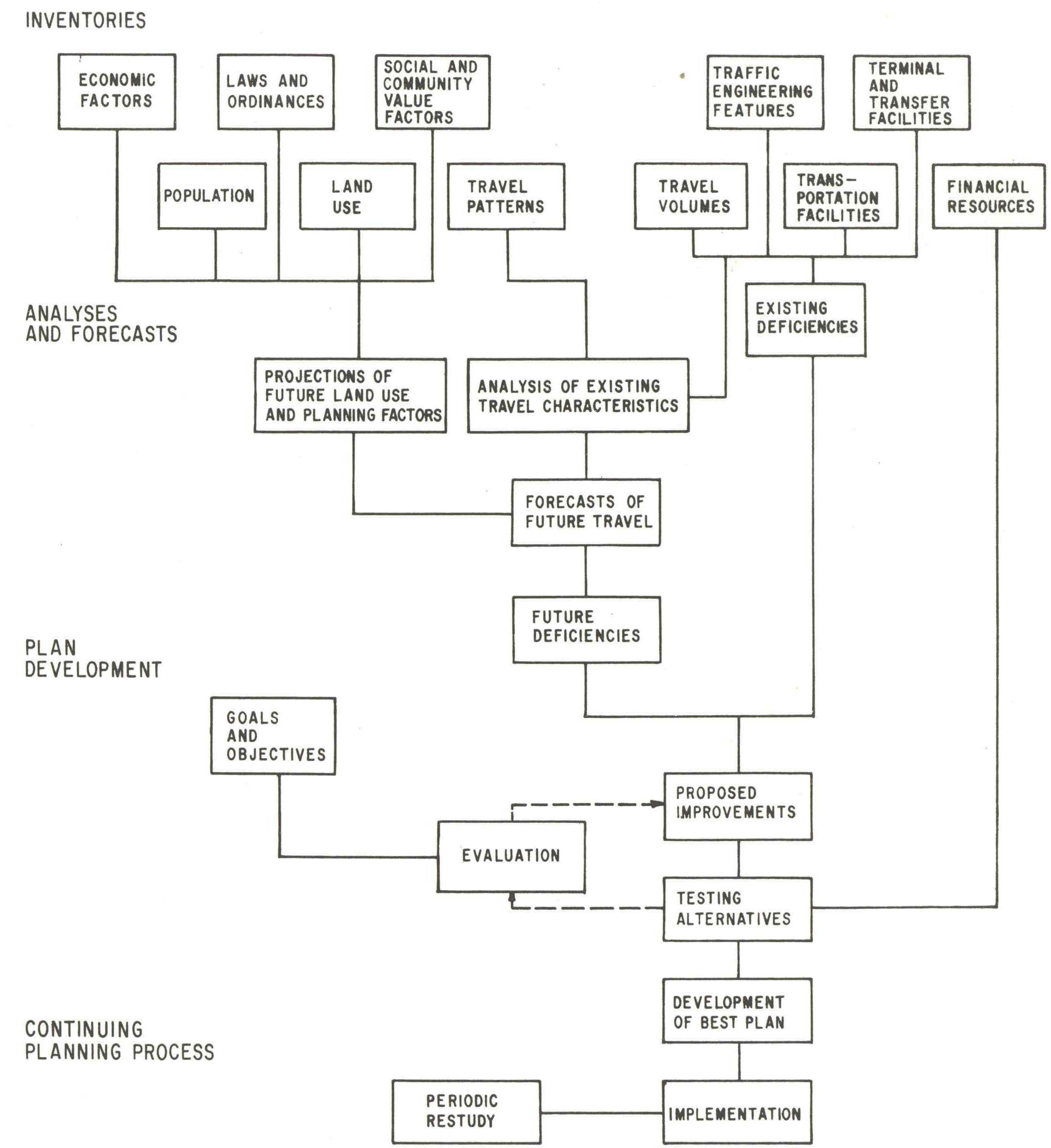
> "It is declared to be in the national interest to encourage and promote the development of transportation systems embracing various modes of transport in a manner that will serve the States and local communities efficiently and effectively."

The Act went on to specify that approval of Federal participation in projects in urban areas of more than 50,000 population would be contingent on a <u>continuing</u>, <u>comprehensive</u> transportation planning process carried on <u>cooperatively</u> by States and local communities. The key words in this section of the Act--continuing, comprehensive and cooperative--have come to be known as the three C's of the transportation planning process.

The transportation planning process is the formulation of procedures and working arrangements to facilitate evaluation of short- and long-range transportation plans. Governing bodies and private individuals are afforded a tool to assure that new transportation facilities are soundly conceived and developed.

Figure 1 is a simplified block diagram showing the various operations involved in the transportation planning process. The <u>comprehensive</u> character of the planning process requires that:

FIGURE 1



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THE TRANSPORTATION PLANNING PROCESS

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1. Economic, population and land use elements be included;

2. Estimates be made of the future demands for all modes of transportation, both public and private, for persons and goods;

3. Terminal and transfer facilities and traffic control systems be included in the inventories and analyses; and

4. The study should encompass the entire area within which the forces of development are interrelated which is usually the area expected to be urbanized within the forecast period.

Inventories of existing transportation facilities together with traffic counts are sufficient to indicate present areas of deficiency. Other factors must be known, however, to forecast future travel. Previous research has shown that definite relationships exist between the amounts and patterns of travel and such measurable and statistical conditions as population, land use, and economic factors. It has also been established that these relationships under existing conditions may be applied to projections of land use and activity to arrive at reasonable projections of future travel patterns and quantities.

Estimates of future travel, together with analyses of present deficiencies, are the starting points in developing alternative transportation systems to meet the goals of the region. As in other phases of planning, there is often more than one way to solve a particular problem. The process involves testing various alternatives, therefore, to determine which would provide the best transportation service considering all relevant planning factors.

The goal of the transportation planning process is to develop an effective, balanced, and smoothly functioning system. Such a system should offer convenient access to all land uses and serve as a framework within which a desirable land use arrangement can develop and thrive.

Until recently, much transportation planning has been piecemeal. Officials and citizens of each political jurisdiction sometimes met their local problems with little regard for areawide implications. Increased mobility of the population, however, has created an awareness of the interrelationship of people living in adjoining communities. It is recognized that planning must not stop at State or corporate lines, but, to be effective, must be cooperatively undertaken to include entire urbanized areas.

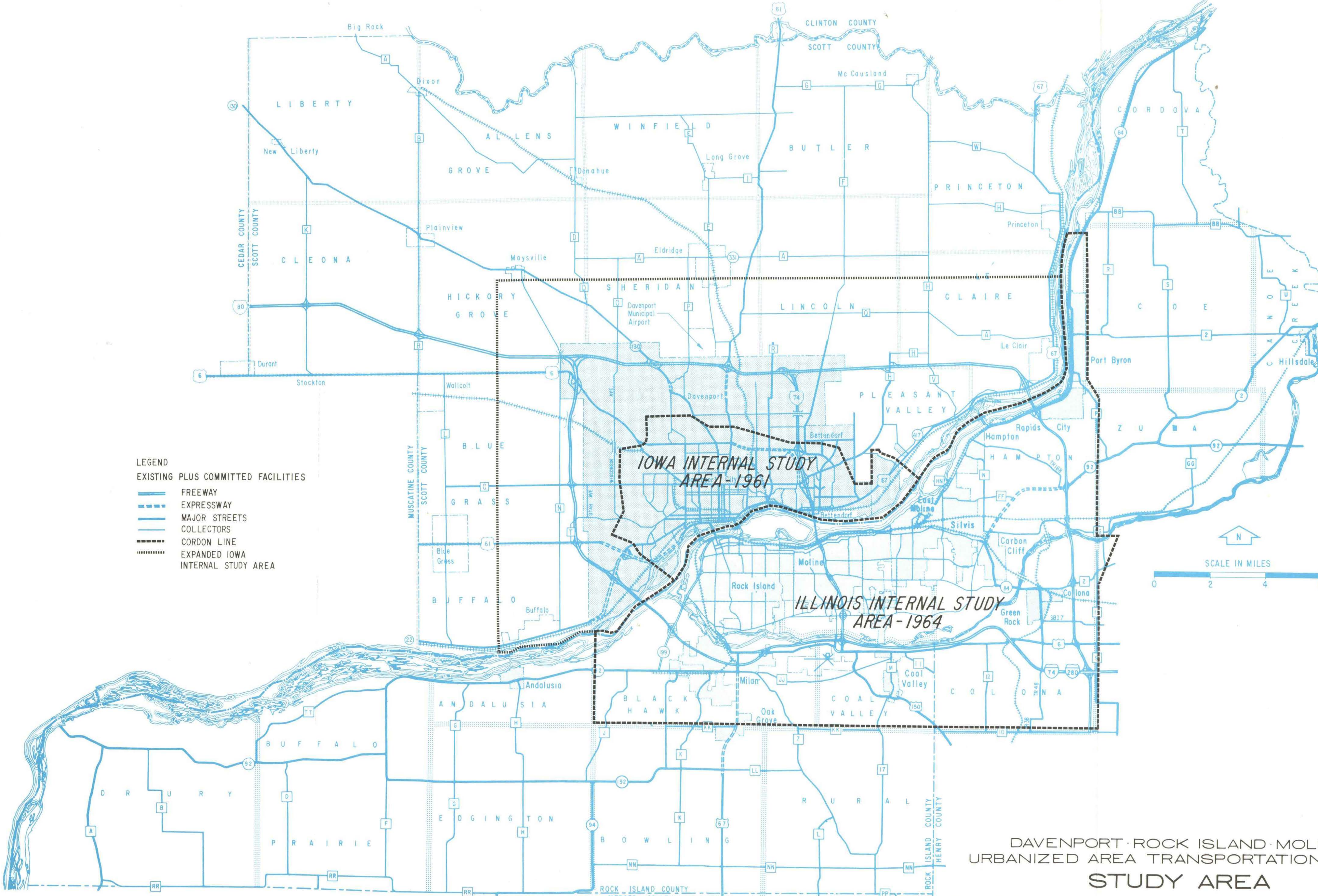
Finally, the planning process must be continuing. Development of an initial plan is the start--rather than the end--of the transportation planning process. Growth and change of the area should be monitored continuously. Elements of the plan should be reappraised, refined and implemented in an orderly manner producing optimum benefit to the area. In addition, the organization established to administer the study should continue to function, furnishing appropriate services to residents and encouraging citizen participation in the planning process.

THE STUDY AREA

The Study Area includes all of Scott County, Iowa, and all of Rock Island County and Colona Township in Henry County, Illinois. See Figure 2. Scott and Rock Island Counties comprise the Davenport-Rock Island-Moline Standard Metropolitan Statistical Area. Internal study areas within which origin-destination studies were made in 1961 and 1964 are delineated by cordon lines. Base year data were analyzed and existing travel characteristics determined for this area. During the course of travel forecasts, the Iowa internal study area was expanded to include areas north of Interstate 80 and west of Interstate 280. This enlarged area, also shown in Figure 2, more nearly encompasses all portions of the Study Area expected to be urbanized by 1985.

STUDY ORGANIZATION

Transportation planning on each side of the Mississippi River began independently. An origin-destination study was made in the Iowa portion of the study area by the Iowa Highway Commission in 1961. Work in the Illinois portion was begun in 1963 by the Illinois Division of Highways and the Rock Island County Regional Planning Commission. Separate consultant contracts were initiated on each side of the river, administered by the Scott County Metropolitan Planning Commission in Iowa and by the Illinois Division of Highways in Illinois. Under a Resolution of Cooperation approved in March 1965, representatives of both states began meeting as the Joint Transportation Policy Committee to consider and resolve matters of regionwide transportation planning significance.



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STUDY AREA
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The Bi-State Metropolitan Planning Commission was formed in the summer of 1966, unifying the existing Scott County Metropolitan Planning Commission and the Rock Island County Regional Planning Commission. Combining the transportation technical committees and respective citizens advisory groups achieved the structural unification of a metropolitan planning commission capable of representing the entire area.

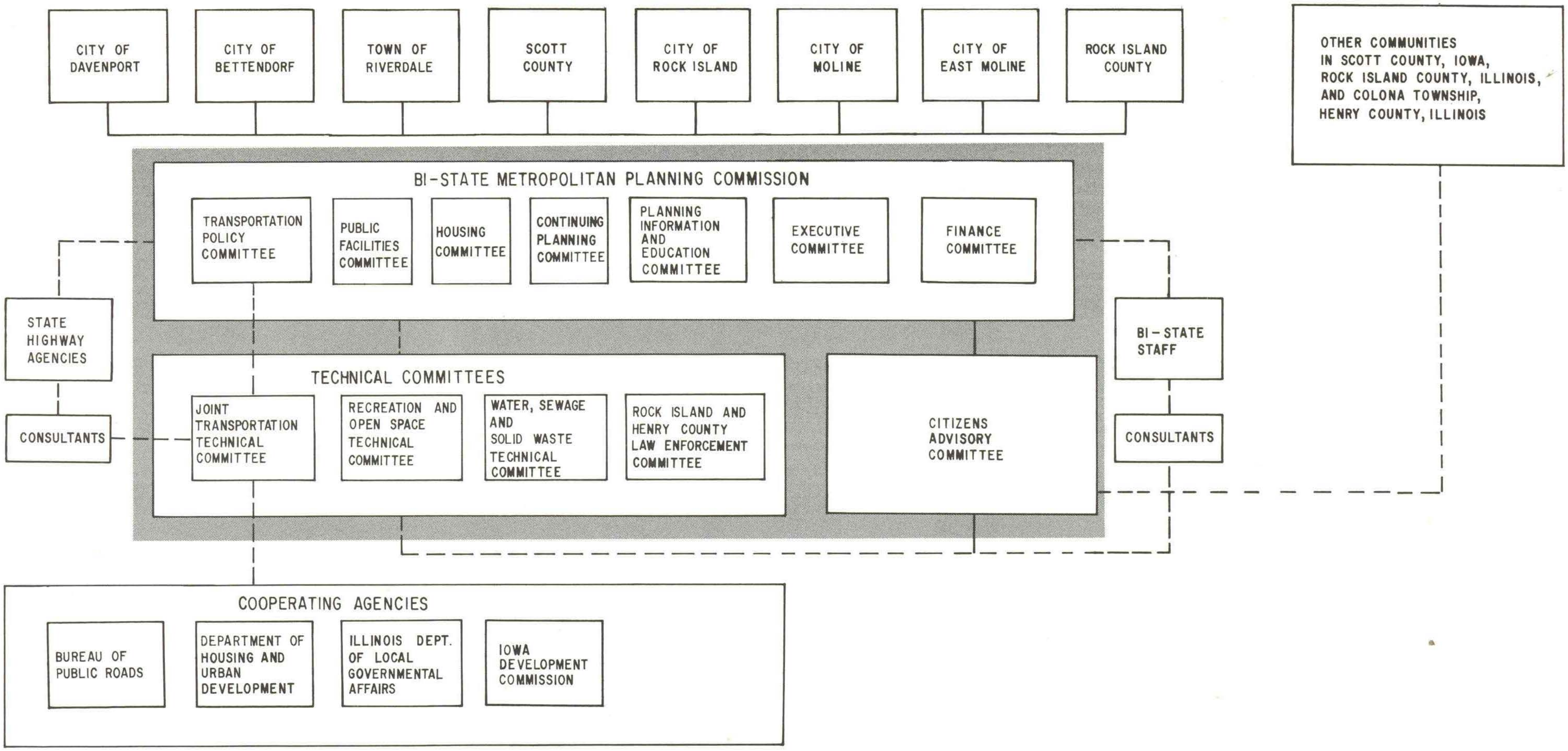
Figure 3 is a chart showing the organizational structure of the transportation study as it now exists. Since 1966, the transportation study was coordinated by the Bi-State Metropolitan Planning Commission. It was administered by the Bi-State staff in Iowa. In Illinois, it was administered by the Illinois Division of Highways. Cooperating agencies include the Department of Housing and Urban Development, Bureau of Public Roads, Iowa Development Commission, Iowa State Highway Commission, and Illinois Department of Business and Economic Development.

Elements of the Plan were prepared by the Bi-State staff, the staffs of both the Iowa State Highway Commission and the Illinois Division of Highways, and their respective consultants. Guidance, technical capabilities, and public support and advice were provided by the following three committees:

Transportation Policy Committee, consisting of mayors, county commissioners and district highway engineers. This committee was responsible for development, approval and review of transportation plans for the metropolitan area.

Joint Transportation Technical Committee, composed of city planners and engineers, county zoning administrators, and highway engineers, the Bi-State Executive Director, and Iowa and Illinois highway district staff engineers. This group was responsible for technical review and guidance of data collection and analysis; preparation of transportation plans; and review of the plan.

Citizens Advisory Committee, comprised of more than 200 citizens of the area representing school districts, municipalities not having members on the Planning Commission, and a broad range of civic, business and other interested groups. This committee identified major problems and potentials of the area, recommended goals for the planning process, and reviewed major proposals as they were presented to the Commission for consideration.



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COMPREHENSIVE TRANSPORTATION PLANNING ORGANIZATIONAL STRUCTURE

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FIGURE 3

PRIOR REPORTS

This report summarizes a number of years' work by governmental agencies and their consultants in connection with the transportation study. It would be impractical to include under one cover all of the findings and analyses of each phase of the study. For detailed information on specific elements, the reader is referred to the following related reports:

Title	Author	Date
Iowa Reports		
Interim Report No. 1 Transportation Facilities Inventory	De Leuw, Cather & Company	1968
Interim Report No. 2 Terminal and Transfer Facilities and Public Transportation	De Leuw, Cather & Company	1968
Interim Report No. 3 Financial Resources	De Leuw, Cather & Company	1969
Interim Report No. 4 Terminal and Transfer Facilities Forecasts	De Leuw, Cather & Company	1969
Davenport Origin and Destination Report	Iowa State Highway Commission	1963
Research and Analysis Report	Candeub, Fleissig and Associates	1967
Finances Report	Candeub, Fleissig and Associates	1968

Title	Author	Date
Illinois Reports		
Interim Report No. 1 Economic-Population Inventories	De Leuw, Cather & Company	1967
Interim Report No. 2 Land Use Inventory	De Leuw, Cather & Company Bi-State Metropolitan Planning Commission	1967
Interim Report No. 3 Transportation Facilities Inventory	De Leuw, Cather & Company	1967
Interim Report No. 4 Laws and Ordinances	Bi-State Metropolitan Planning Commission	1967
Interim Report No. 6 Financial Resources--Current and Forecast	De Leuw, Cather & Company	1969
Interim Report No. 9 Terminal and Transfer Facilities	De Leuw, Cather & Company	1967
Interim Report No. 10 Traffic Engineering Features--Inventory and Improvement Program	De Leuw, Cather & Company	1968
Interim Report No. 11 Origin-Destination Studies	Illinois Division of Highways	1968

Title	Author	Date
Joint Iowa-Illinois Reports		
Interim Report No. 5 Traffic Model and Assignment Techniques	De Leuw, Cather & Company	1969
Interim Report No. 7 Transportation Facilities and Travel Pattern Forecasts	De Leuw, Cather & Company	1969
Interim Report No. 8 Trip Assignments--Alternative Networks	De Leuw, Cather & Company	1969
Alternative Concept Plans	Candeub, Fleissig and Associates	1967
General Plan	Candeub, Fleissig and Associates	1968
Small Area Forecasts	Candeub, Fleissig and Associates	1969
Comprehensive Plan Report	De Leuw, Cather & Company	1970
Technical Supplement to the Comprehensive Plan Report	De Leuw, Cather & Company	1970

The foregoing reports are on file with the Bi-State Metropolitan Planning Commission and the respective contributing agencies.

Chapter II

EXISTING TRANSPORTATION FACILITIES

Several important phases of the transportation study were directed toward evaluating the adequacy of existing transportation facilities in the Davenport-Rock Island-Moline urbanized area. Inventories covered present streets and highways as well as terminal, transfer and public transportation facilities. This study helped define areas of present deficiencies, and guided the planning and programming of recommended improvements.

PRESENT STREETS AND HIGHWAYS

The existing system of principal streets and highways was defined at the outset of the study in conference with the Technical Committee. Inventories were made of the geometric features of each segment of the system. Detailed summaries and analyses of the inventory can be found in Iowa Interim Report Number 1 and Illinois Interim Report Number 3, both entitled "Transportation Facilities Inventory."

Functional Classification

Elements of the present street and highway system were first identified and classified according to traffic service function in collaboration with the Technical Committee. Each street and highway was functionally classified as freeway; expressway; major, collector or local street; or major, collector or local highway according to standards developed by the National Committee on Urban Transportation, American Association of State Highway Officials, and organizational policies of the Iowa Highway Commission and the Illinois Division of Highways. Freeways and expressways were defined as either urban or rural facilities; streets as urban facilities; and highways as rural facilities. The following is a summary of the definitions:

Freeways. Freeways have divided roadways with full control of access. They serve high traffic volumes, usually at high speeds. Since the primary reason for using freeways is to save time, they generally serve trips longer than three miles.

Wide traffic lanes together with wide medians and grade separation of cross traffic contribute to low accident rates at speeds of 60 to 70 miles per hour in rural areas. Speeds may be somewhat lower in urban areas due to higher traffic volumes and more maneuvering. All cross roads are either grade-separated, closed or relocated.

There are no traffic signals on freeways. Interchange ramps allow entrance to and departure from freeways without cross traffic or left turns on main roadways. Where necessary, frontage roads on which parking is permitted are incorporated in the design for access to abutting land.

A freeway is usually designated as an Interstate, a U. S. and/or a state route.

Expressways. Expressways have divided roadways with partial control of access. They serve high traffic volumes at moderate to high speeds for trip lengths generally in excess of three miles--similar to the function of freeways. Expressways differ from freeways, however, in that they are generally built on narrower rights of way, and some at-grade intersections with major streets and highways may be permitted. The differences result in lower levels of service and reduced capacity as compared with freeways.

Although some access to abutting property is permissible, such land is generally served by frontage roads. Parking is not permitted on an expressway except in emergency, but can be allowed on frontage roads. An expressway is generally designated as a U. S. or state route. It may be designed for speeds of from 50 to 70 miles per hour, depending on topography and other factors.

No facility should be classed as a freeway or expressway, regardless of its physical characteristics, unless its principal function is to serve trips of appreciable length.

Major Streets. Major streets are high-type urban facilities which are continuous for a substantial distance. They have intersections at grade and generally provide direct access to abutting property. Geometric design techniques and traffic control measures are used, however, to safeguard movement of through traffic by minimizing roadside interference from driveways and parking facilities. Major streets may include such design features as medians, turning lanes and channelization of intersections. In some cases, access to abutting property may be denied in order to improve design characteristics for high volume traffic. Parking lanes may be included but parking should be discouraged. Principal intersections should be signalized, and cross traffic on other intersecting streets should be required to stop at the major street.

Major streets, which may form boundaries of neighborhoods, should be spaced from one to two miles apart. Trip lengths on major streets generally average over one mile while speeds range from 30 to 40 miles per hour.

Collector Streets. Collector streets are designed for medium to low volumes of traffic being gathered from and distributed to major and local streets. They also serve secondary traffic generators such as schools, churches, hospitals and small shopping centers.

Collector streets are the main interior streets within a neighborhood, and are usually spaced one-quarter to three-quarters of a mile apart. Since they are intended to serve traffic destined to or originating within a particular neighborhood, through traffic should be discouraged from using collector streets.

All abutting property is afforded direct access. Parking lanes are permissible. Traffic on local cross streets should be controlled by stop signs at collector streets, which are intended for speeds of 20 to 30 miles per hour.

Local Streets. Local streets primarily afford access to abutting residential, industrial or commercial property. They assemble vehicles and lead them to higher type facilities such as collector and major streets. Traffic volumes on local streets are low, posted speeds generally being 20 to 30 miles per hour.

Local streets are usually spaced at one-block intervals, except where one is displaced by a major or collector street. Through traffic is discouraged from using local streets by frequent stop signs. Parking may be permitted on one or both sides of local streets.

Local streets comprise a large portion of the total mileage of streets in any city. Traffic volumes are low, however, and hence vehicle-miles of travel on local streets are relatively small.

Major Highways. Major highways are high-type rural facilities handling large traffic volumes at medium to high speeds. They are usually the main roadways connecting cities and towns where traffic volumes do not justify freeways or expressways.

Major highways allow access to abutting property and have intersections at grade, but they are designed primarily for the safe movement of high-speed through traffic. Accordingly, control must be exerted over access to major highways in some cases so that they will retain their capacity and other features.

Major highways generally are designated either as U. S., state or county routes, alone or in combination. Speeds of 50 to 70 miles per hour can usually be maintained on such facilities.

Collector Highways. Collector highways are designed for moderate volumes of rural traffic. They extend for considerable distances, gathering and distributing rural traffic from and to major and local highways. All abutting property has the right of direct access, and all intersections are at grade. Traffic on collector highways has priority over that on local crossroads, however, and should be protected by stop signs except at intersections with major highways or expressways where traffic signals are required.

Collector highways are usually designated as state or county highways, and have posted speeds of 50 to 60 miles per hour.

Local Highways and Roads. Local highways and roads serve low volumes of rural traffic and afford access to abutting property. All intersections are at grade and design speeds range from 30 to 50 miles per hour.

Local highways and roads comprise the largest part of any rural network since they provide access to all farmsteads, but they carry only a small proportion of total rural traffic. These highways are generally maintained by a county or township agency.

Streets and highways in the Davenport-Rock Island-Moline study area classified as freeway, expressway, or major or collector facilities are shown in Figures 4 and 5. These are referred to throughout the report as the Principal Street and Highway System. All other streets and highways were designated "local" facilities. The classifications reflect conditions in 1964, which was taken as the base year for consolidation of the two separate studies in Iowa and Illinois.

Table 1 summarizes mileage of the principal street and highway system by functional classification.

Physical Characteristics

Physical properties of streets and highways include length of section, surface type, and right of way width. Tables 2 and 3 summarize mileage by pavement width and right of way width, respectively, for each functional classification of street or highway in the study area.

Operational Characteristics

Factors to consider when evaluating the quality of service offered by a street and highway system include safety, economy, travel time, comfort and convenience, freedom to maneuver, and

FIGURE 4

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FUNCTIONAL CLASSIFICATION OF PRINCIPAL STREETS AND HIGHWAYS 1964

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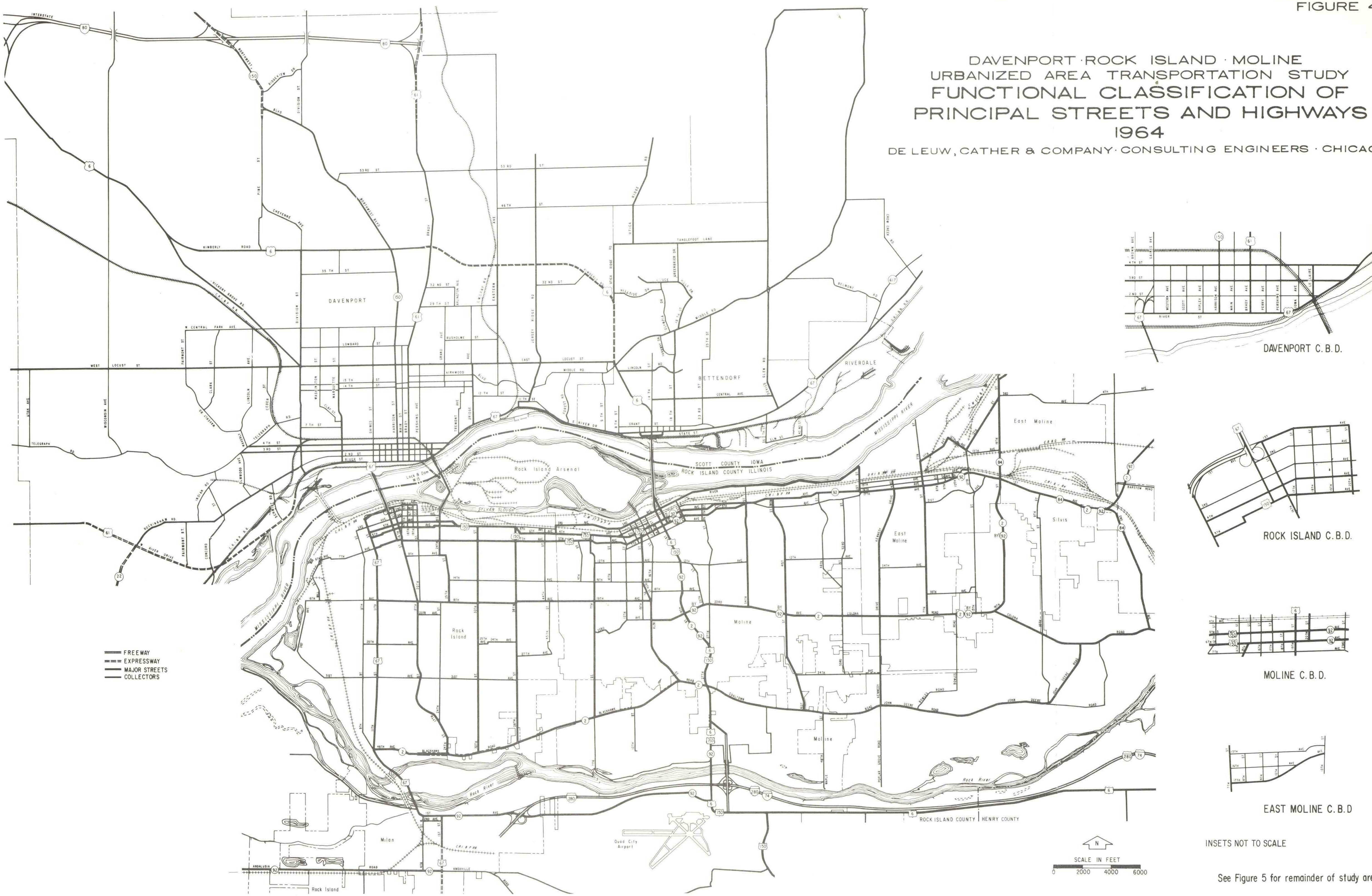
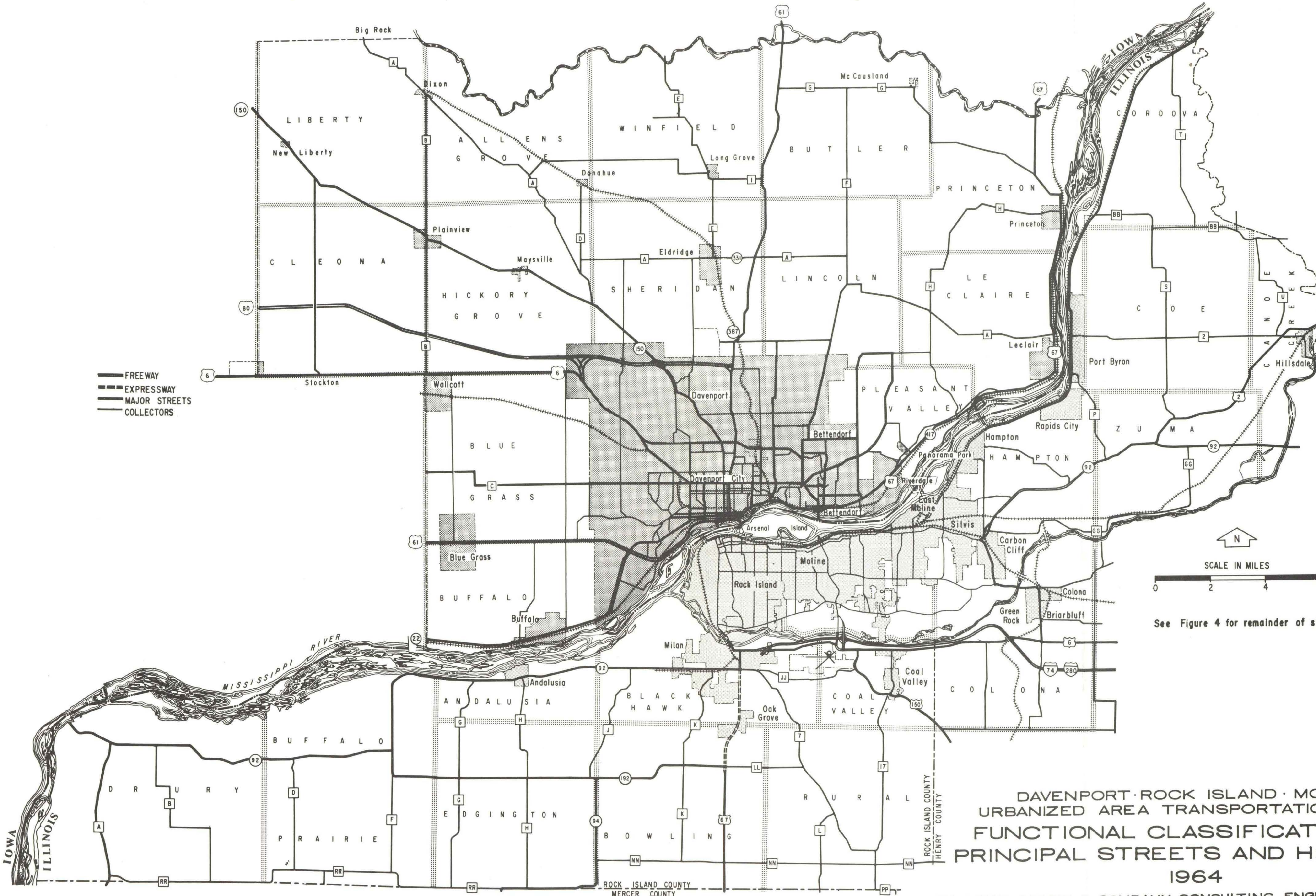


See Figure 5 for remainder of study area.



See Figure 4 for remainder of study area.

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FUNCTIONAL CLASSIFICATION OF PRINCIPAL STREETS AND HIGHWAYS

1964

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Table 1

PRINCIPAL STREET AND HIGHWAY SYSTEM MILEAGE--1964

Jurisdiction	Length in Miles						
	Freeways	Expressways	Major Streets	Collector Streets	Major Highways	Collector Highways	Total
Davenport	5.97	12.32	55.37	63.44	-	-	137.10
Bettendorf	-	0.17	17.59	7.99	-	-	25.75
Remainder of Scott County	11.53	0.39	-	-	85.98	141.02	238.92
Sub-Total--Iowa	17.50	12.88	72.96	71.43	85.98	141.02	401.77
Rock Island	0.66	-	24.91	21.81	-	-	47.38
Moline	-	-	28.37	21.97	-	-	50.34
East Moline	-	-	11.26	10.97	-	-	22.23
Remainder of Rock Island County	7.61	3.87	27.43	7.56	90.99	168.67	306.13
Colona Township - Henry County	6.47	-	1.66	-	10.40	16.78	35.31
Sub-Total--Illinois	14.74	3.87	93.63	62.31	101.39	185.45	461.39
Grand Total--Study Area	32.24	16.75	166.59	133.74	187.37	326.47	863.16

Note: Excludes local streets and highways.

Table 2

MILEAGE OF PRINCIPAL STREETS AND HIGHWAYS BY PAVEMENT WIDTH--1964

	Functional Classification	Length in Miles by Surface Width Class: Less than 20 Feet	21-26 Feet	27-32 Feet	33-38 Feet	39-44 Feet	45-50 Feet	51-56 Feet	57-62 Feet	Over 62 Feet	Total
Iowa	Freeway	-	-	-	-	-	17.50	-	-	-	17.50
	Expressway	-	-	-	0.06	0.11	12.71	-	-	-	12.88
	Major Street	9.10	16.83	14.63	7.66	6.41	10.26	8.07	-	-	72.96
	Collector Street	7.24	22.33	21.05	8.99	8.84	0.51	2.47	-	-	71.43
	Major Highway	30.75	52.89	-	0.34	-	2.00	-	-	-	85.98
	Collector Highway	5.24	135.78	-	-	-	-	-	-	-	141.02
	Sub-Total--Iowa	52.33	227.83	35.68	17.05	15.36	42.98	10.54	-	-	401.77
Illinois	Freeway	-	-	-	-	-	14.41	-	0.20	0.13	14.74
	Expressway	-	-	-	-	3.86	0.01	-	-	-	3.87
	Major Street	20.85	10.78	3.56	15.68	18.97	14.58	5.44	2.63	1.14	93.63
	Collector Street	7.25	18.49	12.02	7.25	11.31	2.49	2.42	1.01	0.07	62.31
	Major Highway	91.18	6.61	0.27	0.28	1.32	1.72	0.01	-	-	101.39
	Collector Highway	122.22	61.12	0.41	1.59	-	0.08	-	-	0.03	185.45
	Sub-Total--Illinois	241.50	97.00	16.26	24.80	35.46	33.29	7.87	3.84	1.37	461.39
	Grand Total--Study Area	293.83	324.83	51.94	41.85	50.82	76.27	18.41	3.84	1.37	863.16

Note: Excludes local streets and highways.

Table 3

MILEAGE OF PRINCIPAL STREETS AND HIGHWAYS BY RIGHT OF WAY WIDTH--1964

	Functional Classification	Length in Miles by Right of Way Width Class									
		Less than 31 Feet	31-41 Feet	42-52 Feet	53-63 Feet	64-74 Feet	75-85 Feet	86-96 Feet	97-107 Feet	Over 107 Feet	Total
Iowa	Freeway	-	-	-	-	-	-	-	-	17.50	17.50
Iowa	Expressway	-	-	-	-	-	-	-	0.43	12.45	12.88
Iowa	Major Street	-	-	1.85	23.38	9.93	9.71	5.76	9.28	13.05	72.96
Iowa	Collector Street	-	1.57	8.22	32.37	15.54	10.42	2.25	1.06	-	71.43
Iowa	Major Highway	-	0.99	0.17	13.96	14.21	4.76	15.66	2.06	33.63	85.98
Iowa	Collector Highway	-	-	-	1.68	39.31	3.40	37.69	55.35	3.59	141.02
	Sub-Total-- Iowa	-	2.56	10.24	71.39	78.99	28.29	61.36	68.72	80.22	401.77
Illinois	Freeway	-	-	-	-	-	-	-	-	14.74	14.74
Illinois	Expressway	-	-	-	-	-	-	-	-	3.87	3.87
Illinois	Major Street	-	-	0.92	23.67	13.38	28.21	1.31	7.29	18.85	93.63
Illinois	Collector Street	1.21	2.75	4.84	14.07	5.79	28.77	1.11	2.86	0.91	62.31
Illinois	Major Highway	0.03	-	-	1.99	21.21	58.77	0.07	2.50	16.82	101.39
Illinois	Collector Highway	-	6.14	8.75	9.09	33.03	119.65	5.83	2.50	0.46	185.45
	Sub-Total-- Illinois	1.24	8.89	14.51	48.82	73.41	235.40	8.32	15.15	55.65	461.39
	Grand Total-- Study Area	1.24	11.45	24.75	120.21	152.40	263.69	69.68	83.87	135.87	863.16

Note: Excludes local streets and highways.

traffic interruptions and restrictions. The element common to all of these factors is travel speed. Travel speeds were determined by averaging the weighted speed values obtained using the "average" car method as described by the National Committee on Urban Transportation.(1) One afternoon peak hour run and one off-peak run in each direction was made on representative sections of the principal street and highway system.

Peak and off-peak travel speeds determined by field survey were combined to represent average operating speeds throughout the day. One way of portraying such travel times is through isochronic maps, which are made by connecting points equidistant on the least-time travel path from a chosen location. Figures 6, 7 and 8 show travel time contours from the Davenport, Rock Island and Moline central business districts, respectively. Almost any sector of the study area could be reached in approximately 45 minutes from any one of the business districts.

Traffic Engineering Features

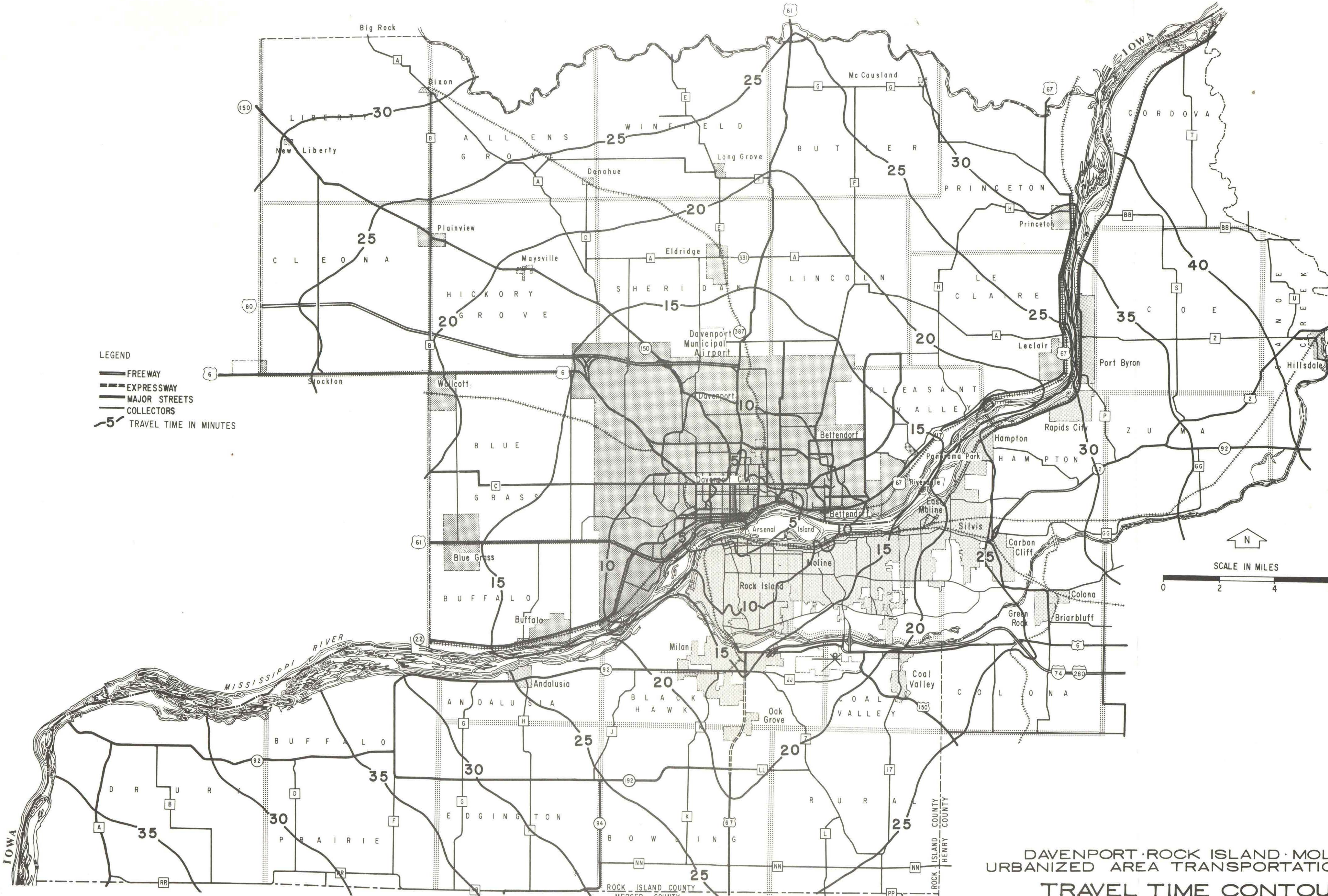
An inventory was made of traffic engineering features such as signals, turn restrictions, and stop and yield signs at all intersections of principal streets and highways in the study area. Parking regulations and posted speed limits were also recorded.

This information, along with capacity analyses and accident data, was used to develop a low-cost, traffic engineering improvement program in the Illinois portion of the study area. It is described in Illinois Interim Report Number 10 entitled "Traffic Engineering Features--Inventory and Improvement Program."

Committed Improvements

In conferences with the Technical Committee, the Iowa Highway Commission and the Illinois Division of Highways, a determination was made of the location and type of new streets and highways already committed for construction. These were added to the

(1)-Procedure Manual 3B--Determining Travel Time, National Committee on Urban Transportation, 1958.



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TRAVEL TIME CONTOURS
DAVENPORT CENTRAL BUSINESS DISTRICT

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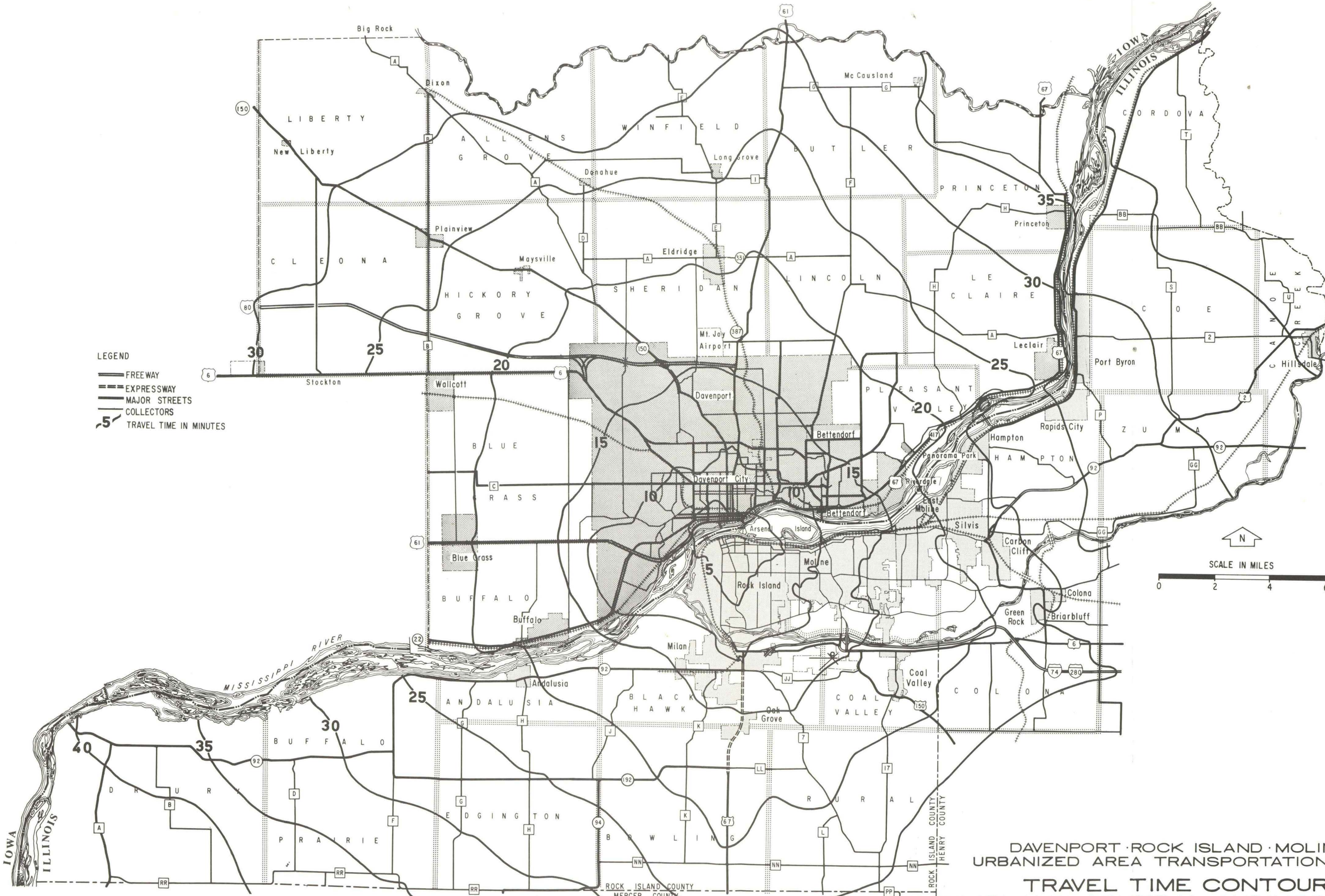
FIGURE 7



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TRAVEL TIME CONTOURS
ROCK ISLAND CENTRAL BUSINESS DISTRICT

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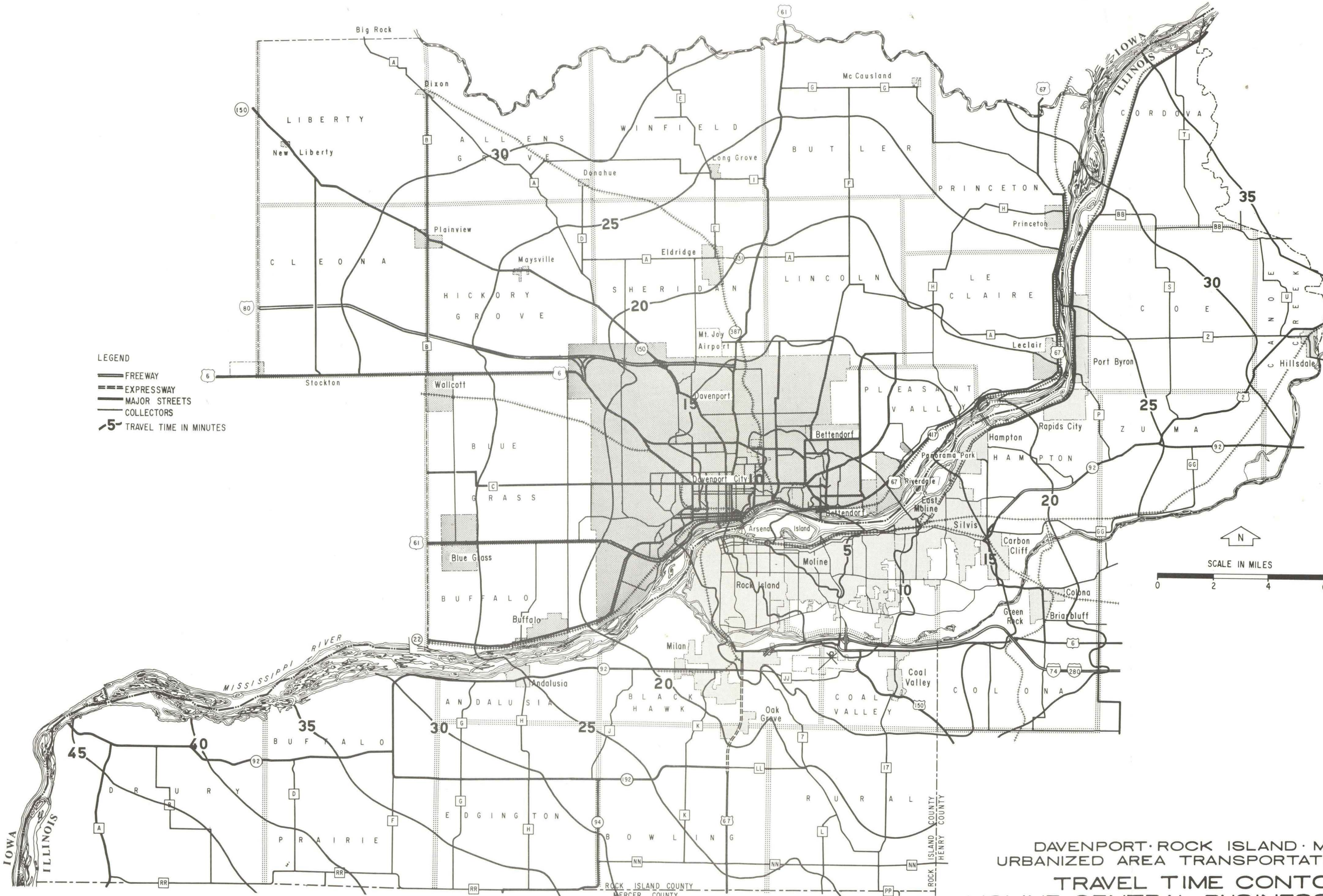

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TRAVEL TIME CONTOURS
MOLINE CENTRAL BUSINESS DISTRICT

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principal street and highway system, described earlier, to arrive at the existing plus committed 1970 thoroughfare plan.(1)

The following major facilities, shown in Figure 9, were considered to be committed improvements:

Iowa

I-74 from Memorial Bridge to I-80.
I-80 from the Mississippi River to U.S. 61.
I-280 from the Mississippi River to I-80.
Marquette Street, Davenport, from Central Park Avenue to 35th Street.
18th Street from Middle Road to Tanglefoot Lane and Spruce Hills Drive from Middle Road to Greenbriar Drive in Bettendorf.

Illinois

I-74 from 46th Avenue, Moline, to Memorial Bridge.
I-280 from Illinois 92 to and including the new Mississippi River Bridge.
I-80 from I-74 and I-280 to and including the new Mississippi River Bridge.
John Deere Expressway (FAS 205) from 7th Street, Moline to Bowles Road and from Colona Road to I-80.
Centennial Expressway from Centennial Bridge to I-280.
Completion of 12th Avenue, Moline, and 30th Avenue, East Moline.

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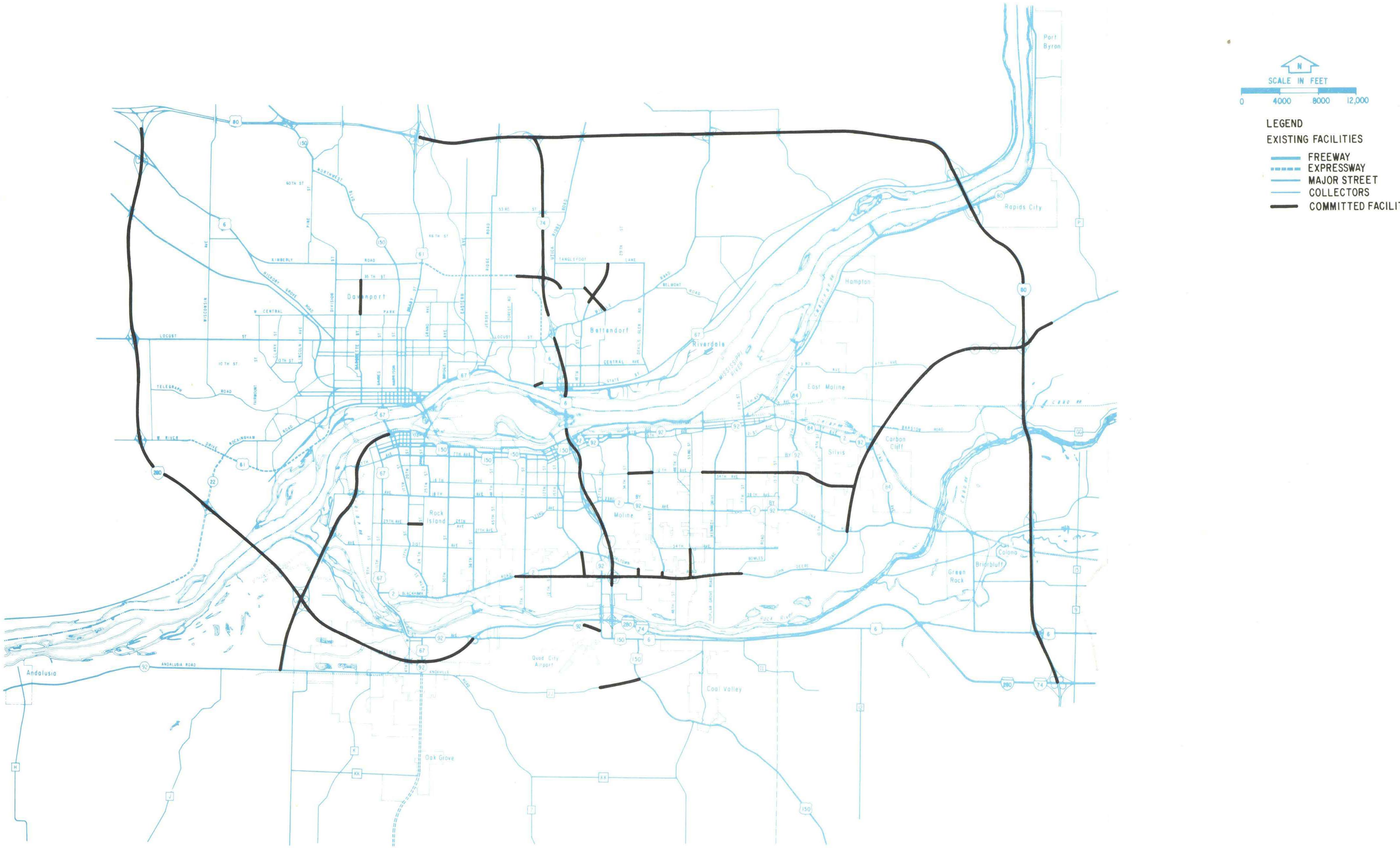
(1)-The term "1970" was added by the Technical Committee to assist some of the agencies in distinguishing between committed and proposed projects. It was recognized that not all of the committed facilities would be completed or in use by 1970.

FIGURE 9



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY
1970 EXISTING AND COMMITTED NETWORK
DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

TERMINAL AND TRANSFER FACILITIES

The efficiency of an urban street and highway system depends in large measure on the adequacy of parking facilities at trip origins and destinations. Inventories of such facilities were made in the central business districts as well as in other areas where terminal or transfer problems existed or might become critical. Locations of parking study areas are shown in Figure 10.

Table 4 summarizes the number of parking spaces, by type, in each business district. Curb spaces preempted for "no parking" or "special use" zones, as well as parking spaces used in alleys, are included. They are not considered, however, in estimates of parking supply. Summaries of parking supply and demand are shown in Table 5. The table indicates that each central business district, as a whole, had a sufficient number of parking spaces. There were many intensely developed subzones, however, where demand could not be satisfied within the subzone. Except in the Davenport CBD, where there are three municipal garages, nearly all parking spaces were in surface lots or at the curb at the time of the surveys.

The inventory did not reveal any serious truck loading and unloading problems in the area's business districts. Complete inventories and analyses of terminal and transfer facilities are covered in Iowa Interim Report Number 2--"Terminal and Transfer Facilities and Public Transportation" and in Illinois Interim Report Number 9 entitled "Terminal and Transfer Facilities."

PUBLIC TRANSPORTATION

Development of a balanced transportation plan requires that consideration be given to public transportation as well as to streets and highways for the use of automobiles and trucks. Current and historical information concerning intra-area transit operation was of great importance, since it related directly to forecasts of person trip movements in the study area. Limited data, as applicable, with regard to airline, railroad, intercity bus, truck, barge and pipeline facilities and traffic were also required to completely define the total transportation system.

FIGURE 10

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

LOCATION OF PARKING STUDY AREAS
1967 IOWA – 1966 ILLINOIS

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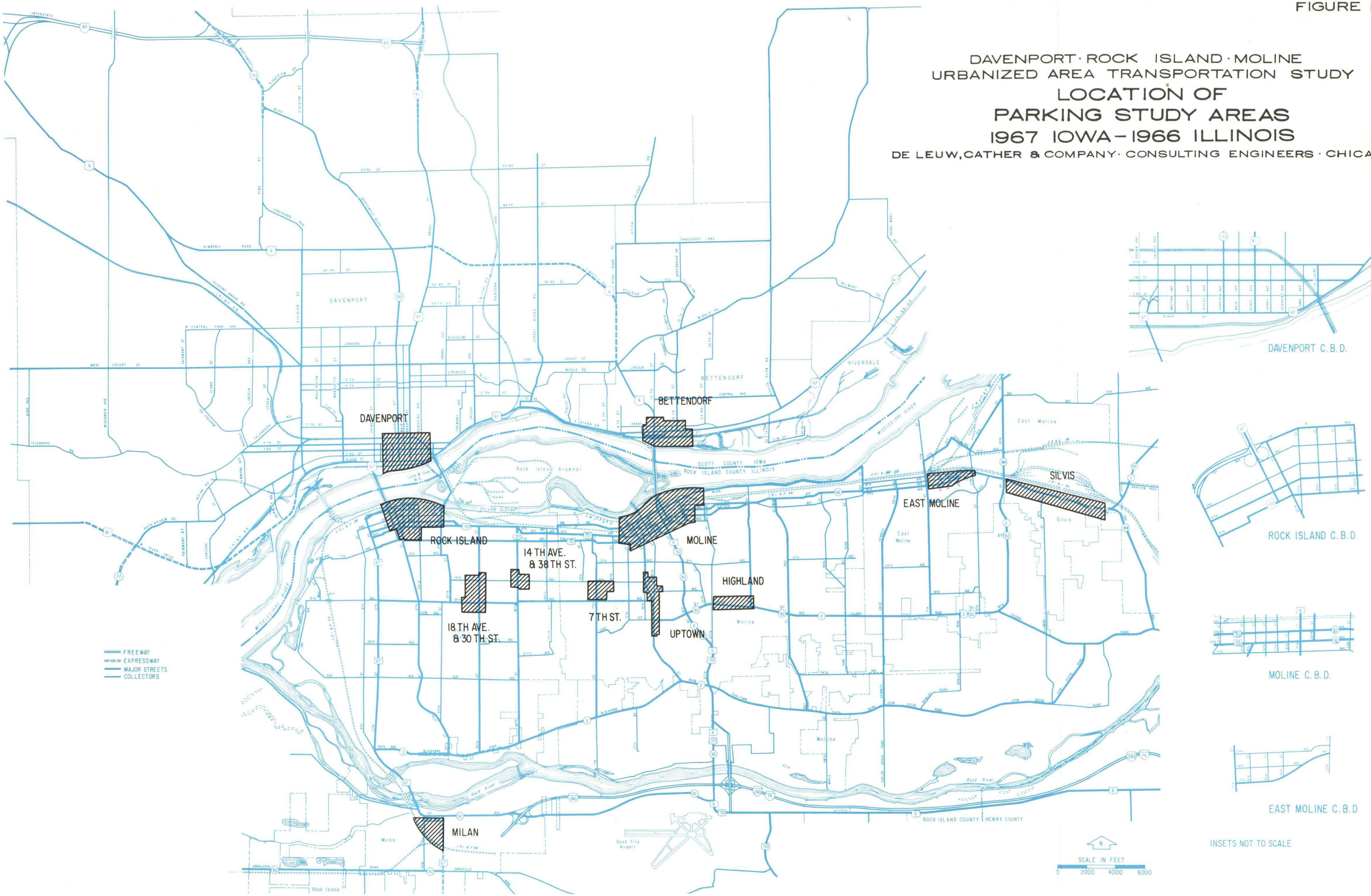

Table 4

INVENTORY OF PARKING SPACES BY BUSINESS DISTRICT
1967 IN IOWA - 1966 IN ILLINOIS

Business District	Curb						Off-Street					
							Lots					
	Metered	Metered with Rush-Hour Restrictions	Unmetered	Special Restriction	No Parking Anytime	Alley	Metered	Unmetered	Attended	Private	Garage	Total
Iowa												
Davenport	999	0	451	293	690	0	1,121	0	424	1,314	1,082	6,374
Bettendorf	11	0	437	0	230	0	0	0	0	1,005	0	1,683
Illinois												
Rock Island	1,034	7	636	214	756	32	203	24	556	1,744	74	5,280
Moline	709	15	1,196	172	1,419	670	663	0	168	3,607	0	8,619
East Moline	234	2	343	9	73	93	88	20	0	516	0	1,378
Silvis	0	0	720	5	252	140	0	13	0	246	0	1,376
Milan	0	0	721	8	120	14	0	62	0	196	0	1,121
18th Avenue and 30th Street	0	0	955	11	140	24	0	0	0	324	0	1,454
14th Avenue and 38th Street	47	0	462	6	90	8	0	0	0	104	0	717

Table 5

COMPARISON OF PARKING SUPPLY AND DEMAND
BY BUSINESS DISTRICT

Central Business District	Practical Space-Hour Capacity(1) 1967 in Iowa - 1966 in Illinois	Total Space-Hour Demand(2) 1961 in Iowa - 1964 in Illinois	Net Deficiency or Surplus	
			Space-Hours Deficiency	Space-Hours Surplus
Davenport	41,960	34,535	12,271	19,696
Bettendorf	9,421	5,540	-	3,881
Rock Island	33,585	25,742	8,594	16,437
Moline	54,999	33,596	5,440	26,843
East Moline	10,480	7,190	652	3,942
Silvis	8,640	5,553	1,383	4,470
Milan	8,682	3,189	-	5,493

(1)-From 6:00 a.m. to 6:00 p.m., taking into account that a reasonable percentage of vacant spaces are required for efficient operation.
(2)-Includes trucks.

Public Transit

Until 1935, streetcars were operated between Davenport and Rock Island by predecessor companies to the Iowa-Illinois Gas and Electric Company. Streetcars were subsequently replaced by buses on the bridge line, however, and essentially all transit service in the study area is now rendered with conventional rubber-tired buses.(1)

Public transit is now provided by the Davenport City Lines, Inc. and Rock Island-Moline City Lines, Inc. The companies operate buses on six routes in Iowa, on four routes wholly within Illinois, and on two others between the Davenport central business district and the downtown areas of Rock Island and Moline, respectively. See Figure 11.

Davenport City Lines buses travel approximately 82,000 miles per month. Rock Island-Moline City Lines buses account for approximately 47,000 bus-miles of travel per month, for a combined total of 129,000 bus-miles per month.

Air Transportation

The Quad City Airport, which serves the Davenport-Rock Island-Moline Metropolitan Area, is located south of Moline near the interchange of Interstate Routes 280 and 74 and is thus easily reached from all parts of the study area. The airport is operated by the Metropolitan Airport Authority.

United Air Lines and Ozark Air Lines provide passenger and freight service between the Quad City Airport and all other major commercial airports in the United States via transfer at Chicago or St. Louis. The airport is also heavily used by private aircraft which, in 1965, accounted for over 80 percent of all takeoffs and landings.

Other airports in the study area are the Davenport Municipal Airport in North Davenport; Woods Airport northeast of Carbon Cliff; and Quad City Seaplane Base on the south bank of the Rock River east of the Interstate 74 bridge.

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(1)-Chicago, Rock Island and Pacific Railroad Company operates one passenger train daily in each direction between Davenport and Silvis.

FIGURE II

DAVENPORT · ROCK ISLAND · MOLINE URBANIZED AREA TRANSPORTATION STUDY

BUS ROUTES – 1966

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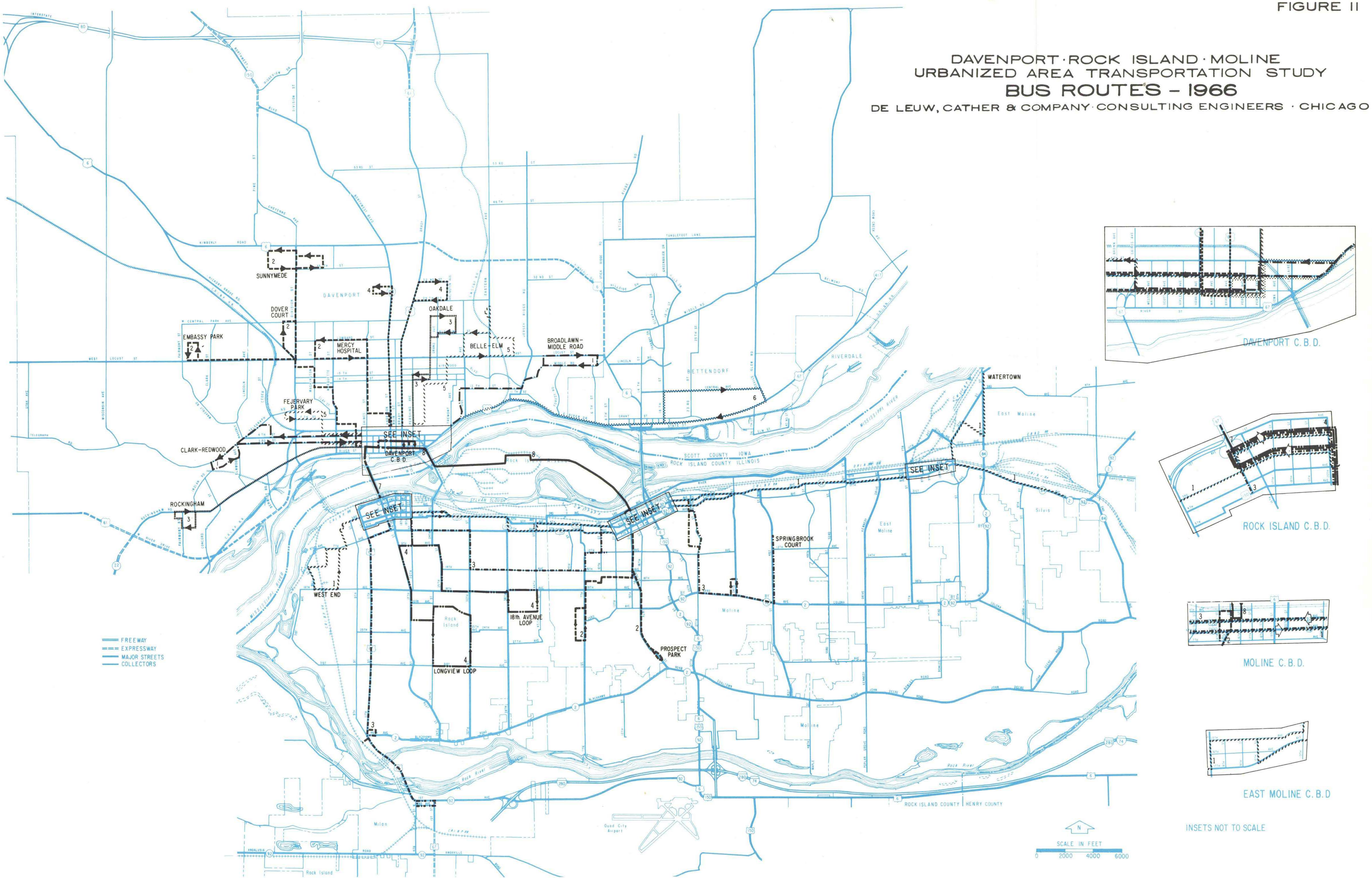

Railroads

The following railroads serve the study area:

1. Chicago, Rock Island and Pacific Railroad with tracks to Muscatine, Iowa City and points west as well as Chicago, Peoria and points east.

2. Chicago, Milwaukee, St. Paul and Pacific Railroad with tracks to Muscatine and points west as well as to Milwaukee and Chicago.

3. Chicago, Burlington & Quincy Railroad connecting the study area with Clinton to the north; Burlington, Galesburg and Peoria to the south; and Chicago to the east.

4. Davenport, Rock Island and North Western Railway, a local switching line, which mainly serves industrial freight traffic in the Quad Cities.

Locations of railroads in the study area are shown in Figures 12 and 13. Each of the railroads operates freight trains. The Chicago Rock Island and Pacific Railroad renders the only direct passenger service to the study area.

Interstate Buses

Interstate bus service is provided by Continental Trailways, Crown Transit Lines, and Central Greyhound Lines. Continental Trailways has a terminal on Harrison Street, while the other two are located on Third Street in downtown Davenport. All carriers have terminals on Third Avenue in downtown Rock Island and Central Greyhound Lines also operates one at 12th Street and 5th Avenue in downtown Moline.

Truck Transportation

In addition to "piggyback" freight service provided by the railroads, motor freight service is afforded by about 35 firms in Scott County and nearly 50 in Rock Island County.

FIGURE 12

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

RAILROADS AND AIRPORTS –1966

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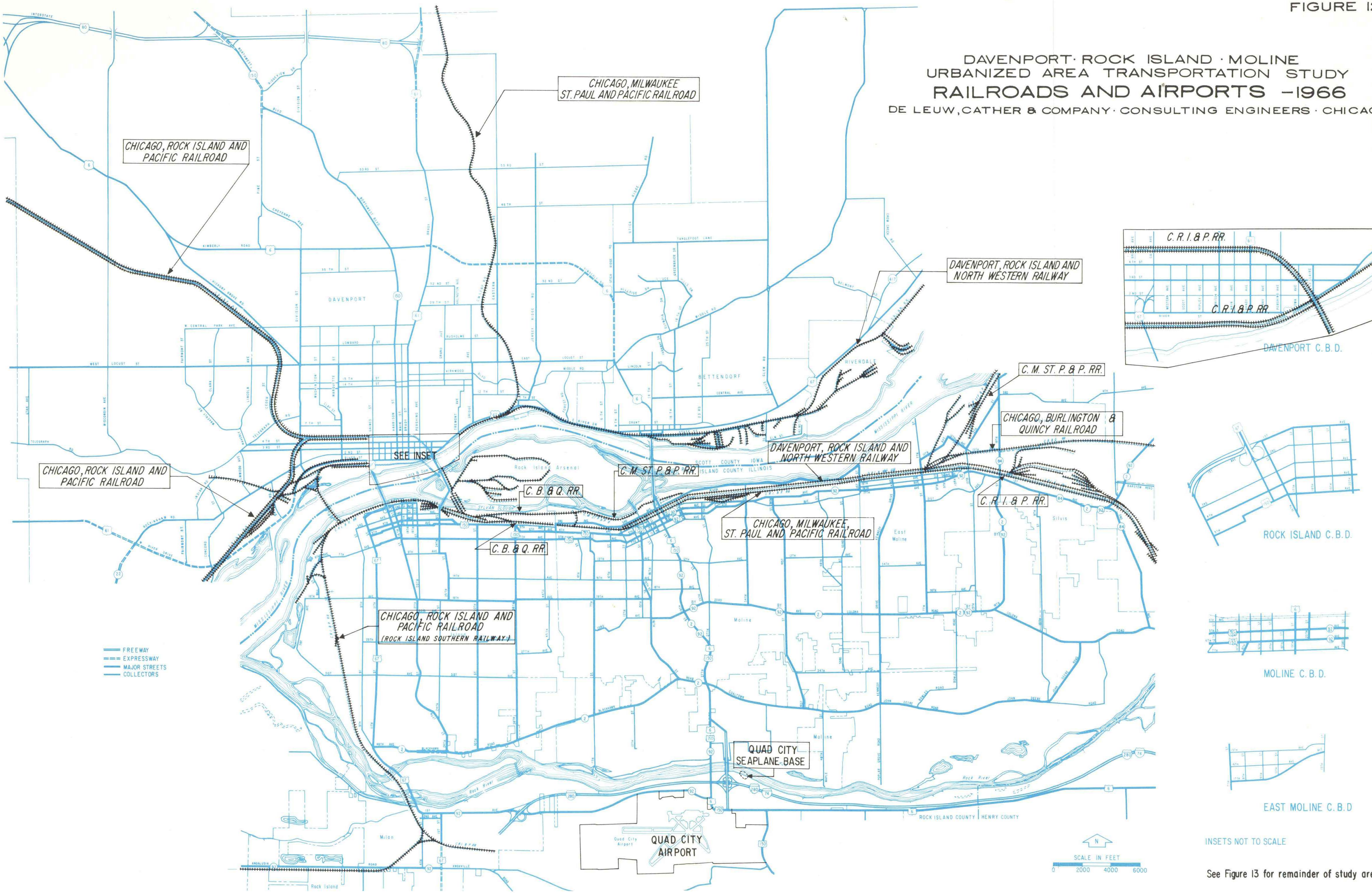
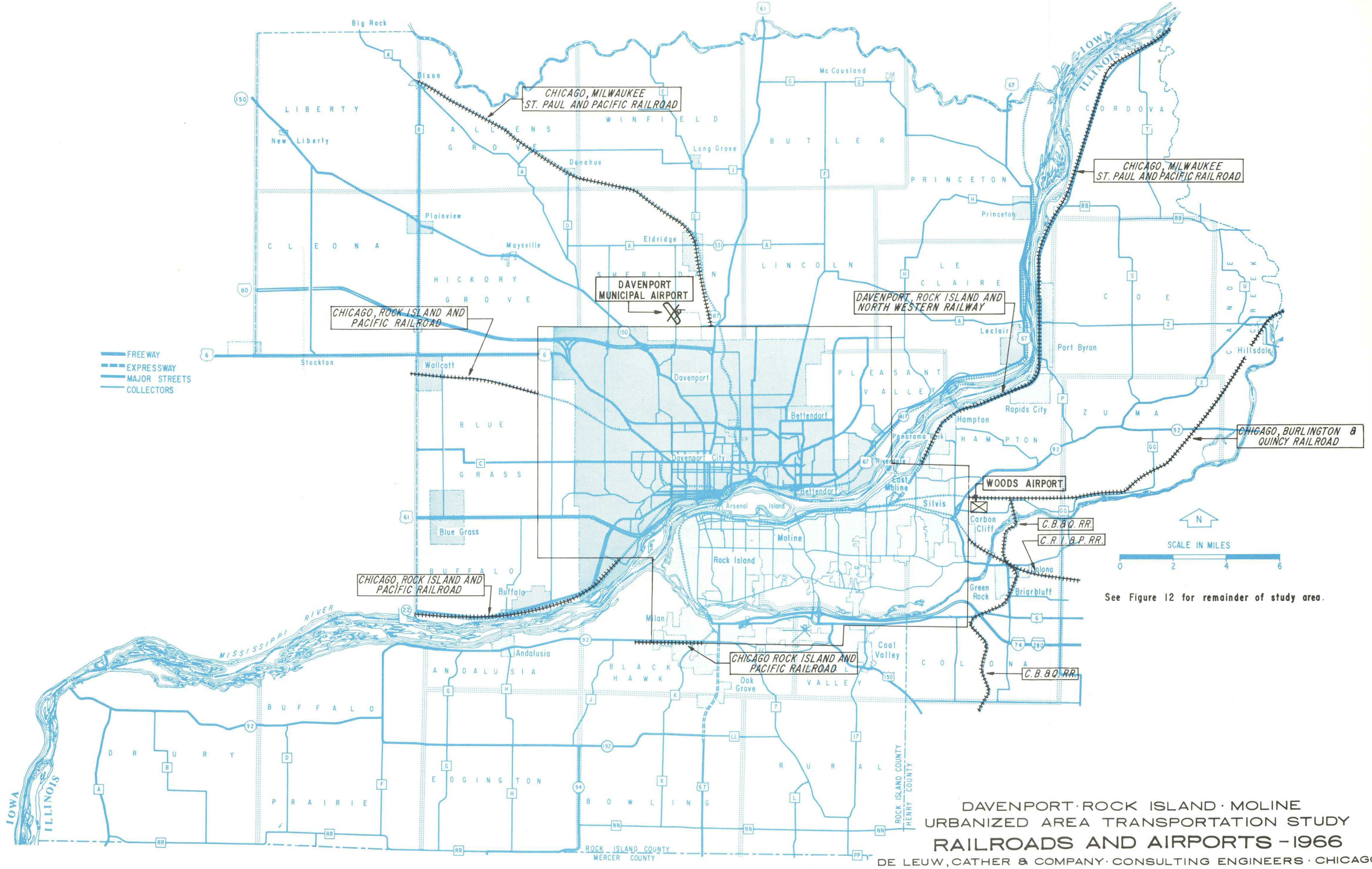


See Figure 13 for remainder of study area.

FIGURE 13



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URBANIZED AREA TRANSPORTATION STUDY
RAILROADS AND AIRPORTS - 1966
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Water Transportation

Extensive barge line operations on the Mississippi River benefit local industry. There are 15 loading and unloading facilities in the metropolitan area. Barge lines operating on the Mississippi River connect with the Illinois River waterway, the Great Lakes and St. Lawrence Seaway, and the Ohio River waterway.

Pipelines

The Natural Gas Pipe Line of America, a major national facility consisting of three parallel pipelines of 20- to 30-inch diameters, crosses the southern part of Rock Island County. There are two other major pipelines in the study area.

Chapter III

BASE YEAR TRAVEL CHARACTERISTICS

Characteristics of travel in the study area were determined through extensive surveys and analyses of data. These included origin-destination studies and traffic counts as well as capacity and accident analyses.

ORIGIN-DESTINATION STUDIES

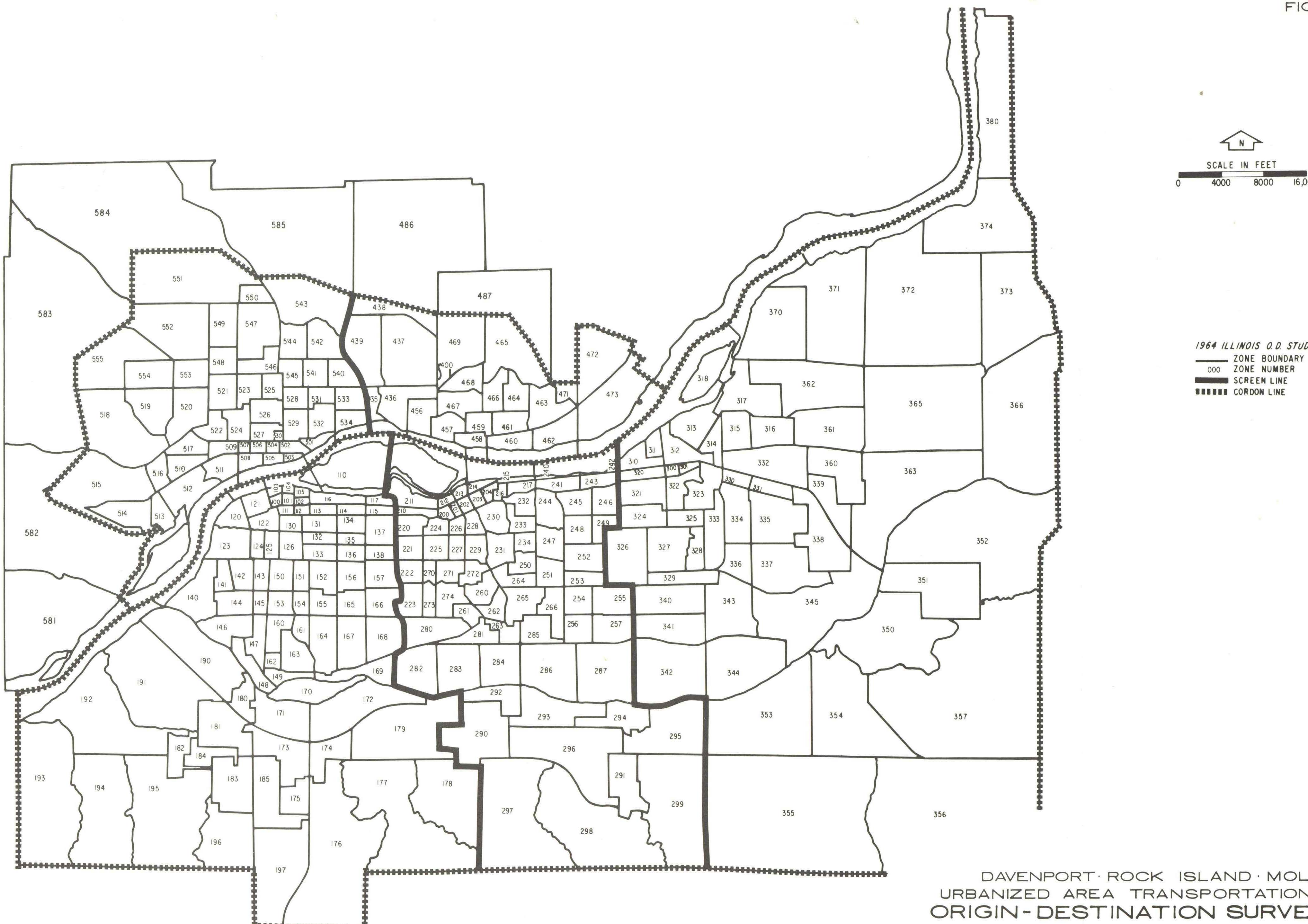
An origin-destination survey gathers basic data on existing travel patterns and characteristics. Origin-destination studies include both internal and external surveys. Internal surveys, which are concerned primarily with travel within a study area, include interviews with residents at selected dwelling units as well as with operators of trucks and taxis. External surveys consist of roadside interviews with motorists crossing the boundaries of a study area.

An origin-destination survey was made in the Iowa portion of the study area in December 1961. The origin-destination survey in the Illinois portion of the study area was conducted in the summer of 1964. The procedures used by both the Iowa State Highway Commission and the Illinois Division of Highways conformed with those established by the Federal Highway Administration, Bureau of Public Roads for comprehensive transportation surveys. Limits of the Iowa and Illinois origin-destination study areas are shown in Figure 14. For purposes of analysis, the area was divided into traffic zones. Zone boundaries in Iowa were the same in each survey, but those in Illinois differed. The zone boundaries shown in Figure 14 are those used in the 1964 survey made by the Illinois Division of Highways. A station number was also assigned to each point at which a highway crossed the cordon line encompassing the study area.

Home Interview Survey

Travel is an expression of an individual's behavior and, as such, it has the characteristic of being habitual. It tends to be

FIGURE 14



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY
ORIGIN - DESTINATION SURVEY AREA
ZONE MAP
DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

repetitive, and the repetition occurs in a definite pattern. It is not necessary, therefore, to obtain travel information from all residents of a metropolitan area in order to measure travel patterns and characteristics. Rather, it has been shown that data obtained from a representative sample of the residents can be expanded with confidence to indicate the whole.

Home interviews in the Iowa portion of the study area included one of every seven dwelling units. One of every ten dwelling units was selected to be included in the sample in the Illinois portion of the study area. Both dwelling unit surveys were carefully planned and conducted to insure uniform geographical distribution of sample dwelling units throughout the study area. Trip data regarding the preceding day's travel for each person five years of age or older in the dwelling units selected for study were gathered by trained interviewers. Travel information obtained dealt with the origin, destination and purpose of each trip made. In addition, data pertaining to the type of dwelling unit, number of cars owned, and occupation and industry of the residents were obtained. Interviews pertained to weekday travel only; hence they were made from Tuesday through Saturday to obtain travel data for the previous day.

Truck and Taxi Surveys

Weekday travel of trucks in both study areas was surveyed by interviewing the owners or operators of 25 percent of all trucks registered in the Iowa portion of the area and 20 percent of those registered in the Illinois portion of the area. The owners or operators of all taxis in the Iowa portion of the area and one-half of those in the Illinois study area were interviewed to obtain data on weekday travel.

External Survey

Data obtained in the home interview and in the truck and taxi studies were supplemented by external roadside surveys at each crossing of the cordon line. Motorists entering and leaving the study area were stopped and interviewed on one weekday to determine travel patterns and characteristics of non-residents' travel. Adjustments were made for trips identified in both internal and external surveys to eliminate duplications, giving preference to data from the external survey because of the relatively larger sample obtained. Roadside interviews were made for 16-hour periods at 22 interview stations on the periphery of the Iowa study area. Similar interviews were made for either 16- or 24-hour periods at 21 external stations in the Illinois study. Survey data were expanded to average daily travel on the basis of concurrent manual classification counts together with automatic traffic recording counts made at each location.

Three roadside interview stations were common to both of the origin-destination surveys--the Centennial, Memorial and Government Bridges crossing the Mississippi River.

Survey Data Comparisons

Numerous comparisons can be made between expanded survey data and comparable values either as measured in the field or as estimated by others. A screen line check compares expanded trip volumes with ground counts. A screen line is an imaginary line (often coinciding with a geographical feature) which divides a study area into two distinct parts. Expanded trip data from home interview, truck, taxi and external surveys are compared with ground counts made during the study at a screen line to evaluate the accuracy of the survey.

Three screen lines--one in Iowa and two in Illinois--were established in connection with the origin-destination surveys. Traffic counts were made at every crossing of each screen line to determine average daily traffic by hour and by vehicle type. The data were then compared with data from the origin-destination surveys. Trip reports from home interview surveys in both study areas were adjusted as deemed warranted to improve the accuracy of the data.

FINDINGS OF THE ORIGIN-DESTINATION STUDIES

The origin-destination surveys gathered important data regarding present characteristics and patterns of travel in the study area. The following discussion summarizes pertinent statistics regarding dwelling units, purpose of trip, mode of travel, and pattern of travel from zone-to-zone.

Trip Generation

Basic data on vehicle ownership and trip generation in both the Iowa and Illinois study areas as well as in the two areas combined are presented in Table 6. For comparative purposes, similar data obtained in other studies in Massachusetts, Illinois and Virginia are also shown.

Purpose of Trip

Trip purposes are important findings of a transportation study since they are basic to the geographical distribution of trips as well as in traffic patterns.

Ten trip purpose categories were recorded in both the Iowa and Illinois dwelling unit surveys. The purposes were identical with one exception--the purpose category "change travel mode" was used in the Illinois survey in lieu of one designated "during work" used in the Iowa survey.

Purpose of trip was recorded at both origin and destination in the home interview survey. Table 7 shows the expanded number and percentage of trips by purpose at the destination. In practice, however, "home" does not represent a genuine trip purpose. It may be considered, instead, as return travel from the purpose which motivated the trip. ("Home" purpose represents less than half of all trips due to the large number of trips with two or more stops before the circuit is completed.) An additional column is shown in Table 7, therefore, in which trips to "home" have been redistributed by purpose at origin, revealing a more nearly representative indication of actual trip motivation.

Mode of Travel

Travel mode is another significant characteristic obtained from data acquired in the transportation study. It is especially important in analyzing factors which influence choice between private automobile and bus for a particular trip. This choice--referred to as modal split--is discussed in detail in Chapter V. Figure 15 shows graphically the number and percentage of internal trips, exclusive of trips made in trucks and taxis, by mode. The chart also shows the number and percentage of trips in each mode category obtained in the Iowa survey and

Table 6

COMPARISON OF TRIP GENERATION CHARACTERISTICS
AS RELATED TO DWELLING UNITS, POPULATION, AND VEHICLE OWNERSHIP

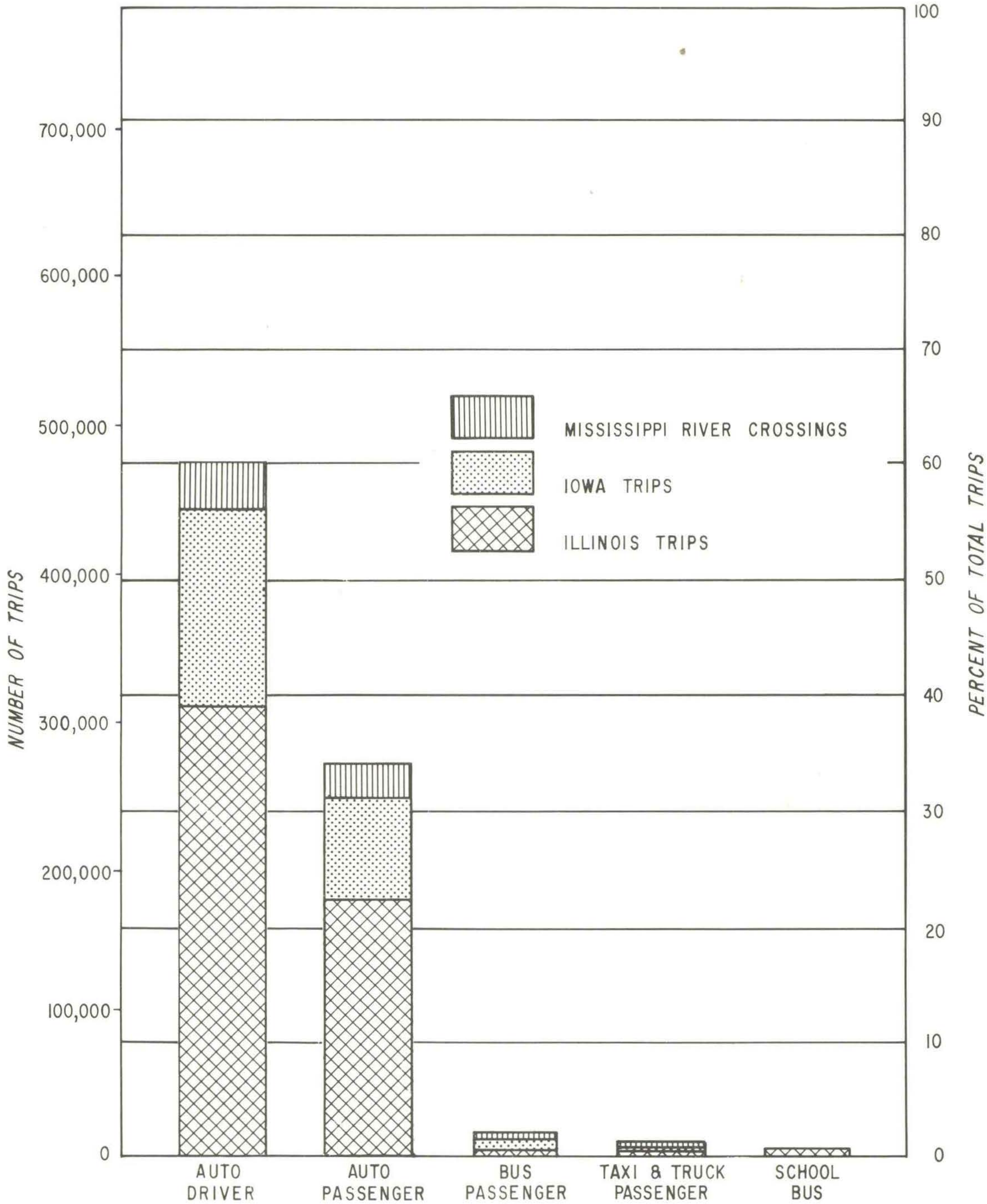
	Peninsula Study (Virginia) 1964	Richmond Area Study (Virginia) 1964	Lynchburg Area Study (Virginia) 1965	Worcester Area Study (Mass.) 1965	Rockford Area Study (Illinois) 1964	Davenport-Bettendorf Study 1961	Rock Island-Moline Study 1964	Quad City Area Combined
Persons	277,156	417,630	86,804	281,587	232,000	97,619	153,132	250,751
Dwelling Units	84,462	128,686	25,544	86,587	67,888	30,836	47,181	78,017
Cars Owned	88,276	137,359	25,439	84,604	93,621	33,389	56,782	90,171
Persons per Dwelling Unit	3.28	3.25	3.40	3.25	3.42	3.16	3.25	3.21
Persons per Car Owned	3.14	3.04	3.41	3.32	2.48	2.93	2.70	2.78
Cars Owned per Dwelling Unit	1.04	1.07	0.92	0.98	1.38	1.08	1.20	1.16
Person Trips	596,005	972,958	201,876	848,000	652,974	213,060	502,010	772,208*
Auto Driver Trips	347,124	570,007	118,800	497,900	413,430	131,651	310,999	476,141**
Person Trips per Person	2.15	2.33	2.54	3.02	2.81	2.18	3.28	3.08
Person Trips per Dwelling Unit	7.06	7.56	7.90	9.80	9.62	6.91	10.64	9.90
Auto Driver Trips per Car	3.93	4.15	4.66	5.88	4.42	3.94	5.48	5.28
Auto Driver Trips per Dwelling Unit	4.11	4.43	4.65	5.75	6.09	4.26	6.59	6.10

*-Includes 57,138 trips crossing Mississippi River.
**-Includes [illegible] auto driver trips crossing Mississippi River.

Table 7

PERSON TRIPS BY PURPOSE
WITHIN EACH INTERNAL STUDY AREA
1961 IN IOWA - 1964 IN ILLINOIS

Trip Purpose	Number of Trips	Percent of Total	Percent Excluding "Home"
	Iowa Internal Study Area		
Home	86,207	40.5	-
Work	25,877	12.1	20.4
Transact Business During Work	20,271	9.5	16.0
Medical-Dental	2,040	1.0	1.6
School	1,736	0.8	1.4
Social-Recreation	31,594	14.8	24.9
Change Travel Mode	-	-	-
Eat Meal	4,126	1.9	3.3
Shopping	23,400	11.0	18.4
Serve Passengers	17,809	8.4	14.0
Total	213,060	100.0	100.0
	Illinois Internal Study Area		
Home	202,633	40.4	-
Work	46,371	9.2	15.5
Personal Business	73,672	14.6	24.6
Medical-Dental	3,077	0.6	1.0
School	29,082	5.8	9.7
Social-Recreation	48,087	9.6	16.1
Change Travel Mode	314	0.1	0.1
Eat Meal	20,552	4.1	6.9
Shopping	57,733	11.5	19.3
Serve Passengers	20,489	4.1	6.8
Total	502,010	100.0	100.0



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

INTERNAL TRAVEL BY MODE

1961 IOWA – 1964 ILLINOIS

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

the Illinois survey as well as trips between the two study areas. These same data are summarized in Table 8. Auto drivers accounted for 62.5 percent of all internal person trips.

Travel Desires

Travel desires are an important consideration in estimating the future need for streets and highways. Figure 16 portrays trip desires on paths which connect the centroids of traffic districts.(1) The desire line or "spider web" network is useful in delineating travel desire corridors closely approximating those shown by conventional desire line charts. The spider web network is widely used in data analysis because it is easier to interpret than a desire line chart. The band between two traffic districts does not necessarily indicate travel with origin and destinations in those areas alone, but trips which would logically flow through one or both districts as well as between them. This technique permits showing all trips on the desire line network with minimum confusion.

Detailed information concerning the origin-destination surveys may be obtained from Origin and Destination Traffic Report, Davenport, Iowa, prepared by the Iowa State Highway Commission, and from Illinois Interim Report Number 11.

TRAVEL VOLUME STUDIES

Counts of the number and type of vehicles using segments of the principal street and highway system were made by the Iowa State Highway Commission and the Illinois Division of Highways. De Leuw, Cather & Company also made peak hour counts of vehicles by type and direction of travel at critical intersections. The counts were used in estimating sufficiency of the street and highway system and in calibrating the computer traffic assignment.

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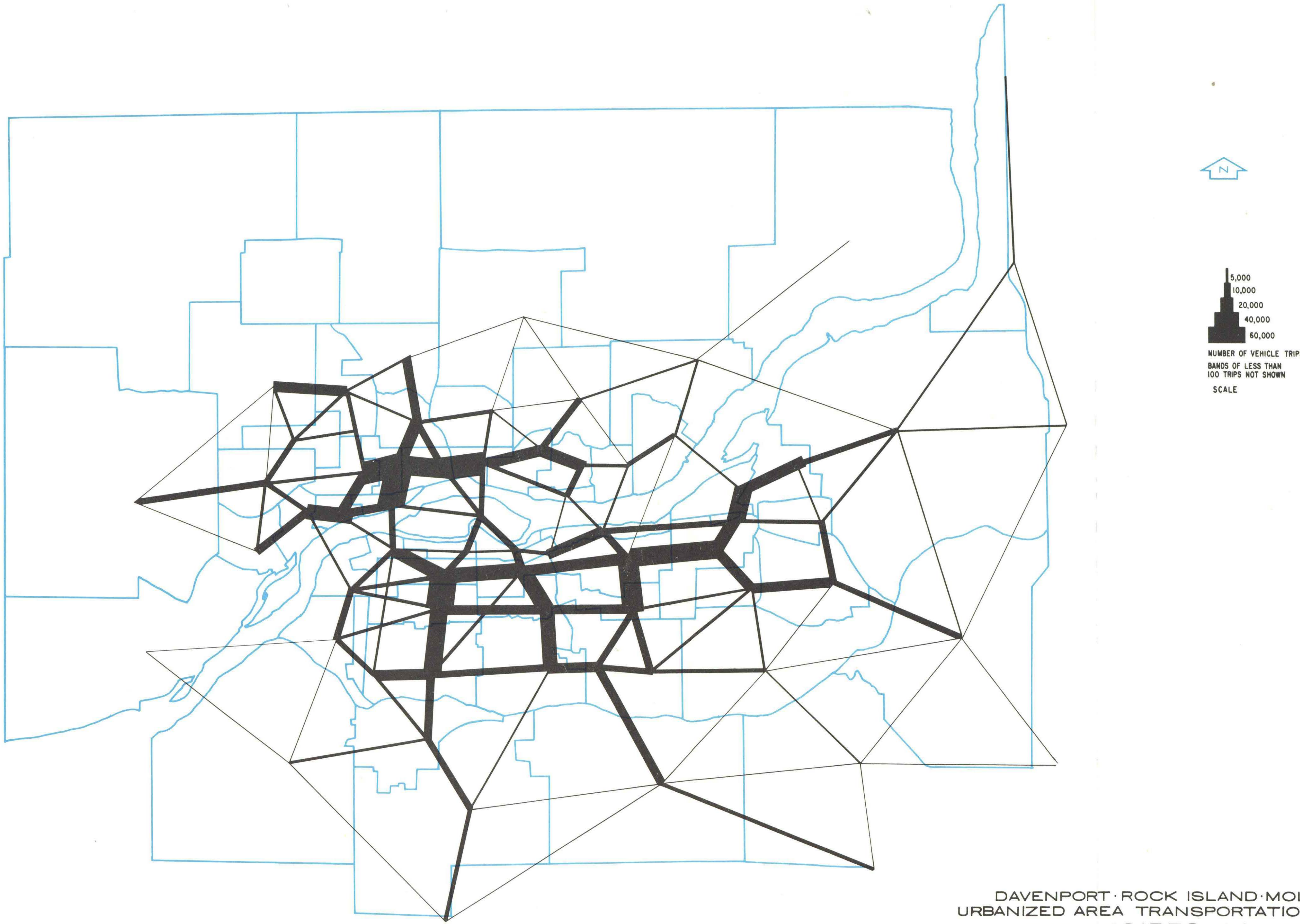
(1)-It would be meaningless to show trip desires from every zone to each of the other 289 internal traffic zones described earlier. The zones were combined, therefore, into 56 districts.

Table 8

PERSON TRIPS BY MODE
WITHIN COMBINED INTERNAL STUDY AREA
1961 IN IOWA - 1964 IN ILLINOIS

Mode	Trips	Percent of Each Group	Percent of Total
	Iowa Internal Study Area		
Auto Driver	131,651	61.8	17.0
Auto Passenger	74,672	35.0	9.7
Bus Passenger	5,982	2.8	0.8
Taxi Passenger	537	0.3	0.1
Truck Passenger	218	0.1	0.0
School Bus	-	-	-
Total	213,060	100.0	27.6
	Illinois Internal Study Area		
Auto Driver	310,999	61.9	40.3
Auto Passenger	179,821	35.8	23.3
Bus Passenger	3,387	0.7	0.4
Taxi Passenger	1,384	0.3	0.2
Truck Passenger	201	0.1	0.0
School Bus	6,218	1.2	0.8
Total	502,010	100.0	65.0
	Mississippi River Crossing		
Auto Driver	33,491	58.6	4.4
Auto Passenger	22,391	39.2	2.9
Bus Passenger	194	0.3	0.0
Taxi Passenger	-	-	-
Truck Passenger	1,062	1.9	0.1
School Bus	-	-	-
Total	57,138	100.0	7.4
Grand Total--Study Area	772,208		100.0

FIGURE 16



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

TRIP DESIRES 1961–1964
DISTRICT SPIDER WEB NETWORK

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Control Counts

Data from continuous counting stations are useful in monitoring traffic volumes and discerning trends. There is only one permanent counting station in the study area--in Davenport on East Locust Street just west of Spring Street. Monthly and daily variations in traffic volume as recorded at this continuous counting station are given in Figures 17 and 18 for the period from 1961 through 1967. Daily variations were relatively small from year-to-year, but the counts showed the effect of construction and traffic detours on Locust Street during the summer months of 1964, 1965 and 1966.

Coverage Counts

Counts were made at numerous points in the Illinois portion of the study area in 1964 and in the Iowa portion in 1965 and 1966 to measure traffic flows on principal streets and highways. Figures 19 and 20 show average annual daily traffic (AADT) throughout the principal street and highway system as well as on other heavily traveled local streets and highways.

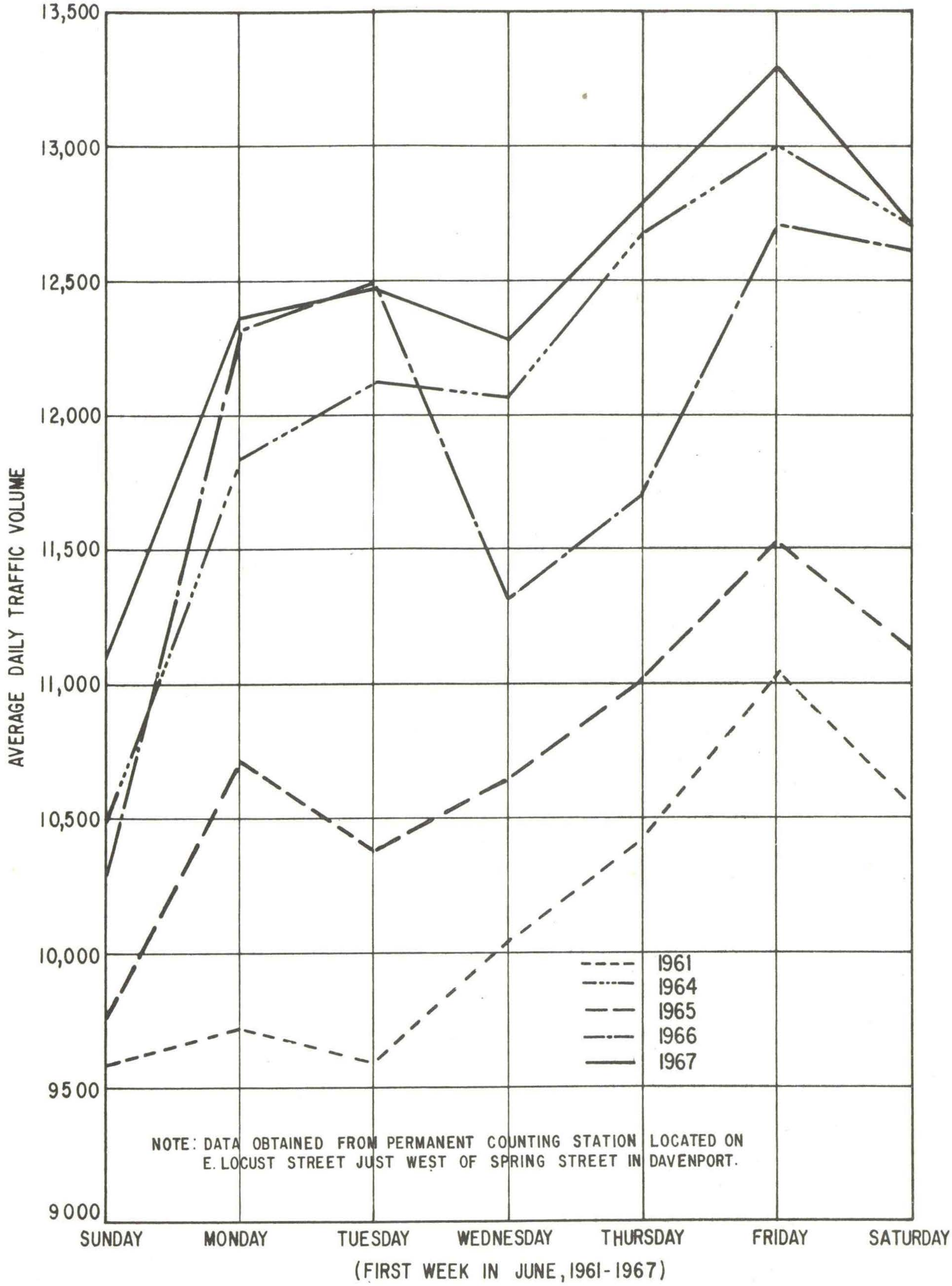
Screen Line Counts

Screen line counts are used extensively in origin-destination studies to compare the expanded number of trips reported in the various interview surveys with actual ground counts. These manual traffic counts are also useful in analyzing daily variations of traffic, directional split, and percentage of 24-hour traffic moving in the peak hour.

One screen line in the Iowa portion of the study area and two in Illinois are depicted in Figure 14. Much of the 1961 screen line data for the Iowa portion of the study area was not available for detailed analysis. Hourly traffic variations at Screen Lines A and B in Illinois are shown in Figure 21.

Intersection Turning Movement Counts

Peak hour turning movement counts at critical intersections are considered in designing traffic improvements. It is important to know the volume and direction of traffic flow at the peak as well as the number and percentage of commercial vehicles making each movement. Such counts were made at 21 intersections in the Iowa



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

DAILY VARIATION IN TRAFFIC VOLUME AT CONTROL STATION

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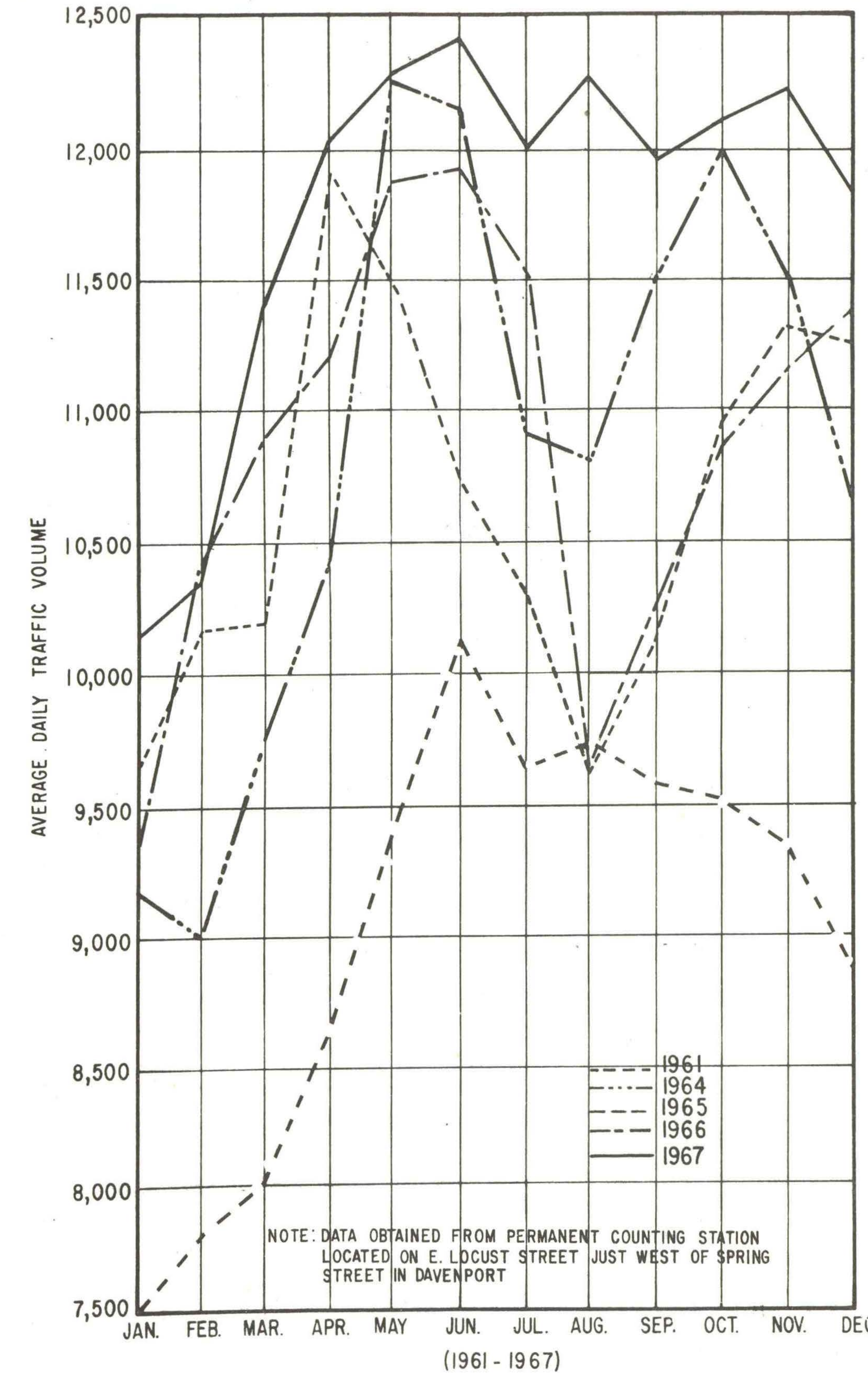
FIGURE 18



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URBANIZED AREA TRANSPORTATION STUDY

MONTHLY VARIATION IN TRAFFIC VOLUME AT CONTROL STATION

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FIGURE 19

DAVENPORT · ROCK ISLAND · MOLINE URBANIZED AREA TRANSPORTATION STUDY

AVERAGE DAILY TRAFFIC 1965 IOWA–1964 ILLINOIS

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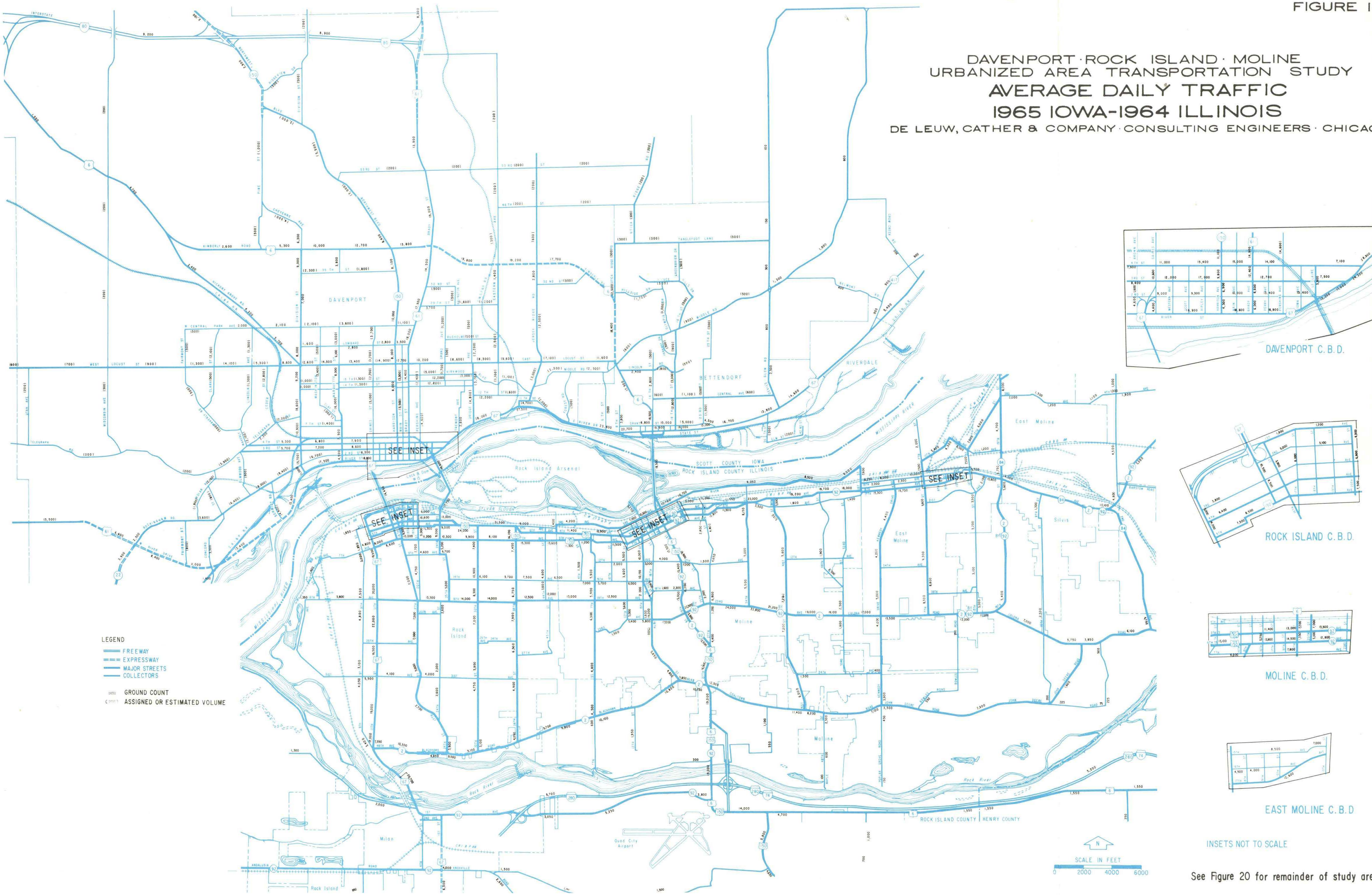
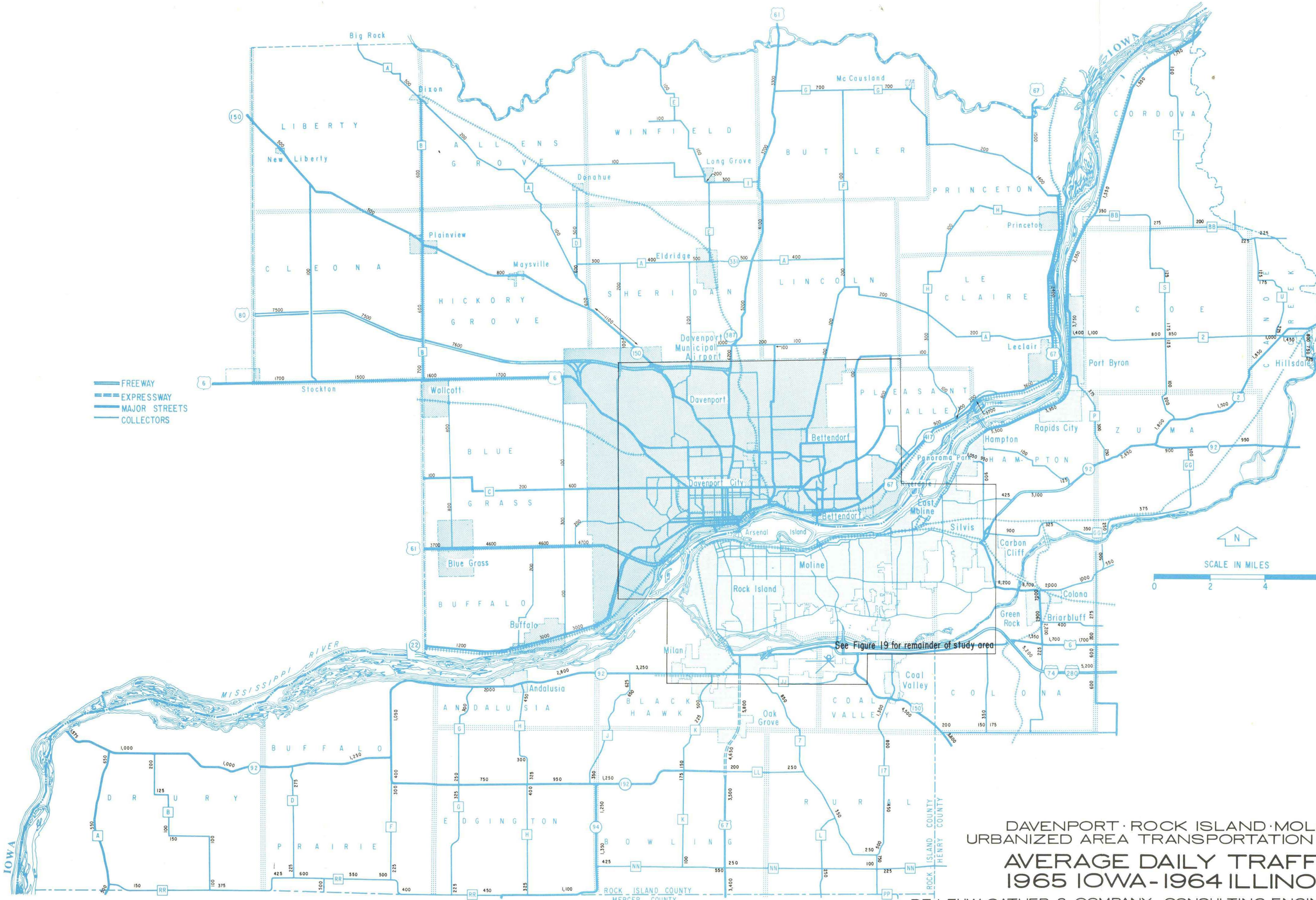


See Figure 20 for remainder of study area.

FIGURE 20



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

AVERAGE DAILY TRAFFIC
1965 IOWA - 1964 ILLINOIS

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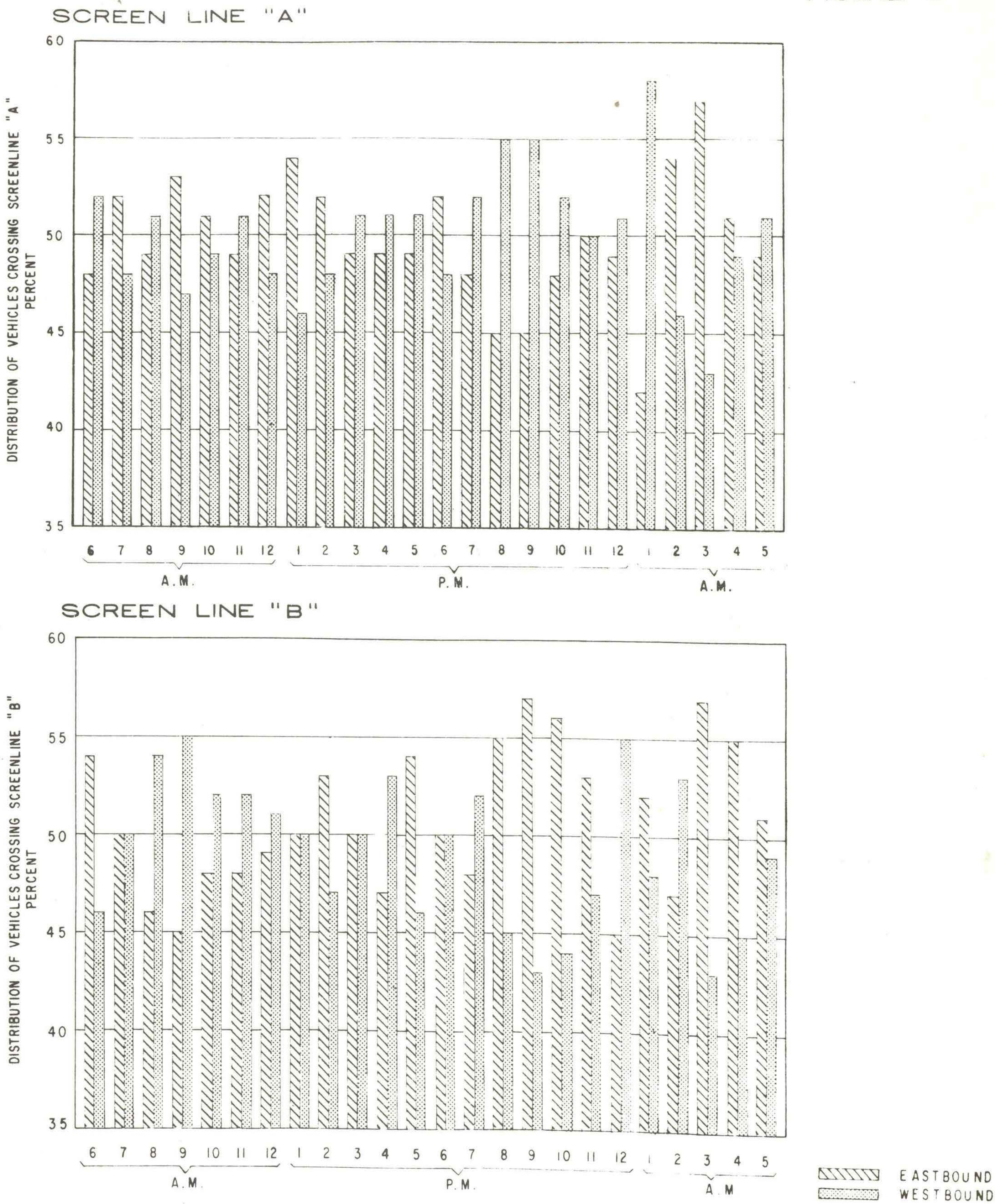
FIGURE 21



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

HOURLY VARIATIONS IN TRAFFIC CROSSING THE SCREEN LINES

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portion of the study area and at 59 intersections in Illinois. These data are summarized in detail in Iowa Interim Report Number 1 and in Illinois Interim Report Number 3.

Cordon Counts

A cordon line is an imaginary line bounding a study area. See Figure 14. Manual and automatic recording counts were made concurrently with the origin-destination studies at locations where streets and highways intersected the internal cordon line. The counts are summarized in the aforementioned interim reports.

Cross-River Traffic

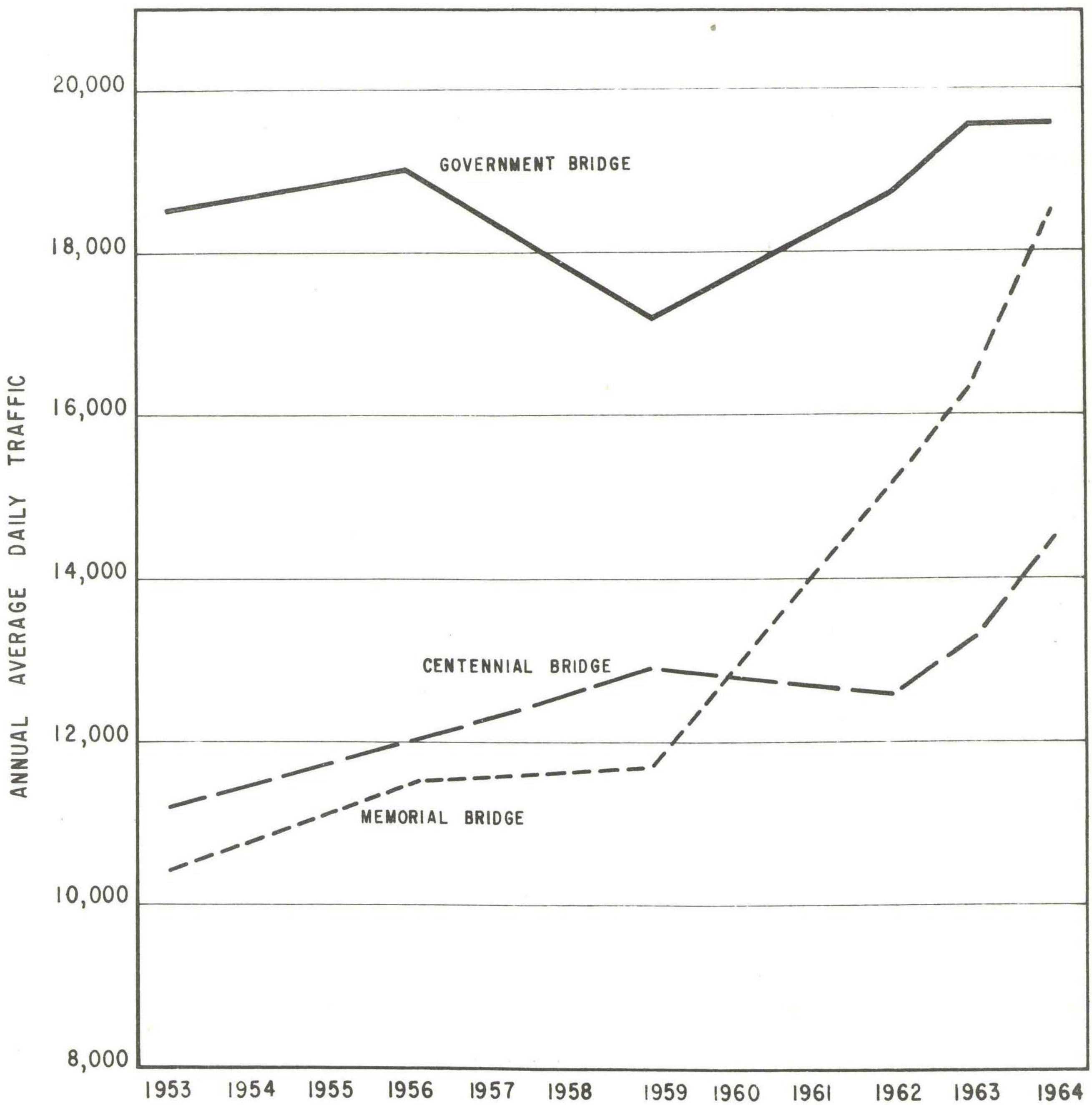
Three bridges across the Mississippi River--Memorial, Centennial and Government--connect the Iowa and Illinois portions of the study area.(1) Figure 22 shows average annual daily traffic using each bridge during calendar years 1956 through 1964. Cross-river traffic in 1964 averaged 52,600 vehicles per day.

ESTIMATION OF CAPACITY

One of the most important phases of the transportation planning process is the development of a standard to measure the ability of a system to accommodate existing as well as future travel demands. The capacity of a street or highway is a measure of its ability to accommodate traffic. Capacity is defined as "the maximum number of vehicles which has a reasonable expectation of passing over a given section of a lane or a roadway in one direction (or in both directions for a two-lane or a three-lane highway) during a given time period under prevailing roadway and traffic conditions."(2) Capacity is also a function of both the physical features of a highway and the operational characteristics of the traffic using that highway. Because of differences in characteristics of traffic in urban and rural areas, the

(1)-The I-80 bridge was constructed after the surveys were made. The Muscatine Bridge connects Muscatine County, Iowa with Rock Island County, Illinois.

(2)-Highway Capacity Manual, Highway Research Board Special Report 87, Washington, D. C. 1965, page 5.



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

TRAFFIC CROSSING THE MISSISSIPPI RIVER

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capacity of highways in each of these areas is calculated in a different manner. The following discussion pertains to major and collector streets with interrupted flow. Freeways and expressways with free flow design characteristics are discussed separately at the end of the section.

Urban Capacities

Generally, the section of roadway which determines capacity is either an intersection or a pavement constriction between intersections. Before capacities could be calculated for the subject study, it was necessary to define certain factors which describe the type of traffic using the present system and levels of service that might be provided in the future.[1] A discussion of these factors follows.

Location. The location of a roadway has a definite effect on its capacity. A distinction was made, therefore, between urban and rural areas. Urban areas were further classified as being parts of a central business district, a fringe area, an outlying business district, or a residential area. See Figures 23 and 24. Criteria used in defining these areas are summarized below.

Central Business District. That portion of an area in which the dominant land use is for intense business activity. A district in this category is characterized by large numbers of pedestrians, commercial vehicle loading, transit bus operation with closely-spaced stops, heavy demand for parking accommodations, and high turnover in use of parking space.

Fringe Area. That portion of a municipality immediately outside the central business district in which there is a wide range in type of business activity, generally including small businesses, light industry, warehousing, automobile service activities, and intermediate strip development as well as some concentrated

(1)-Norman, O.K., Variations in Flow at Intersections as Related to Size of City, Type of Facility and Capacity Utilization, Highway Research Board Bulletin 352, Traffic Characteristics and Intersection Capacity.

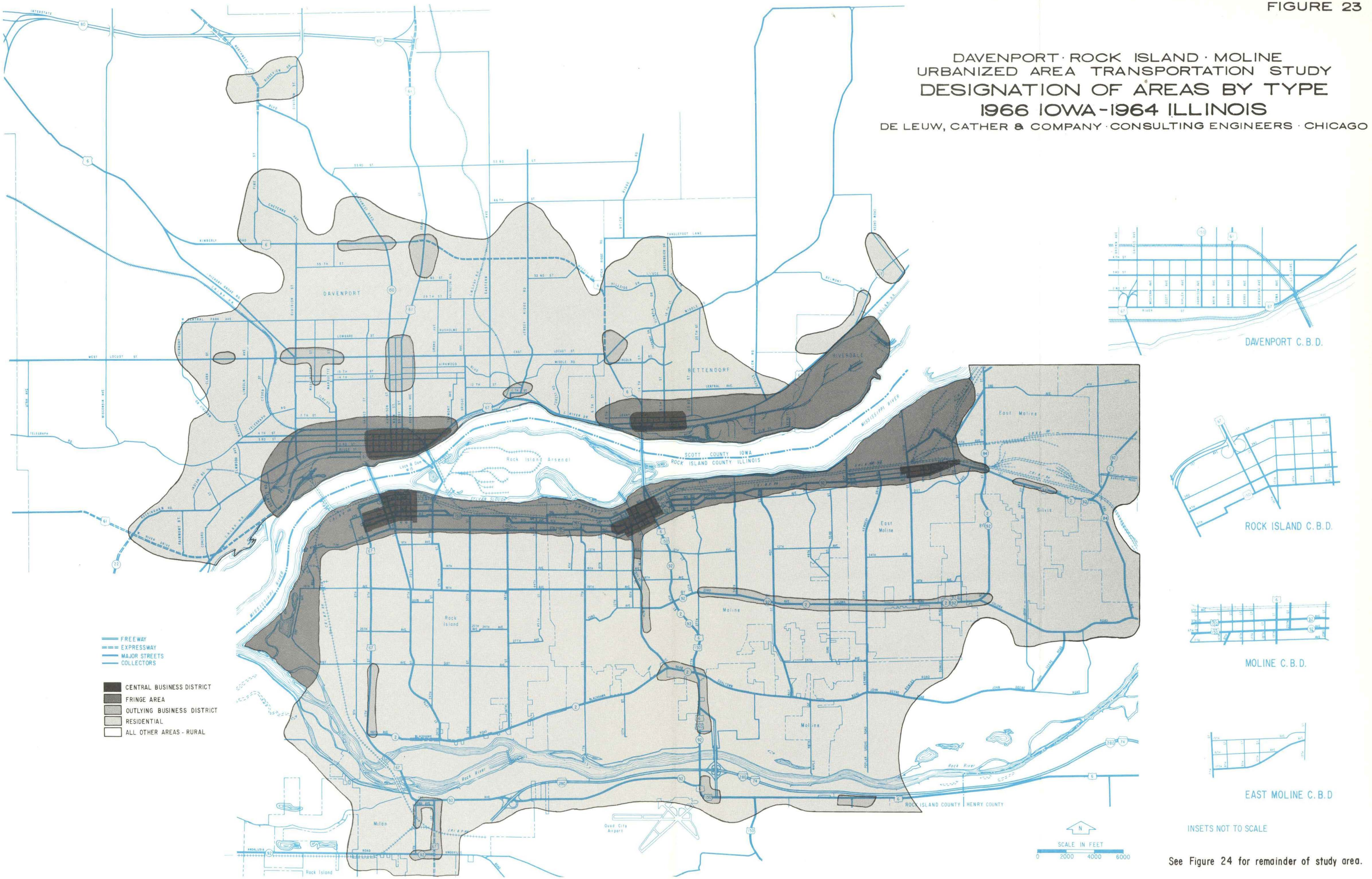

FIGURE 23

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

DESIGNATION OF AREAS BY TYPE
1966 IOWA - 1964 ILLINOIS

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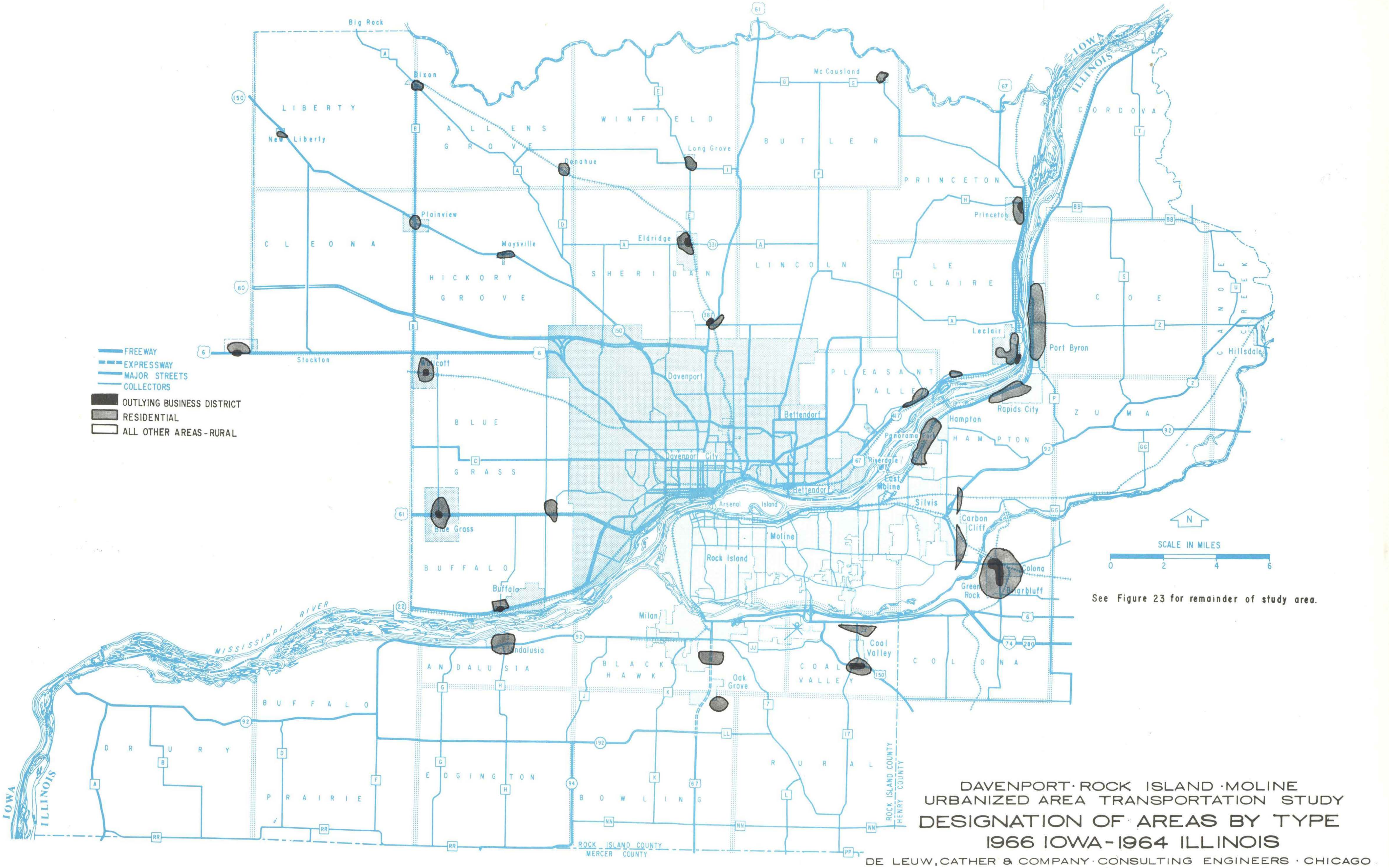
See Figure 24 for remainder of study area.

FIGURE 24



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

DESIGNATION OF AREAS BY TYPE
1966 IOWA - 1964 ILLINOIS

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residential areas. Most of the traffic in this area involves trips that do not have an origin or a destination within the area. This area is characterized by moderate pedestrian traffic and lower parking turnover than is found in the central business district, but it may include large parking areas serving the CBD.

Outlying Business District. That portion of a municipality or an area within the influence of a municipality, normally separated geographically by some distance from the central business district and its fringe area, in which the principal land use is for business activity. Such a district has its own local traffic superimposed on through movements to and from other traffic generators, relatively high parking demand and turnover, and moderate pedestrian traffic. Compact shopping developments entirely on one side of a major street are not considered to be within the scope of this definition.

Residential Area. That portion of a municipality, or an area within the influence of a municipality, in which the dominant land use is residential, but where there may be small business areas. Such areas are characterized by few pedestrians and low parking turnover.

Level of Service. Level of service is a term which denotes the different operating conditions that prevail on a given lane or roadway when accommodating various traffic volumes. It is a qualitative measure of the effect of a number of factors, including speed and travel time, traffic interruptions, freedom to maneuver, driver comfort and convenience and, indirectly, safety and operating costs.

Levels of service are best defined in terms of measures obvious to the drivers using the highways in question, such as speed or travel time. At single intersections, however, it is not possible to use speed as a yardstick. Instead, the degree of loading, or load factor, is used in association with less direct criteria. The load factor, which is an indication of the use of the entire approach roadway during one hour of peak traffic flow may be defined as follows:[1]

$$\text{Load Factor} = \frac{\text{Total number of green phases that are fully utilized by traffic during the peak hour}}{\text{Total number of green phases for that approach during the same period}}$$

A green phase on an approach may be considered to be fully utilized when there are vehicles ready to enter the intersection in all lanes when the signal turns green, and when vehicles continue to enter in all lanes during the entire phase with no unused time or excessive spacing between vehicles due to lack of traffic. A load factor of 0.20, representative of a desirable level of service, was selected for use in the study area. At this level of service, drivers may have to wait through more than one red signal indication during peak periods and may feel somewhat restricted, but not to the point of extreme irritation. Use of a smaller load factor would result in more unused capacity, while increasing the load factor would result in greater restriction on motorists.

Physical and Operational Conditions

The geometrics of a street, the proportion of total pavement width available to moving traffic, and the manner in which traffic is handled on that pavement are all fundamental factors influencing the capacity of a roadway. Street width, parking conditions, and type of operation (one-way or two-way) were determined for all links in the system as part of the street inventory survey. For purposes of analysis, ten percent left turns and ten percent right turns were assumed. These figures are commonly used as typical proportions of turning movements and were confirmed by the manual counts made in the study area by the Consultant. An analysis of available data and additional counts made by the Consultant showed that commerical vehicles represented approximately 4.0 percent of total traffic in the central business districts, 2.0 percent of total traffic in fringe areas, and 3.0 percent of total traffic in outlying business districts and residential areas. Panel, pickup and other light trucks having only four

(1)-Traffic Engineering Handbook, Institute of Traffic Engineers, Washington, D.C., 1965, Chapter 8.

wheels were considered equivalent to passenger cars since they are similar in size and performance. All other types of trucks as well as intercity and local buses were defined as commercial vehicles. The family of curves reflecting the basic conditions described are shown in Figures 25 and 26. Service volumes are given in vehicles per hour of green.

The peak hour factor (PHF) reflects variations in peak hour traffic flow and provides a means of more accurately evaluating a roadway. The peak hour factor is defined as the ratio between the total number of vehicles entering the intersection during the peak hour, to four times the number of vehicles entering the intersection during the highest 15 consecutive minutes of the peak hour. It is possible for the peak hour factor to range from 0.25 to 1.00. Existing peak hour factors in the study area were estimated from manual intersection counts by cycle. A peak hour factor of 0.90 was estimated to be average for conditions throughout the area and was applied to the service volume curves to give final peak hour approach capacities.

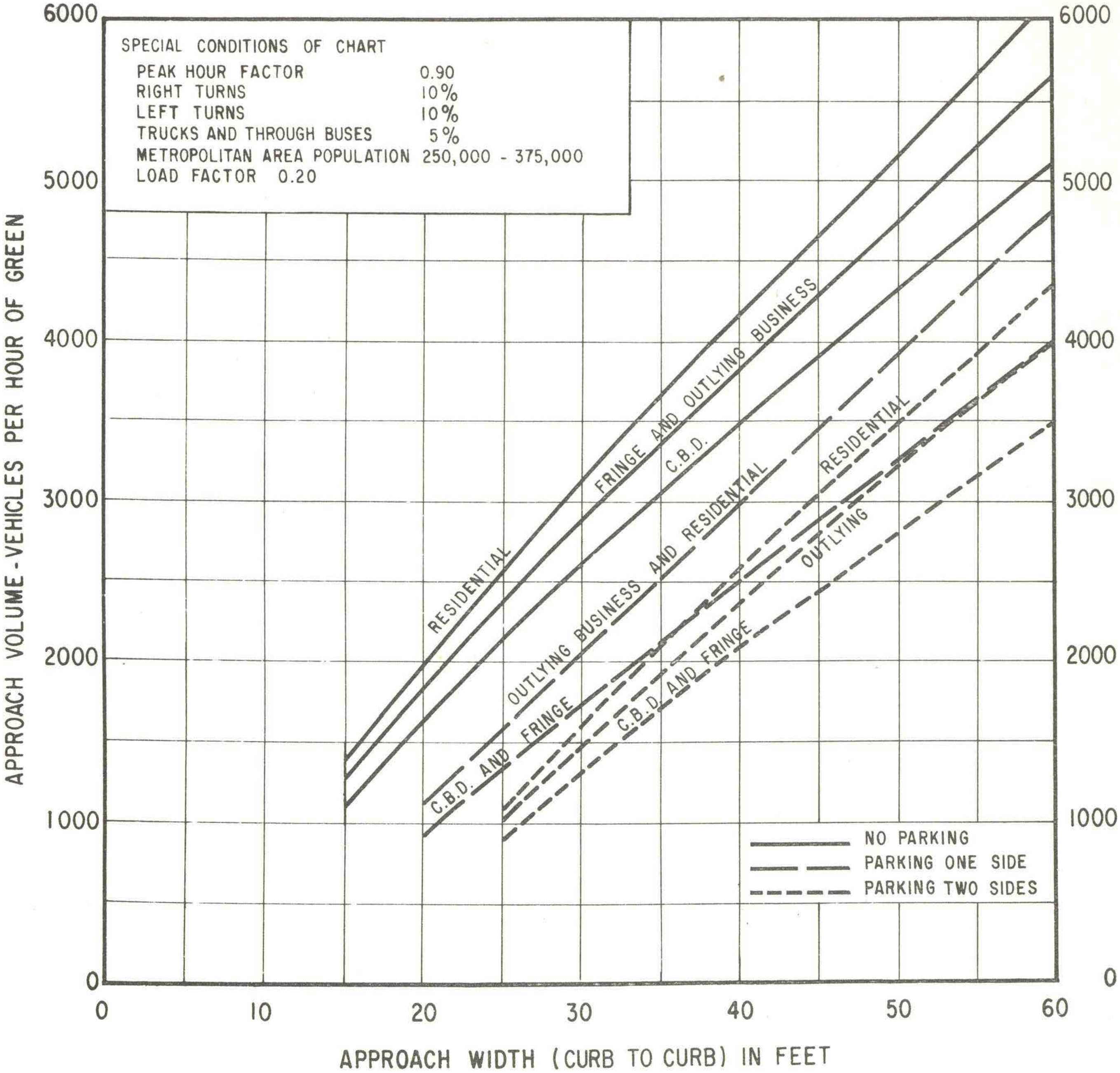
Traffic volumes are usually expressed in terms of daily traffic. To allow direct comparison with these volumes, it was necessary to convert peak hour capacities to average weekday traffic (AWT) service volumes. This conversion was accomplished through use of the observed relationships of the peak hour directional split and the ratio between peak hour traffic and average weekday traffic. The average relationships used for capacity analyses are summarized in Table 9.

Table 9

PEAK HOUR TRAFFIC CHARACTERISTICS
IN THE STUDY AREA - 1964

Location	Directional Split (Percent)	Percent of Average Weekday Traffic	Peak Hour Factor
Central Business District	65-35	9.5	0.90
Fringe Area	70-30	9.0	0.87
Outlying Business District	60-40	9.5	0.92
Residential Area	60-40	9.5	0.90

Source: Intersection turning movement counts. (See Interim Report Number 1--Transportation Facilities Inventory, Iowa Portion Exhibit A-1, and Interim Report Number 3--Transportation Facilities Inventory, Illinois Portion, Figure 18.)



SOURCE: HIGHWAY CAPACITY MANUAL - 1965, HIGHWAY RESEARCH BOARD SPECIAL REPORT 87, NATIONAL ACADEMY OF SCIENCES, NATIONAL RESEARCH COUNCIL, PUBLICATION 1328, WASHINGTON, D.C. FIGURES 6.5, 6.6 AND 6.7.

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

INTERSECTION APPROACH SERVICE VOLUME BY TYPE OF AREA ONE - WAY STREETS

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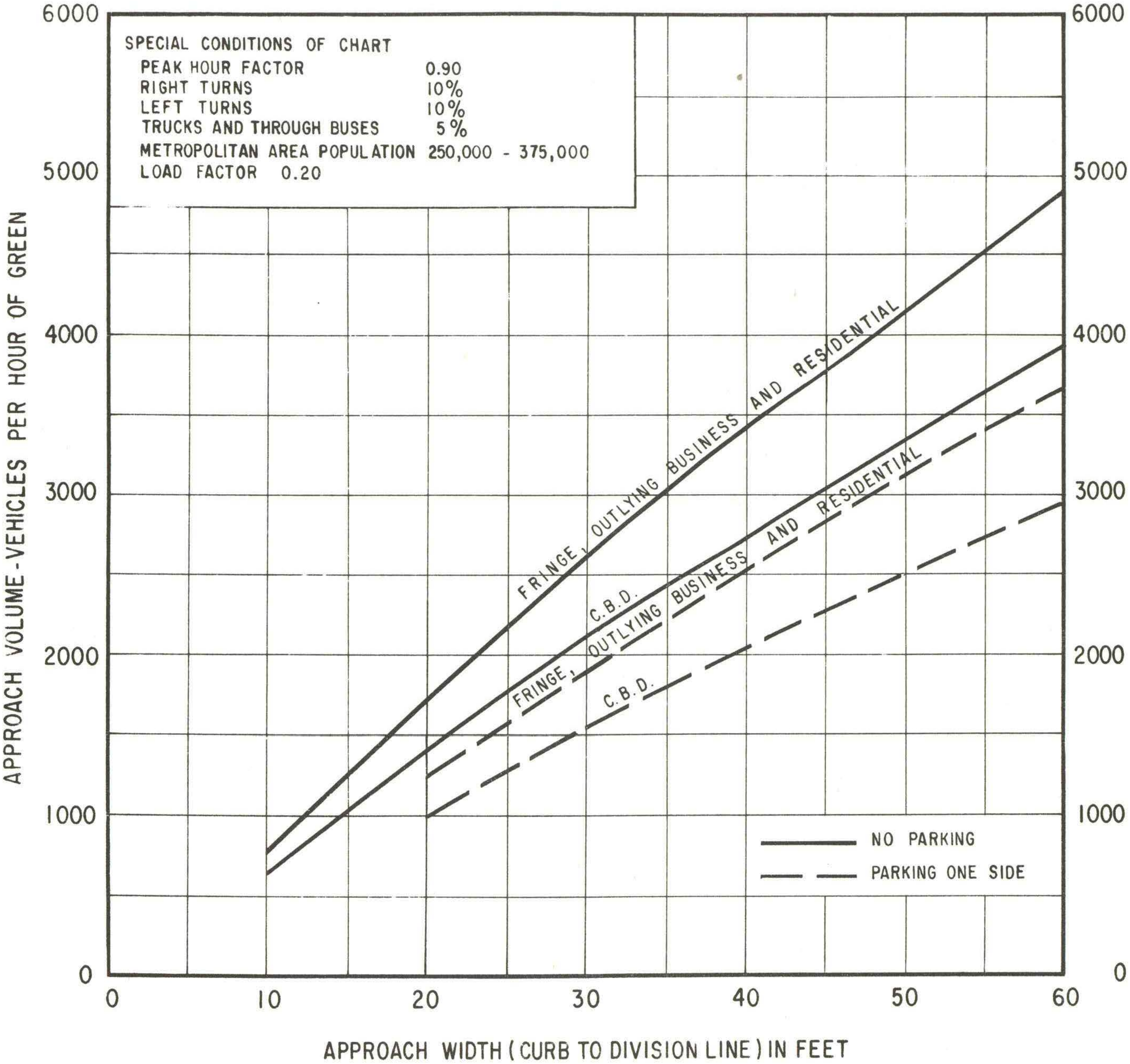

SOURCE: HIGHWAY CAPACITY MANUAL - 1965 HIGHWAY RESEARCH BOARD SPECIAL REPORT 87, NATIONAL ACADEMY OF SCIENCES, NATIONAL RESEARCH COUNCIL, PUBLICATION 1328 WASHINGTON D.C. FIGURES 6.8 AND 6.9

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

INTERSECTION APPROACH SERVICE VOLUME BY TYPE OF AREA TWO-WAY STREETS

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

Average weekday service volume was calculated by dividing peak hour approach capacity by the appropriate peak hour directional split and the percentage of the peak hour to average weekday traffic.

Freeway and expressway service volumes were calculated by multiplying appropriate values from Table 10 by the number of lanes available for traffic movement.

Table 10

ACCESS-CONTROLLED FACILITY CHARACTERISTICS IN THE STUDY AREA

Location	Vehicles Per Day Per Lane Freeways	Vehicles Per Day Per Lane Expressways
Urban Areas	12,600	10,500
Rural Areas	8,000	6,400

Source: Instruction Manual for Operational Characteristics Inventory and Capacity Analysis - 1966, Illinois Division of Highways.

Rural Service Volumes

Rural service volumes were calculated by adjusting rural capacities under ideal conditions to representative conditions of the study area. For two-lane, two-way highways, an ideal total capacity of 2,000 passenger vehicles per hour for both lanes was used. For multi-lane highways, a value of 2,000 passenger vehicles per hour per lane was used. Adjustments were made for lane width, proportion of commercial vehicles, and level of service. Factors used to adjust for lane width are given in Table 11.

Two separate factors were developed to account for commercial vehicles. On two-lane facilities, commercial vehicles accounted for approximately 2.0 percent of total traffic, while on multi-lane facilities, 3.0 percent was an average value. For two-lane highways, one commercial vehicle was estimated to be equivalent to 2.5 passenger vehicles. For multi-lane highways, one commercial vehicle was

Table 11

EFFECT OF LANE WIDTH ON CAPACITY
RURAL STREETS AND HIGHWAYS
IN THE STUDY AREA

Lane Width (Feet)	Capacity Expressed as a Percentage of Capacity of Ideal 12-Foot Lane	
	Two-Lane Streets and Highways Percent	Multi-Lane Streets and Highways Percent
12	100	100
11	88	97
10	81	91
9	76	81

taken to be equivalent to 2.0 passenger vehicles. The formula used to determine the factors was:

$$\text{Factor} = \frac{100}{100 - T + PT}$$

Where T = percentage of commercial vehicles
P = passenger car equivalents

This gave a truck adjustment factor of 0.97 for both two-lane facilities and multi-lane rural highways.

It was found that peak hour traffic in rural areas typically was approximately 8.0 percent of total 24-hour volume. A factor of 0.50 was selected as being representative of a desirable level of service. Dividing peak hour capacities by the percentage of total 24-hour traffic in the peak hour and multiplying by the level of service factor produced figures representing average weekday traffic (AWT) service volumes for rural areas.

SUFFICIENCY ANALYSIS

Full capacity of a street or highway is seldom realized due to various factors which act as restraints to free vehicular movement. The most important factor limiting the capacity of any facility in urban areas is the at-grade intersection. Since it would be impractical to make a detailed capacity analysis of each intersection, a computer program was developed which calculated, in general, the capacity of each segment of the major street and highway system based on limitations imposed by intersections. The analysis indicated areas of present deficiency. See Figure 27.

Deficiencies in the Iowa portion of the study area were apparent on 14th Street and Kimberly Road, as well as at the intersections of 8th Street with East River Drive in Bettendorf, and Kimberly Road with both Harrison and Brady Streets in Davenport.

In the Illinois portion of the study area, analyses showed that areas of greatest deficiency were in the vicinity of the junction of 5th and 6th Avenues at 38th Street in Rock Island; on Blackhawk and Coaltown Roads in Moline; at the intersection of 23rd Avenue and 19th Street in Moline; and on a section of 4th Avenue, Moline.

ACCIDENT EXPERIENCE

The principal function of a street and highway system is to provide for the safe, efficient and convenient movement of people and goods. Information on the degree of safety afforded the users, therefore, is necessary for a complete analysis of the system's performance.

A study was made of all reported accidents in the study area during 1964 and 1965. Data were obtained from the law enforcement department of each local agency as well as from the Iowa State Highway Commission and the Illinois Division of Highways.

Reported accidents in the study area during 1964 totaled 9,695. The total number of accidents increased by 11.2 percent to 10,805 in 1965. Table 12 classifies these accidents by severity, defined as follows:

FIGURE 27

DAVENPORT · ROCK ISLAND · MOLINE URBANIZED AREA TRANSPORTATION STUDY

CAPACITY DEFICIENCIES 1966 IOWA-1964 ILLINOIS

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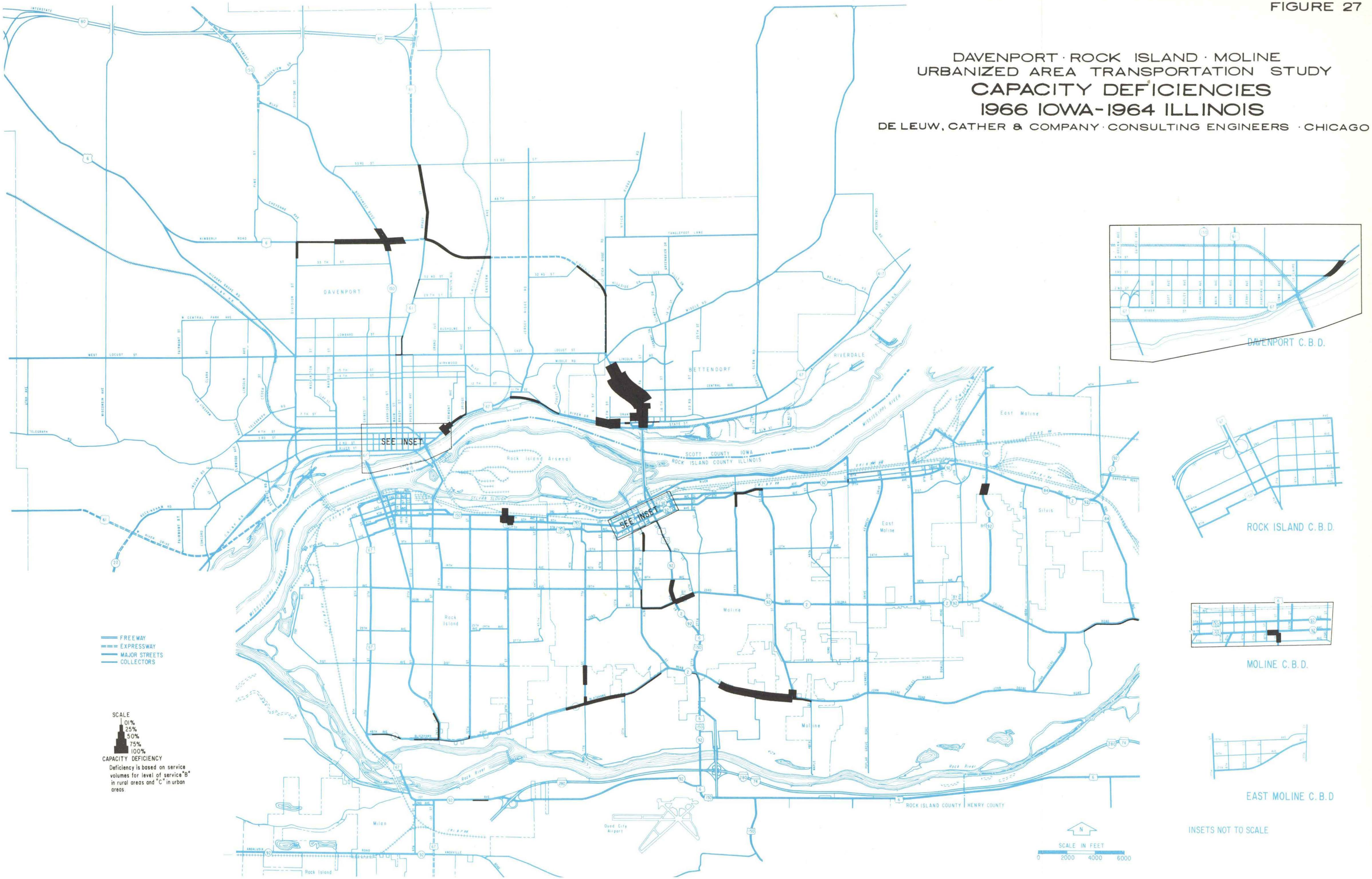


Table 12

SUMMARY OF MOTOR VEHICLE ACCIDENTS
ON ALL STREETS AND HIGHWAYS IN THE STUDY AREA

Jurisdiction	Number of Accidents by Severity: Property Damage	Personal Injury	Fatality	Total
1964				
Davenport	2,268	888	13	3,169
Bettendorf	290	98	0	388
Remainder of Scott County	172	113	8	293
Sub-Total--Iowa	2,730	1,099	21	3,850
Rock Island	1,971	537	8	2,516
Moline	1,634	349*	5	1,988
East Moline	314	151	0	465
Remainder of Rock Island County	497	327	6	830
Colona Township - Henry County	22	22	2	46
Sub-Total--Illinois	4,438	1,386	21	5,845
Grand Total--Study Area	7,168	2,485	42	9,695
1965				
Davenport	2,608	968	9	3,585
Bettendorf	362	107	1	470
Remainder of Scott County	238	143	5	386
Sub-Total--Iowa	3,208	1,218	15	4,441
Rock Island	2,230	589	4	2,823
Moline	1,963	304	7	2,274
East Moline	361	145	3	509
Remainder of Rock Island County	407	279	15	701
Colona Township - Henry County	26	31	0	57
Sub-Total--Illinois	4,987	1,348	29	6,364
Grand Total--Study Area	8,195	2,566	44	10,805

*-Does not agree with figure reported to National Safety Council. Tabulation of personal injury accidents on the principal streets and highways alone showed 316 such accidents compared with 275 reported in the standard Summary of Motor Vehicle Accidents. Personal injury accidents on local streets in Moline accounted for 11.1 percent of all such accidents in 1965. This rate was applied to the 1964 total to arrive at the number shown.

Property Damage. Those accidents which resulted only in damage to property regardless of the number of vehicles and the magnitude of costs.

Personal Injury. Accidents in which one or more persons were injured, but in which there were no fatalities.

Fatal. Accidents which resulted in one or more fatalities.

Computations were made of accident rates on the principal street and highway system. Intersection rates were expressed in terms of accidents per million vehicles entering the intersection annually. Rates for segments of streets or highways were computed in terms of both annual accidents per mile per year and accidents per 100 million vehicle-miles of travel per year. These studies are fully documented in Iowa Interim Report Number 1 and Illinois Interim Report Number 3.

High Accident Locations

The following intersections were found to be the most dangerous locations in terms of total accidents in both 1964 and 1965:

Iowa

Intersection of: Gaines and 3rd Streets, Davenport
Brady and 3rd Streets, Davenport
14th and State Streets, Bettendorf
Brady and 4th Streets, Davenport
Brady and Locust Streets, Davenport

Illinois

Intersection of: Blackhawk Road and 27th Street, Moline
23rd Avenue and 19th Street, Moline
31st Avenue and 11th Street, Rock Island
18th Avenue and 11th Street, Rock Island
23rd Avenue and 41st Street, Moline
5th Avenue and 15th Street, Rock Island

The most dangerous segments of the principal street and highway system were portions of 11th Street, Rock Island; 23rd Avenue, Moline; and Brady, Harrison and 4th Streets, Davenport.

Another way to measure accident experience is by determining accident rates in terms of accidents per given number of vehicles entering the intersection annually. These rates are shown for 1965 in Figure 28.

Cost of Accidents

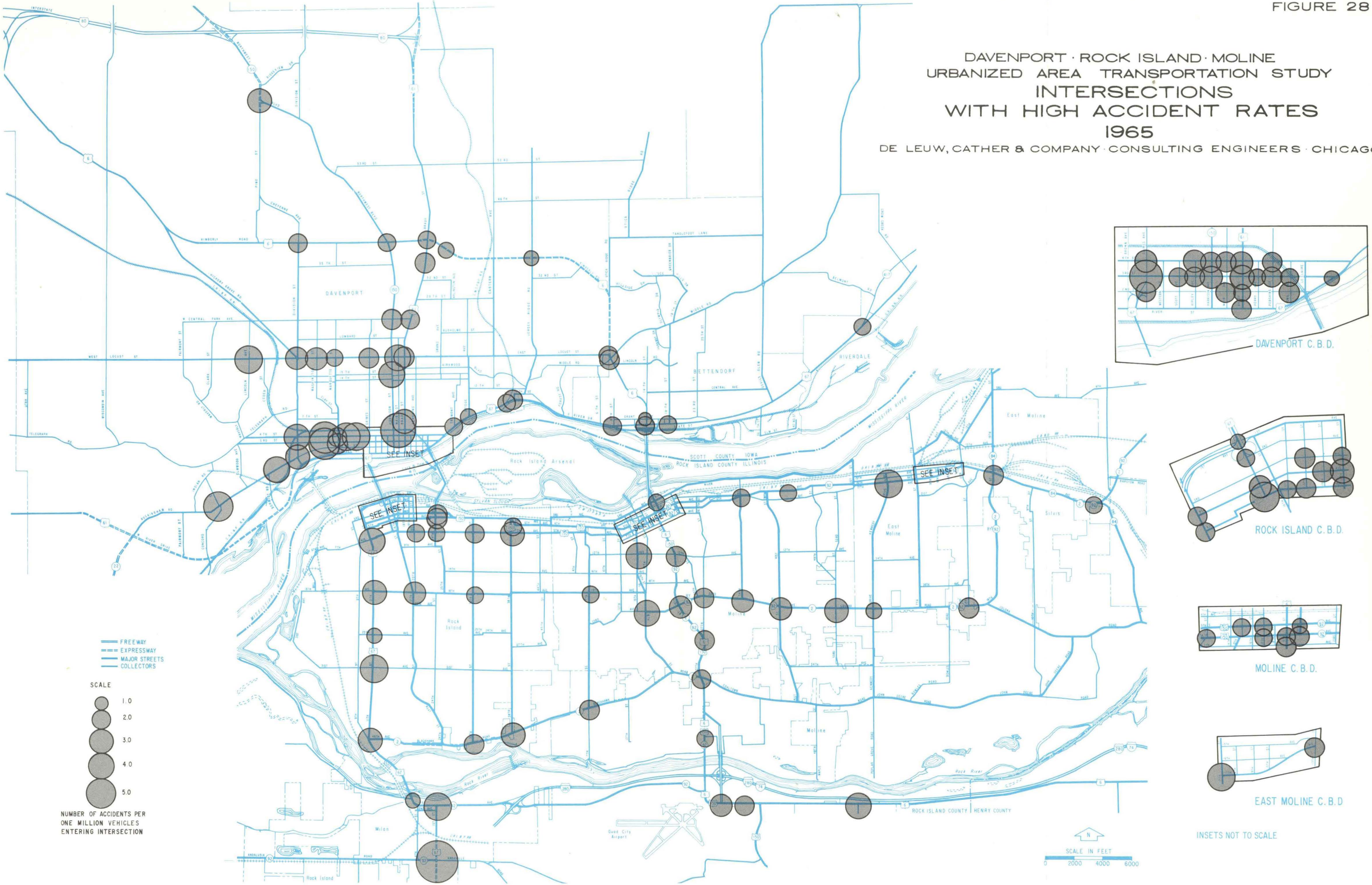
Total accident costs were estimated through use of approximations of average calculable costs furnished by the National Safety Council. The total cost of motor vehicle accidents in the study area was approximately $8,890,000 in 1964 and $10,120,000 in 1965.

FIGURE 28

DAVENPORT · ROCK ISLAND · MOLINE URBANIZED AREA TRANSPORTATION STUDY

INTERSECTIONS WITH HIGH ACCIDENT RATES 1965

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO



Chapter IV

BASE YEAR PLANNING FACTORS

Present patterns and characteristics of travel in the Davenport-Rock Island-Moline Urbanized Area are closely related to land use and other measurable and observable conditions. Knowledge of the existing type and amount of land use, population, employment, and other economic and social factors affecting development is a prerequisite to forecasting future travel.

The Rock Island County Regional Planning Commission (now incorporated into the Bi-State Regional Planning Commission) assembled much of the basic data described in this chapter of the report. Other inventories made by the technical staffs of individual cities in the area and their consultants were used in compiling all existing planning data. Reports on studies made by each of these agencies are listed in Chapter I.

LAND USE

Information concerning the physical environment--how land is used--is needed in making decisions and formulating programs concerning matters relating to the physical development of the study area. Informed decisions concerning not only transportation needs and facilities but locations of schools, parks and other public facilities, opportunities for economic development, and zoning policy and administration require background information about how land is used and how it may be used in the future.

Land use inventories made in the Iowa portion of the study area in 1966 are summarized in Research and Analysis Report. In the Illinois portion, these inventories were collected in 1964, and are described in detail in Illinois Interim Report Number 2 (Part 1), entitled "Land Use Inventory." Identical coding and tabulating procedures were followed in each survey. Table 13 is a summary of base year land use in the study area.

About 25,550 acres of land, almost evenly divided between the Iowa and Illinois portions of the study area, were used for residential purposes in the base year. There were approximately 92,200 households in Scott and Rock Island Counties in 1960. The once-separate

Table 13

SUMMARY OF LAND USE ACREAGE
1966 IOWA - 1964 ILLINOIS

Land Use	Acres	Percent
Residential	25,549.9	39.6
Retail	865.6	1.3
Manufacturing	1,703.1	2.6
Services	675.4	1.1
Public	12,803.3	19.8
Transportation, Communications and Utilities	22,998.5	35.6
Total	64,595.8	100.0

Sources: Base Year - Surveys by Bi-State Metropolitan Planning Commission and/or local civil divisions. For Scott County see Research and Analysis report, pages following 16, September 1967. For Rock Island County (Illinois Interim Report Number 2 (Part 1), Land Use Inventory) prepared by De Leuw, Cather & Company.

river towns have long since expanded to fill all frontage along the Mississippi River. Inland, new subdivisions have tended to leapfrog beyond existing developments to any land suitable for residential use where utilities were available or could be provided at reasonable cost.

The major commercial activities are in the central business districts of Davenport, Rock Island and Moline. Outlying shopping centers have been developed recently in both the Iowa and Illinois portions of the study area.

Most industrial development is adjacent to the Mississippi River in both counties.

POPULATION

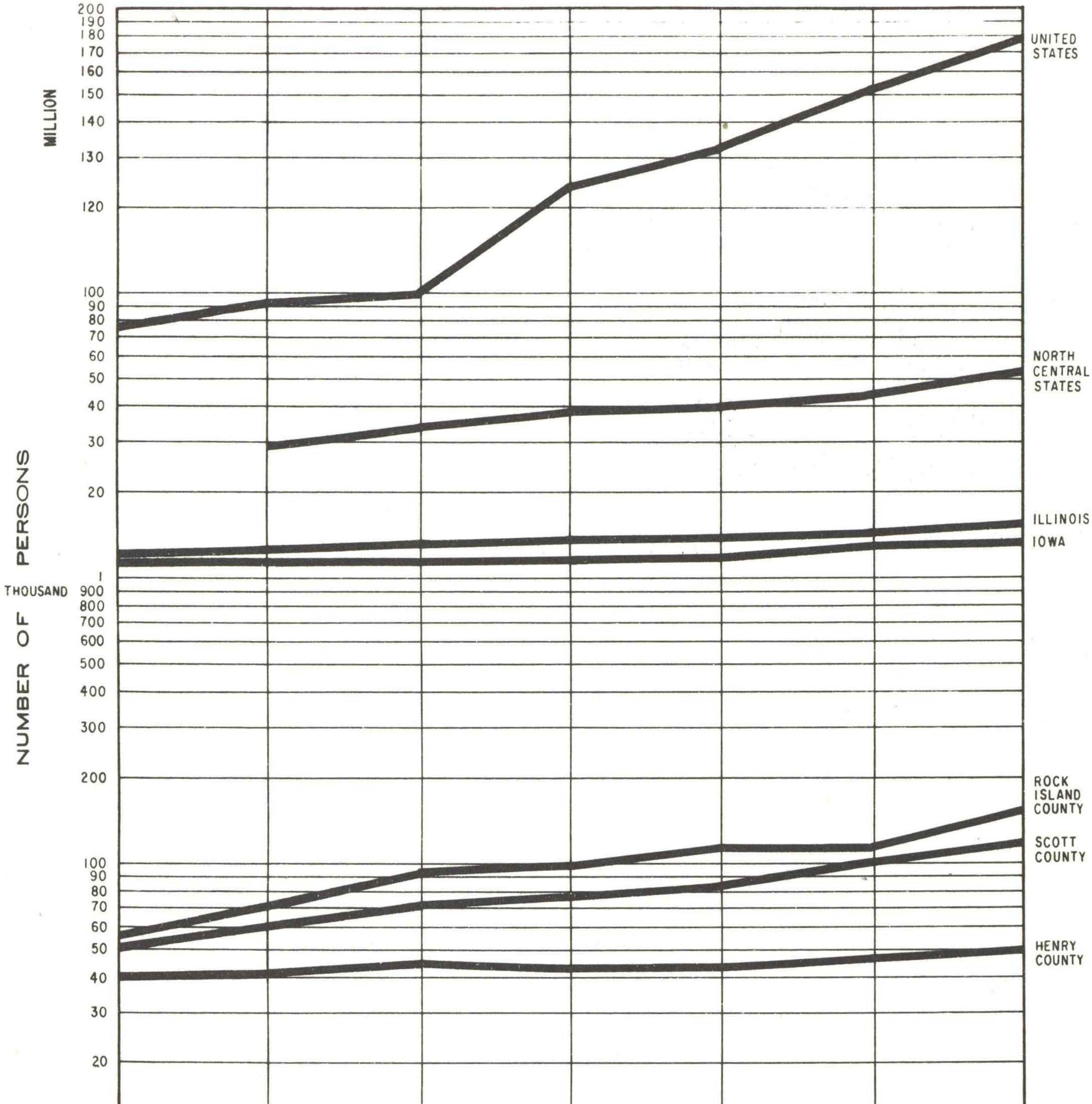
Figure 29 shows population growth of Scott County, Rock Island County, and Henry County, along with population trends of Iowa, Illinois, the North Central states, and the entire United States since 1900. Population of the two-county area together with Colona Township in Henry County totaled approximately 293,600 persons in the base year (1966 data for Scott County, 1964 data for Rock Island County and Colona Township)--a gain of about 19,190 (7.0 percent) since 1960.

About 127,700 persons or 43.5 percent of the study area's population resided in Scott County in 1966, representing a gain of 8,630 (7.2 percent) since 1960. Another 159,700 persons (54.4 percent of the area's population) resided in Rock Island County in 1964, representing a gain of 8,700 persons (5.8 percent) since 1960. The home interview survey indicated that the population of Colona Township, Henry County was 6,230 in 1964--an increase of 1,860 persons (42.6 percent) over 4,370 in 1960.

Population under 19 years of age in the two-county area, plus Colona Township, increased from 73,949 persons in 1950 to 102,568 in 1960, a gain of 38.7 percent. This age group increased by 44 percent in Scott County and by 35 percent in Rock Island County plus Colona Township.

The working age population (ages 20-64) declined from 58.0 percent of total residents in 1950 to 51.7 percent in 1960. The elderly population (65 years of age and over) increased by 5,786 or 27.5 percent during the same decade and, in 1960, comprised 10.5 percent of the entire population.

Detailed information on population inventory as well as economic factors discussed in the next section can be found for Scott County in Research and Analysis Report and for Illinois in Interim Report Number 1 (Part 1) entitled "Economic-Population Inventories."



SOURCE: U.S. DEPARTMENT OF COMMERCE CENSUS OF POPULATION

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

POPULATION GROWTH
1900-1960

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OTHER PLANNING FACTORS

Historical data indicative of the viability of the study area are required to project the total change in the level of activity from the present time to the forecast year. To project traffic volumes and patterns of travel with reasonable accuracy, consideration must be given to the future growth and impact of such traffic-generating factors as employment, retail sales, car ownership, and school enrollment.

Employment

Employment in the study area was approximately 106,100 in 1964. Figure 30 shows employment change (all industries) from 1940 to 1960 in Scott, Rock Island and Henry Counties; in Iowa and Illinois; in the Great Lakes States; and in the entire United States.

Table 14 summarizes base year study area employment by industry. Employment in manufacturing totaled 45,100 persons of which 13,800 were employed in Scott County and 31,300 in the Illinois portion of the area. A total of 15,600 persons were employed in trade and service--8,100 in Scott County and 7,500 in the Illinois portion.

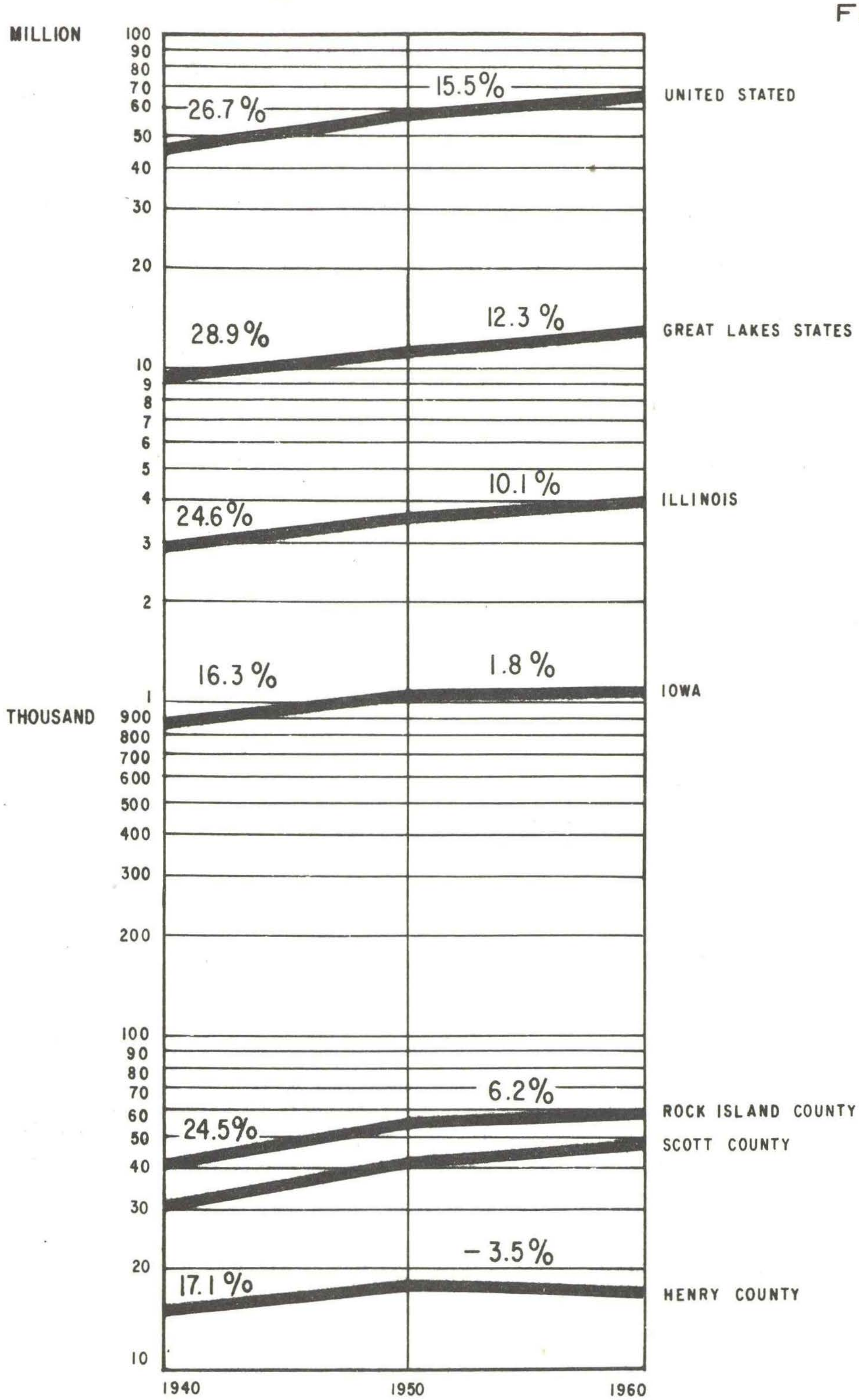
Table 14

TOTAL EMPLOYMENT BY INDUSTRY
1964

Industry	Scott County	Rock Island County	Colona Township	Total
Manufacturing	13,787	31,296	6	45,089
Retail	8,100	7,479	21	15,600
Other	21,500	23,840	50	45,390
Total	43,387	62,615	77	106,079

Source: Employment data for the Internal Study Area was derived from origin-destination studies. Bi-State Metropolitan Planning Commission staff estimated base year employment outside the O-D cordon line.

FIGURE 30



SOURCE: OFFICE OF BUSINESS ECONOMICS
U.S, DEPARTMENT OF COMMERCE, GROWTH PATTERNS
IN EMPLOYMENT BY COUNTY, VOLUME 3, 1965

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

TOTAL EMPLOYMENT
AND RATE OF CHANGE BY DECADES
ALL INDUSTRIES

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

Retail Sales

Retail sales in the two counties totaled $579.8 million in 1965, a gain of 66.8 percent since 1954. Retail sales gaines were paced by the Shopping Goods category which increased by 112.2 percent between 1954 and 1965. Wholesale sales in the two counties exceeded $591.6 million in 1963, a gain of over 14 percent since 1958. In 1963, wholesale sales in Scott County accounted for 56 percent of the area's total while Rock Island County had 44 percent.

Car Ownership

There were 107,670(1) automobiles owned in 1964 by residents of the study area--42,975 in Scott County, 62,527 in Rock Island County, and 2,168 in Colona Township, Henry County.

School Enrollment

A total of 85,242 students were enrolled in schools and colleges in the study area in 1966. Table 15 shows the number of students by county and grade in school.

Table 15

SCHOOL ENROLLMENT - 1966

Grade	Scott County	Rock Island County	Colona Township	Study Area Total
Elementary and Junior High School	27,873	29,752	935	58,560
High School	8,000	10,051	-	18,051
Junior College and College	4,391	4,240	-	8,631
Total	40,264	44,043	935	85,242

Sources: 1966--Estimated by Bi-State Metropolitan Planning Commission (Illinois Interim Report Number 2 (Part 1) and Bi-State General Plan inventories).

(1)-Estimated by Bi-State Metropolitan Planning Commission from base year ratios of automobiles owned to population (Davenport Origin-Destination Report, Table A-1; Illinois Interim Report Number 11, Table B-1).

Social and Community Value Factors

The items under the canopy "social and community value factors" include parks, recreation areas, historical sites, libraries, museums, zoos, public buildings, schools and school districts, fire stations and fire districts, and all other social and community facilities which should be considered in the process of developing a transportation plan. Locations of all such facilities in the study area were determined, and an especially extensive inventory was made in the Illinois portion as documented in Illinois Interim Report Number 2 (Part 1) entitled "Land Use Inventory."

Laws and Ordinances

The various types and distribution of land uses within an urbanized area shape the travel patterns and subsequently the transportation system of the area. Laws and ordinances which regulate these land use patterns are thus significant in relation to the transportation systems. A review and analysis of the principal laws and ordinances of the various jurisdictions in the study area were undertaken, therefore, to evaluate their content, coverage and presentation. These are covered in Scott County Development Controls--County and Municipalities and in Illinois Interim Report Number 4. The review included zoning ordinances, subdivision regulations and other applicable codes.

Chapter V

TRAVEL FORECASTING PROCEDURES

This phase of the transportation study had as its objective an understanding of the fundamental relationships governing travel demands, followed by quantification of these relationships in a series of mathematical formulas which permitted estimation of traffic volumes from land use data. These mathematical relationships in the Davenport-Rock Island-Moline urbanized area were developed on the basis of a number of similar studies in other parts of the United States. An additional step was required to consolidate two similar--but not identical--origin-destination studies. A central framework for traffic forecasting was selected; the analysis quantified the various factors and relationships required to apply the selected technique to the study area. More detailed information is contained in Interim Report Number 5 entitled, "Traffic Model and Assignment Techniques."

The techniques of urban traffic estimation and analysis have been developed in four basic stages. The first concept, used in the 1920's, was the development and application of traffic-counting procedures. Later, statistical techniques were evolved to expand such counts. Such basic data are still effectively used by planning and engineering agencies in analyzing traffic problems. The traffic counts in themselves could not be used, however, to predict traffic movements in the future or under changed conditions. The counts merely indicated use of existing facilities without regard for the basic factors motivating intracity travel.

To acquire more comprehensive information on transportation needs of an urban area, the origin-destination survey was developed in the late 1930's. This method, with its various forms of roadside interviews, home interviews, and truck and taxi interviews, has served well. It furnishes reliable data on existing traffic movements and reveals the motivating factors which influence travel desires. Nevertheless, traffic engineers soon recognized the shortcomings of a methodology in which transportation planning was based entirely on existing origin-destination patterns. The limitations of this technique became particularly apparent after World War II with the rapid expansion of urban areas.

The third major step in the evolutionary process came with the development of mathematical methods to expand existing travel patterns, obtained through origin-destination surveys, to reflect the anticipated future development of a city. This technique, using calculated growth factors, represented a significant advance in the field of urban traffic analysis. Again, however, it had many serious limitations. First, it could not be used to estimate future travel patterns to and from presently undeveloped areas, since there were no data on existing travel to expand. Second, and similarly, forecasts could not anticipate travel patterns which might follow major changes in land use such as urban redevelopment or construction of a new shopping center. Third, the technique could not predict changes in travel patterns and demands which might result from the construction of freeways or other new transportation facilities.

The most recent stage in urban traffic analysis came in the late 1950's with development of several traffic models--mathematical formulas, or simulation techniques--designed to overcome the deficiencies of the growth factor method. Of these traffic models, the procedure known as the gravity model technique is the most widely used. This procedure has been applied in many cities of various sizes.

The methodology used in the Davenport-Rock Island-Moline transportation study, therefore, profited from research and experience gained in many other similar studies.

TRAFFIC MODELS

The gravity model is currently the most widely used method of trip distribution. Extensive research has shown it to be a reliable tool in transportation planning. As the name implies, this model adapts the theory of gravity advanced by Newton to the problem of distributing traffic throughout an urban area.

In essence, the gravity model says that trip interchange between every pair of zones is directly proportional to the relative attraction of each of the zones and inversely proportional to some function of the spatial separation between the centers of the two zones. This function of spatial separation adjusts the relative attraction of each zone for the ability, desire or necessity of the trip maker to overcome the spatial separation involved.

Mathematically, the gravity model is stated as follows:

$$T_{ij} = P_i \frac{\dfrac{A_j}{d_{ij}^{\,b}}}{\dfrac{A_1}{d_{i1}^{\,b}} + \dfrac{A_2}{d_{i2}^{\,b}} + \ldots + \dfrac{A_n}{d_{in}^{\,b}}}$$

Where: T_{ij} = trips produced in zone i and attracted to zone j

P_i = trips produced in zone i

A_j = trips attracted by zone j

d_{ij} = spatial separation between zone i and j. This is generally expressed as total travel time (t_{ij}) between zones i and j

b = an empirically determined exponent which expresses average areawide effect of spatial separation between zones on trip interchange

n = the number of zones in the study area

In actual application of the gravity model formula, it is necessary to develop the parameters in the formula for each urban area individually. Furthermore, these parameters are developed for each separate trip purpose. Experience has demonstrated that the exponent of travel time is not constant for all intervals of time. Thus it is necessary to work with a gravity model formula which differs from that shown above.

This revised formula is expressed as follows:

$$T_{ij} = P_i \frac{A_j \; F_{ij} \; K_{ij}}{\sum_{j=1}^{n} A_j \; F_{ij} \; K_{ij}}$$

1. Home Based Work. A trip between a person's place of residence and his place of employment for the purpose of work.

2. Home Based Shop. A trip between a person's place of residence and a commercial establishment for the purpose of shopping.

3. Home Based Other. Any other trip between a person's place of residence and some form of land use for any other trip purpose.

4. Non-Home Based. Any trip which had neither origin nor destination at home regardless of its purpose.

5. Truck Trips. All truck trips.

Analytical steps to develop all parameters required by the traffic model are outlined below.

Step 1--Consolidation of Origin-Destination Data. Data from two similar--but not identical--origin-destination studies were consolidated into one combined trip table.

Step 2--Calibration of Traffic Assignment Network. Speeds derived from the travel time studies were adjusted until the traffic assignment model simulated current ground counts.

Step 3--Calibration of Trip Distribution Model. Friction factors, socio-economic adjustment factors, zone terminal times, and intrazonal travel times were developed for the trip distribution model.

Step 4--Development of Trip Generation Equations. Analyses were made of relationships between residential characteristics at origins of trips and trip productions; and of relationships between land activity measures at destinations of trips and trip attractions.

Step 5--Development of Modal Split Procedures. A technique was devised for allocating travel between public transit and automobiles. Companion analyses resulted in procedures to translate person trips into vehicle trips.

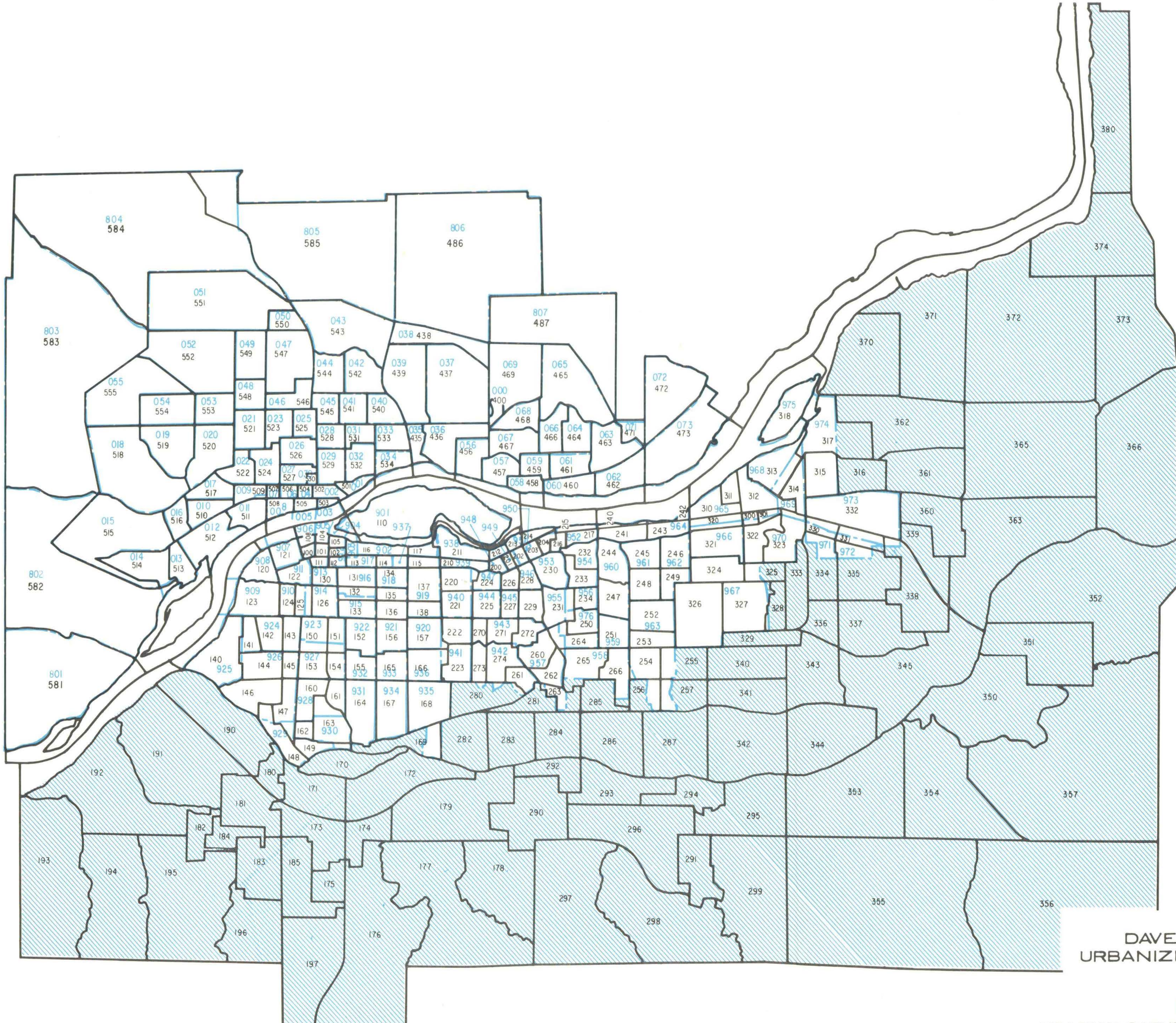
CONSOLIDATION OF ORIGIN-DESTINATION DATA

The Davenport-Rock Island-Moline Urbanized Area Transportation Study was unique in that it involved consolidation of two origin-destination studies--the Iowa study made in 1961 and the Illinois survey in 1964. Both the Iowa Highway Commission and the Illinois Division of Highways foresaw the need for an areawide transportation plan. The traffic zone system of the Iowa study included portions of Rock Island, Moline and East Moline.

During the Illinois origin-destination study, a concerted effort was made to achieve compatibility with the earlier Iowa study. Boundaries of traffic zones in Iowa were not changed, but zone numbers were revised. It was found, however, that Illinois traffic zones defined in the 1961 study were far too large for purposes of the Illinois study. In addition, the cordon line established in 1961 by the Iowa Highway Commission for the Illinois portion of the study area included less than half of the urbanized area in which the State planned to conduct home interviews. An entirely new zone system was defined, therefore, in the Illinois portion of the study area. Figure 31 compares traffic zone boundaries and zone numbers of the two origin-destination studies. Early in the study, therefore, procedures were defined for consolidating data from the two surveys. The general methodology, where it was not specifically defined in accepted manuals covering this type of work, was set forth in identical agreements between the Consultant and both the Iowa and Illinois study groups. Figure 32 graphically illustrates the sources of data used in consolidation of the two studies which resulted in a combined origin-destination vehicular trip table which was used in traffic assignments. The table is in "true" origin-destination form rather than in terms of productions and attractions required for model development. Consolidated daily vehicle trips by type in the base year are summarized below:

Type of Trip	Number of Vehicle Trips
Auto driver (internal-internal)	477,206
Taxi (internal-internal)	5,673
Truck (internal-internal)	65,122
Internal-external	29,641
External-internal	30,934
Through trips	4,915
Total	613,491

FIGURE 31



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

ZONE MAP
1961 IOWA - 1964 ILLINOIS

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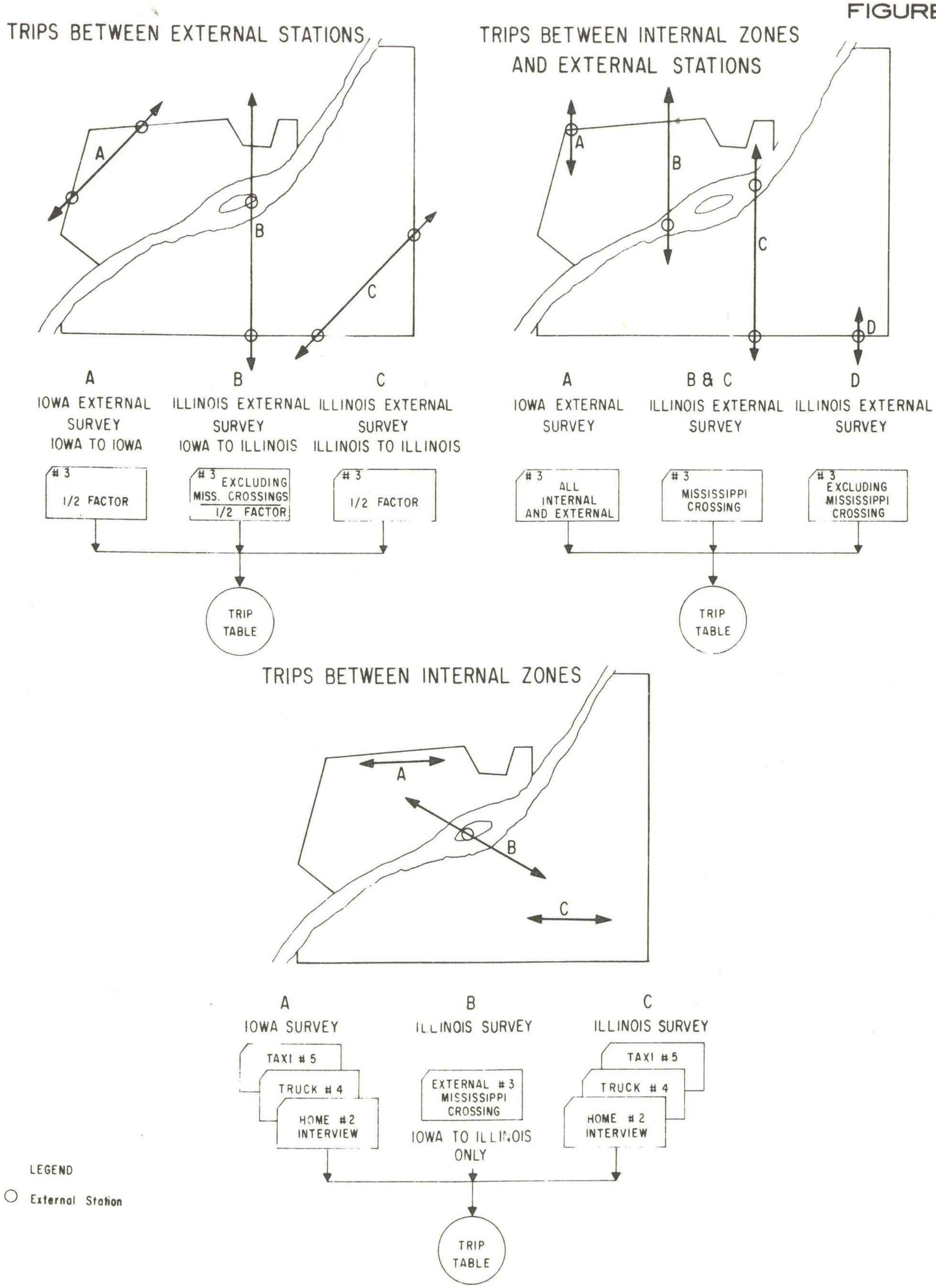
FIGURE 32



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URBANIZED AREA TRANSPORTATION STUDY

DATA SOURCES FOR TRIP MOVEMENTS

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Total daily vehicle and person trips by purpose in categories required for model calibration in the base year are as follows:

Classification	Number of Vehicle Trips	Number of Person Trips
Home based work	124,331	161,108
Home based shop	74,608	117,062
Home based other	232,955	407,005
Non-home based	102,852	146,582
Truck trips	73,798	-
Through trips	4,915	-
Total	613,459*	831,757

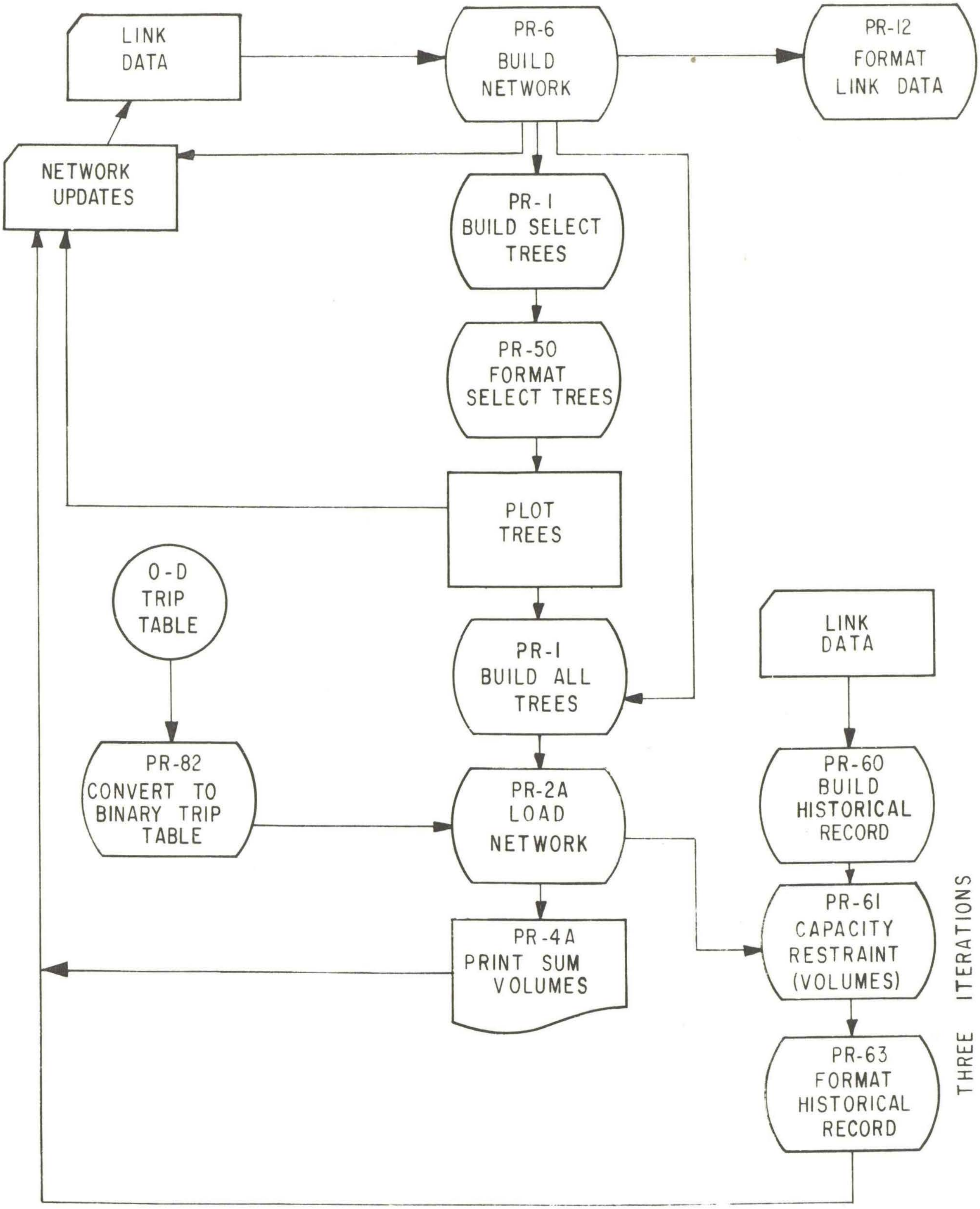
*-Differences between vehicle trips by type and classification are due to rounding of figures.

TRAFFIC ASSIGNMENT

Traffic assignment is an important procedure since it results in a systematic and reproducible means of predicting traffic loads on each segment of a transportation network. This process may be used not only to allocate a given set of trip interchanges to a specific transportation system over minimum time paths to estimate future traffic, but it may also be used to simulate existing conditions.

The traffic assignment process requires two inputs--(1) a complete description of the transportation system; and (2) a trip volume matrix of the interzonal traffic movements. A battery of computer programs is then used to build a minimum time path from the network description and to load all trips from the trip volume matrix on the individual route sections comprising the minimum time path routes between zones. The loads may be examined and, if deemed warranted, the assignment network may be adjusted. The sequence of steps involved and the programs used are shown in Figure 33. Several examples of minimum time path routes from one centroid to all others, referred to as "trees", are shown in Figure 34.

FIGURE 33



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URBANIZED AREA TRANSPORTATION STUDY

TRAFFIC ASSIGNMENT PROGRAMS

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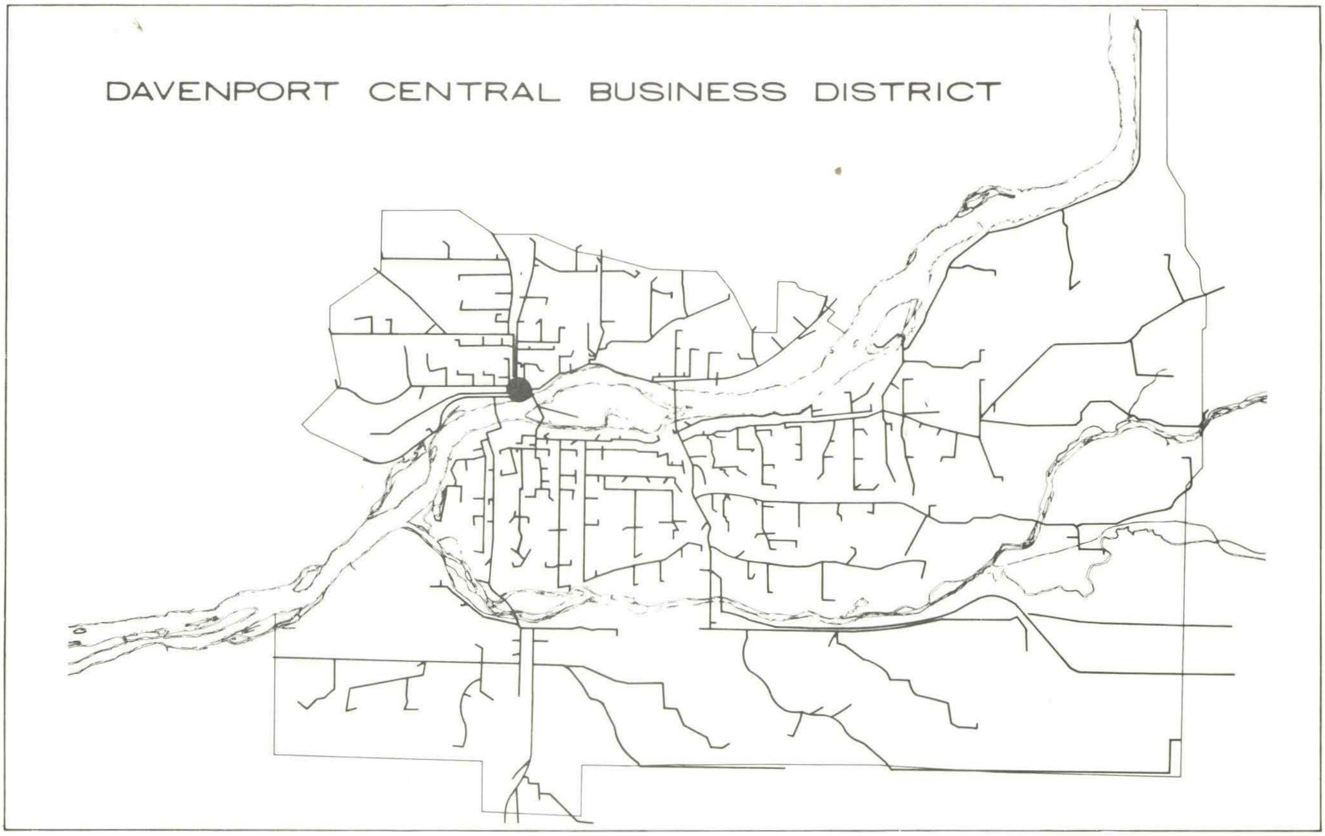

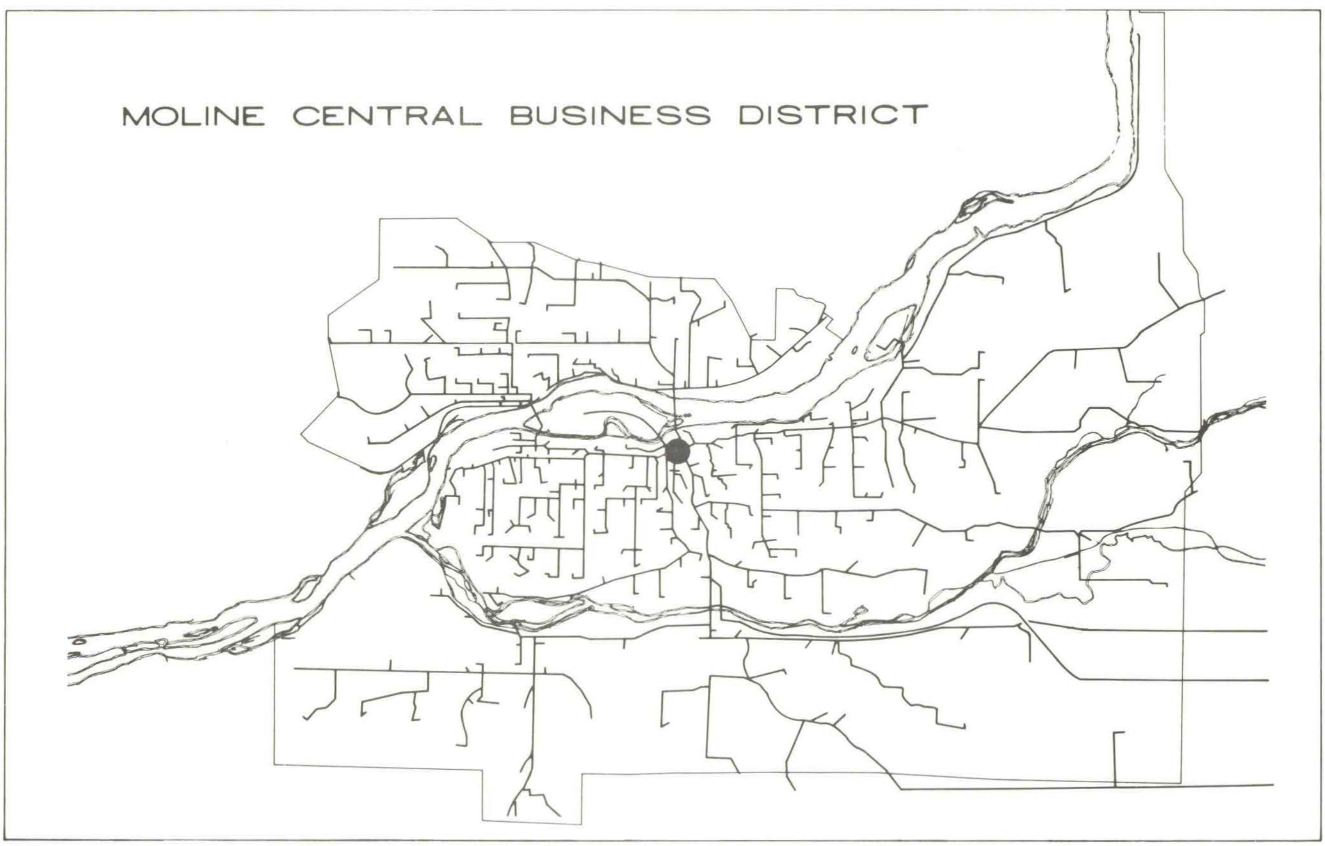

DAVENPORT·ROCK ISLAND·MOLINE
URBANIZED AREA TRANSPORTATION STUDY

MINIMUM TRAVEL TIME PATH TRACE FROM CENTRAL BUSINESS DISTRICTS

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Traffic Assignment Network

The network description for traffic assignments was based on the 1961-1964 functionally classified street system developed by the participating governmental agencies and the Consultant. All freeways, expressways and major and collector streets were included in the system. Local streets were added as necessary to fill gaps which otherwise would have distorted assigned travel patterns.

Lengths of individual street segments were scaled from the most accurate maps available for each jurisdiction in the study area. Travel times for each segment were calculated from field surveys made in other phases of the study. The travel times represented a weighted average of peak and off-peak conditions. Travel times on segments not covered in the field surveys were approximated from those on other routes of similar character. Travel times on centroid connectors were estimated on the basis of the character of each zone. Thus every link in the system was coded with the required data.

Network Calibration

Upon completion of coding and checking the traffic assignment network, trips from the consolidated 1961-1964 origin-destination studies were loaded onto the system and compared with ground counts. The traffic assignment process was repeated with adjustments to the network until a satisfactory match was achieved between the assigned traffic volumes and the ground counts. This is known as calibration of the traffic assignment system.

Calibration was necessary to arrive at an assignment model which would accurately reproduce vehicular travel. The same type of assignment procedure may be used to allocate projected trip interchanges to a future transportation system. Adjustments can be made by changing the speeds (and thereby the time) on links either manually or by use of a computerized technique referred to as "Capacity Restraint." Both methods were used in this study in making ten traffic assignments during the calibration process. Actual counted volumes were substituted for capacity, however, since the goal was to develop a network which would simulate actual traffic volume counts.

In general, three methods were used in analyzing the effectiveness of the adjusted assignment network in simulating traffic counts. These were:

1. Visual comparison of assigned and counted traffic on a map of the area;

2. Comparison of assigned and counted traffic across screen lines; and

3. Statistical analyses to determine the deviation between assigned and counted traffic by volume groups.

Figure 35 compares assigned and counted traffic (after network adjustments) on the street system in the study area. Screen line comparisons are summarized in Table 16. Locations of screen lines are shown in Figure 36.

Assigned O-D volumes on the traffic capacity network developed for this study were compared with ground counts on links for which data were available. A summary of differences between assigned traffic and ground counts is shown graphically in Figure 37. Statistics from these analyses, by volume groups, are presented in Table 17.

Standard deviation for the entire study area was 39.0 percent, which compares favorably with the results of similar statistical analyses in other studies.

TRIP DISTRIBUTION

Trip distribution techniques provide the planner with a systematic procedure for estimating zonal trip interchanges for alternative plans of both land use and transportation facilities. Trips between zones constitute a basic part of the travel information needed for transportation planning.

As indicated by the gravity model formula, four factors had to be analyzed and quantified before the gravity model could be applied to the Davenport-Rock Island-Moline transportation study area. These are defined as follows:

FIGURE 35

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COMPARISON OF ASSIGNED VOLUMES WITH GROUND COUNTS AVERAGE DAILY TRAFFIC 1961 IOWA - 1964 ILLINOIS

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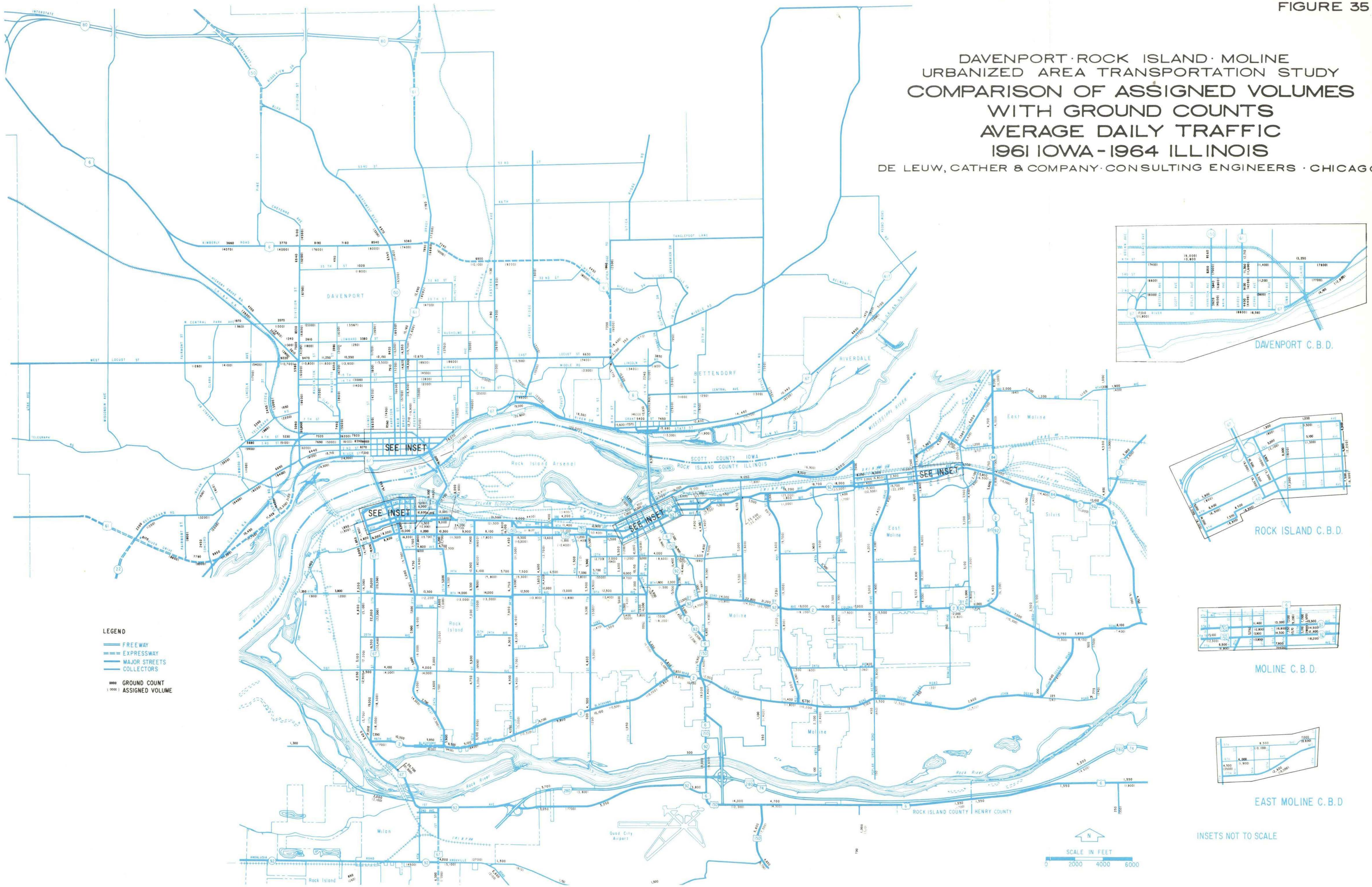

Table 16

SCREEN LINE COMPARISON OF 1961-1964
ORIGIN-DESTINATION ASSIGNMENT AND GROUND COUNTS

Screen Line	Ground Count	Assigned Volume	Difference Trips	Difference Percent
A	66,950	66,443	- 507	- 0.8
B	67,300	73,345	+ 6,045	+ 9.0
C	52,763	56,119	+ 3,356	+ 6.4
D	52,550	49,360	- 3,190	- 6.1
Ia - 1	57,480	61,496	+ 4,016	+ 7.0
Ia - 2	66,020	68,637	+ 2,617	+ 4.0
Ia - 3	34,560	37,790	+ 3,230	+ 9.3
Ia - 4	38,640	37,685	- 955	- 2.5
I11 - 1	39,700	43,087	+ 3,387	+ 8.5
I11 - 2	72,125	69,185	- 2,940	- 4.1
I11 - 3	145,250	149,847	+ 4,597	+ 3.2
I11 - 4	78,200	75,371	- 2,829	- 3.6
I11 - 5	40,350	42,686	+ 2,336	+ 5.8

FIGURE 36

DAVENPORT · ROCK ISLAND · MOLINE URBANIZED AREA TRANSPORTATION STUDY
SCREEN LINE LOCATION MAP
TRAFFIC ASSIGNMENT NETWORK

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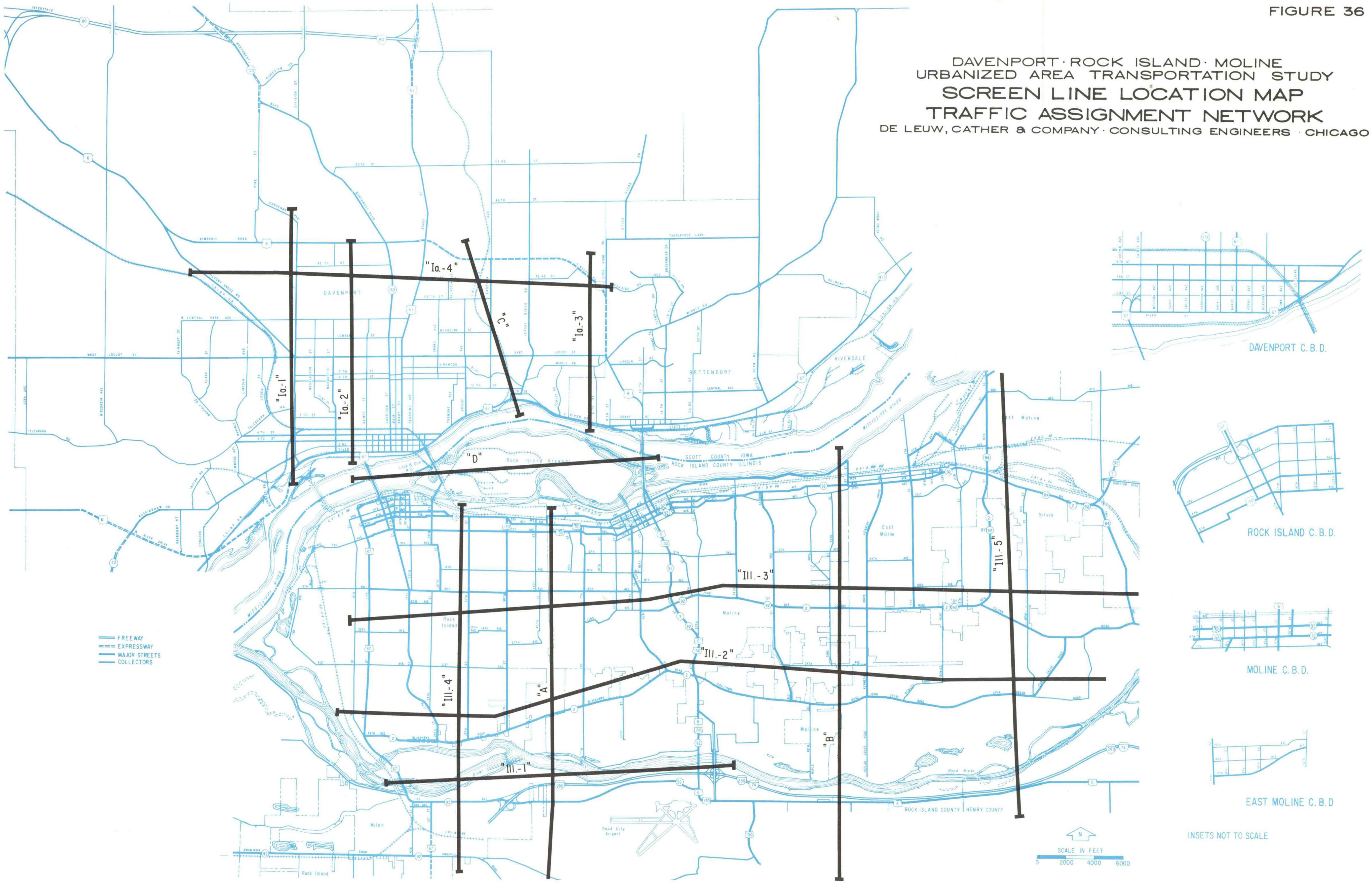
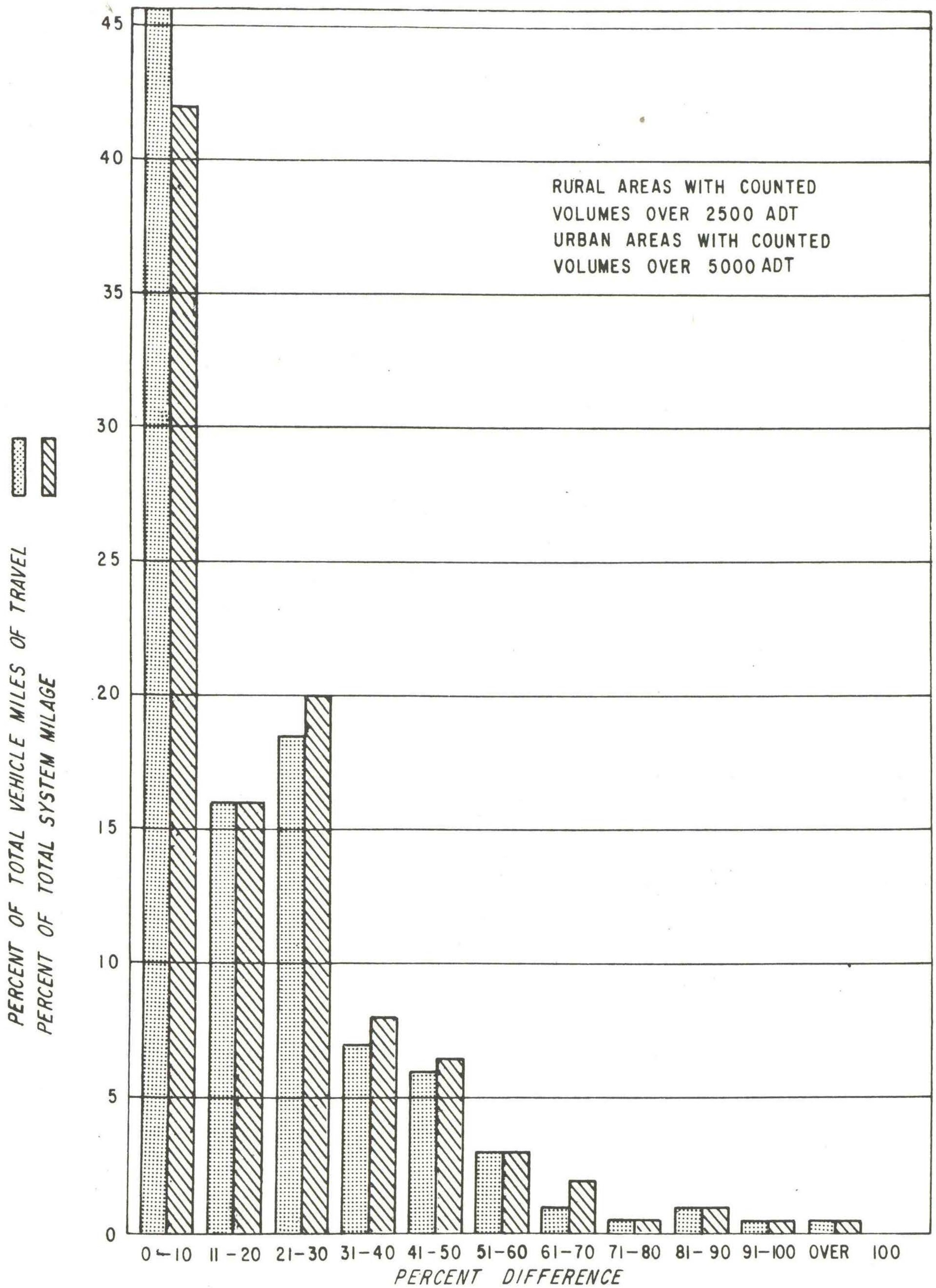


FIGURE 37



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

SUMMARY OF DIFFERENCES BETWEEN
GROUND COUNTS AND ASSIGNED TRAFFIC

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Table 17

STATISTICAL ANALYSIS OF ASSIGNMENT VERSUS GROUND COUNT

Volume Group	Number of Count Locations	Average Counted Volume	Average Assigned Volume	Difference Of Assigned And Counted	Standard Deviation	Standard Deviation As Percent of Average Counted Volume	Percent Total Volume In Group	Weighted Standard Deviation
0- 500	15	286.6	386.6	100.0	648.0	226.07	0.05	0.11
500- 1,000	31	677.4	1012.9	335.5	1260.8	186.12	0.25	0.48
1,000- 2,000	99	1424.2	1600.0	175.8	1989.9	139.72	1.73	2.42
2,000- 3,000	85	2315.2	1825.8	-489.4	1817.1	78.48	2.43	1.89
3,000- 5,000	183	3905.4	4758.4	853.0	3537.2	90.57	8.80	7.96
5,000-10,000	376	6982.7	6460.3	-522.4	2586.6	37.04	32.31	11.96
10,000-15,000	183	11949.1	11881.4	-67.7	3421.3	28.63	26.91	7.69
15,000-20,000	77	17441.5	15800.0	-1641.5	4249.9	24.36	16.52	4.02
20,000-25,000	28	21885.7	23135.7	1250.0	2987.5	13.65	7.54	1.02
25,000-30,000	10	28100.0	26650.0	-1450.0	831.6	2.95	3.46	0.10
30,000 OR MORE	0	0.0	0.0	0.0	0.0	0.00	0.00	0.00
ALL VOLUME GROUPS	1087	7476.3	7319.1	-157.2	2919.3	39.04	100.00	37.65

1. Trip Productions and Trip Attractions. The number of trips produced (P_i) and the number of trips attracted (A_j) by each traffic zone in the study area are related to the use of land and to the socio-economic characteristics of the people who make trips. A gravity model is used to distribute trips from production zones to attraction zones. Trip productions and attractions are covered in detail in the next section on trip generation.

2. Spatial Separation of Zones. The spatial separation of zones (d_{ij}) is measured in terms of total travel time. It is the sum of the minimum path travel times between zones plus the terminal times at both ends of the trip.

3. Travel Time Factors. Travel time factors, sometimes referred to as "friction factors" (F_{ij}) express the effect that spatial separation exerts on trip interchange. In effect, these factors measure the probability of trip making at each one-minute increment of travel time.

4. Zone-to-Zone Adjustment Factors. These factors (K_{ij}) reflect the effect on travel patterns of social, economic and other characteristics which are not elsewhere accounted for in the use of the model.

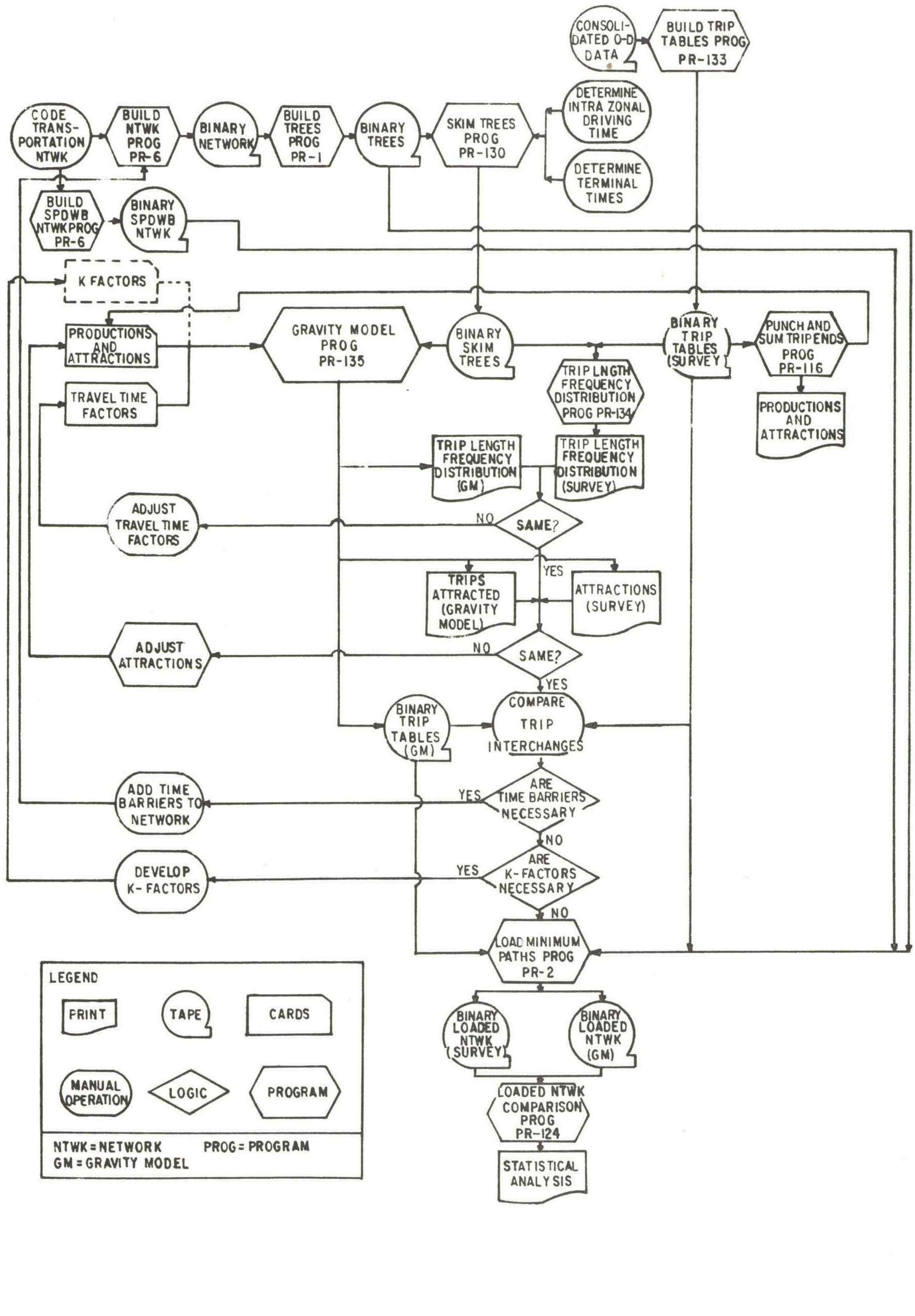
The phases involved in calibrating the gravity model trip distribution formula as well as those concerned with testing the calibrated model are shown in Figure 38.

Spatial Separation of Zones

Zone-to-zone travel time is the sum of over-the-road driving time between zones and the terminal times within the origin and destination zones. Consequently, a measure of terminal time for each zone in the study area was developed and combined with the driving times calibrated earlier, during the traffic assignment process.

Terminal time may be composed of the following items, alone or in combination:

1. Time spent looking for a parking space at the non-home end of a trip.



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GRAVITY MODEL CALIBRATION AND TESTING PROCESS

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2. Time spent walking from a parking place to the actual destination of a trip.

3. Time spent walking from the actual trip origin to the parking place.

4. Time spent getting from the parking place to the street system at the origin end of the trip.

Initial terminal times were estimated on the basis of location of each zone and personal knowledge of the study area as to relative degree of congestion in each zone. Intrazonal driving times were estimated at approximately one-half of the average driving time from each zone to all adjoining zones. Later in the analysis, both terminal times and intrazonal driving times were modified slightly to bring intrazonal trips predicted by the gravity model into balance with those from the origin-destination study.

Additional factors which many of the gravity model studies have shown to be important in spatial separation are the presence of topographical barriers such as mountains, rivers and large open spaces. In this study, it was found that the Mississippi River caused bias in the gravity model which was further compounded by tolls charged on two of the bridges. Travel time penalties of eight minutes were inserted in each of the three river crossing segments of the traffic assignment network.

Travel Time Factors

The use of a set of travel time factors (F_{ij}) simplifies computations and makes it possible to use a variable exponent in the gravity model. This procedure has been shown by previous studies to be desirable.

The absolute value of each friction factor is unimportant. Only the relative values for various trip lengths within each purpose category affect the behavior of the gravity model. Therefore, the initial set of travel time factors used in calibrating the gravity model were taken from another transportation study made in an area of comparable size.

The best set of friction factors associated with each trip purpose was determined through a process of trial and adjustment using recommended Bureau of Public Roads procedures. The comparison of survey and the resulting gravity model trip length frequencies is shown graphically in Figures 39 through 43. Average trip length comparisons by purpose are also included on these figures. Table 18 compares survey and gravity model trip lengths by one-minute increments for the five vehicular trip models.

Comparison of survey and gravity model average trip lengths and trip length frequencies indicated that the gravity model properly simulated the survey trip length distribution for the various trip purpose categories. Final travel time factors are shown graphically in Figure 44.

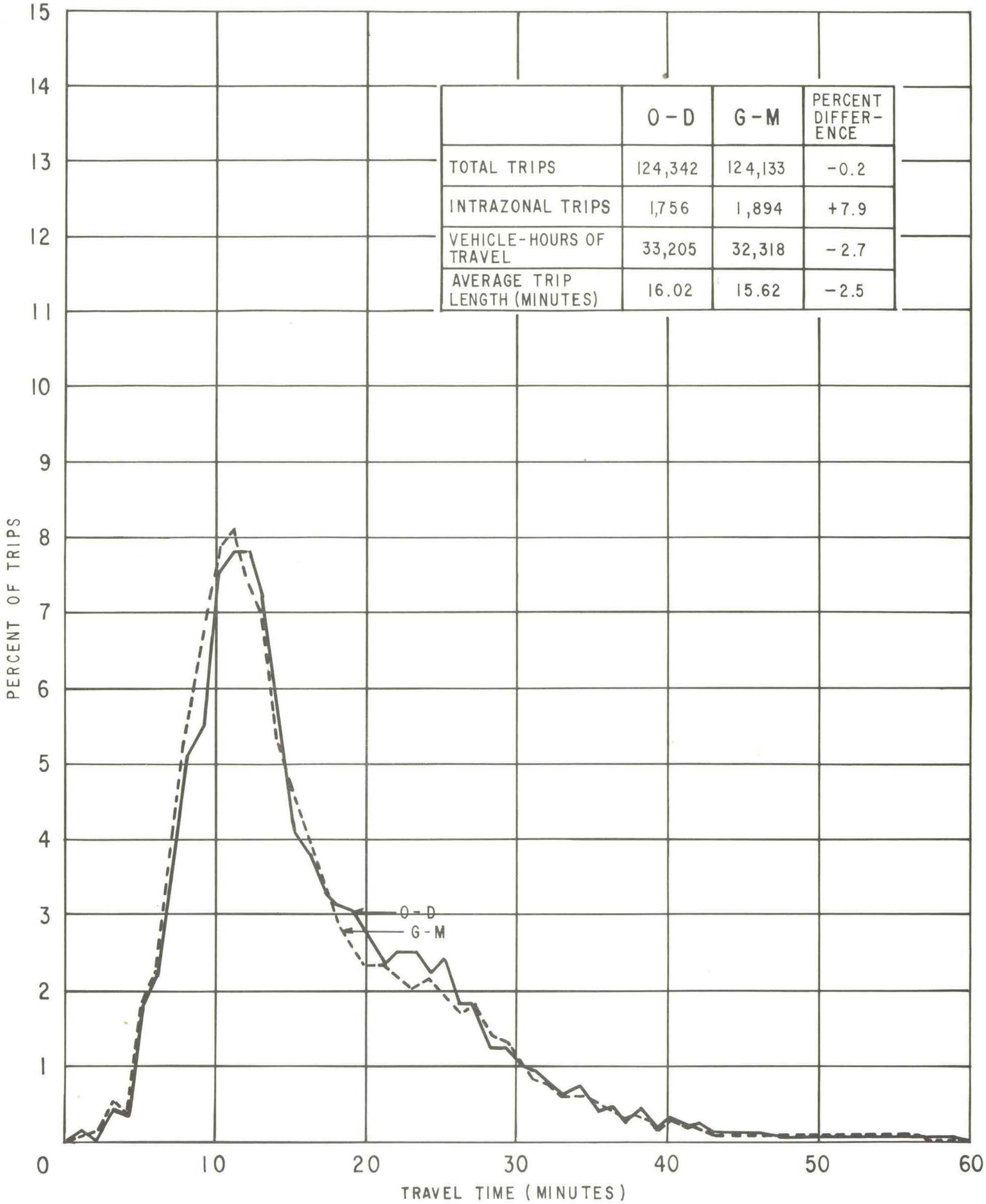
Zone-to-Zone Adjustment Factors

Zone-to-zone adjustment factors (K_{ij}) are often required in the gravity model calibration to account for various social and economic conditions which cannot be described mathematically in the gravity model formula. It was found after analysis of the initial gravity model trip distributions that zone-to-zone adjustment factors were required in the Davenport-Rock Island-Moline urbanized area to account for the following conditions:

1. The internal study area is made up essentially of five separate but closely related cities. There are some trips, obviously, which are made wholly within the confines of an individual city. These may include, among others, trips to schools, government offices and public buildings. It was also found that there was a bias in other trip categories indicating that a substantial number of people prefer to live in the same city in which they are employed, or tend to shop or transact business more in the city in which they reside than elsewhere. This condition is further amplified by the State line crossing the study area. Adjustment factors were applied by purpose category, therefore, to account for this situation.

2. Traffic impedance caused by congestion on Mississippi River bridges during peak periods exceeding the eight-minute time penalty for types of trips concentrated in peak periods.

FIGURE 39



	O-D	G-M	PERCENT DIFFERENCE
TOTAL TRIPS	124,342	124,133	-0.2
INTRAZONAL TRIPS	1,756	1,894	+7.9
VEHICLE-HOURS OF TRAVEL	33,205	32,318	-2.7
AVERAGE TRIP LENGTH (MINUTES)	16.02	15.62	-2.5

HOME BASED WORK TRIPS

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TRIP LENGTH FREQUENCY COMPARISON

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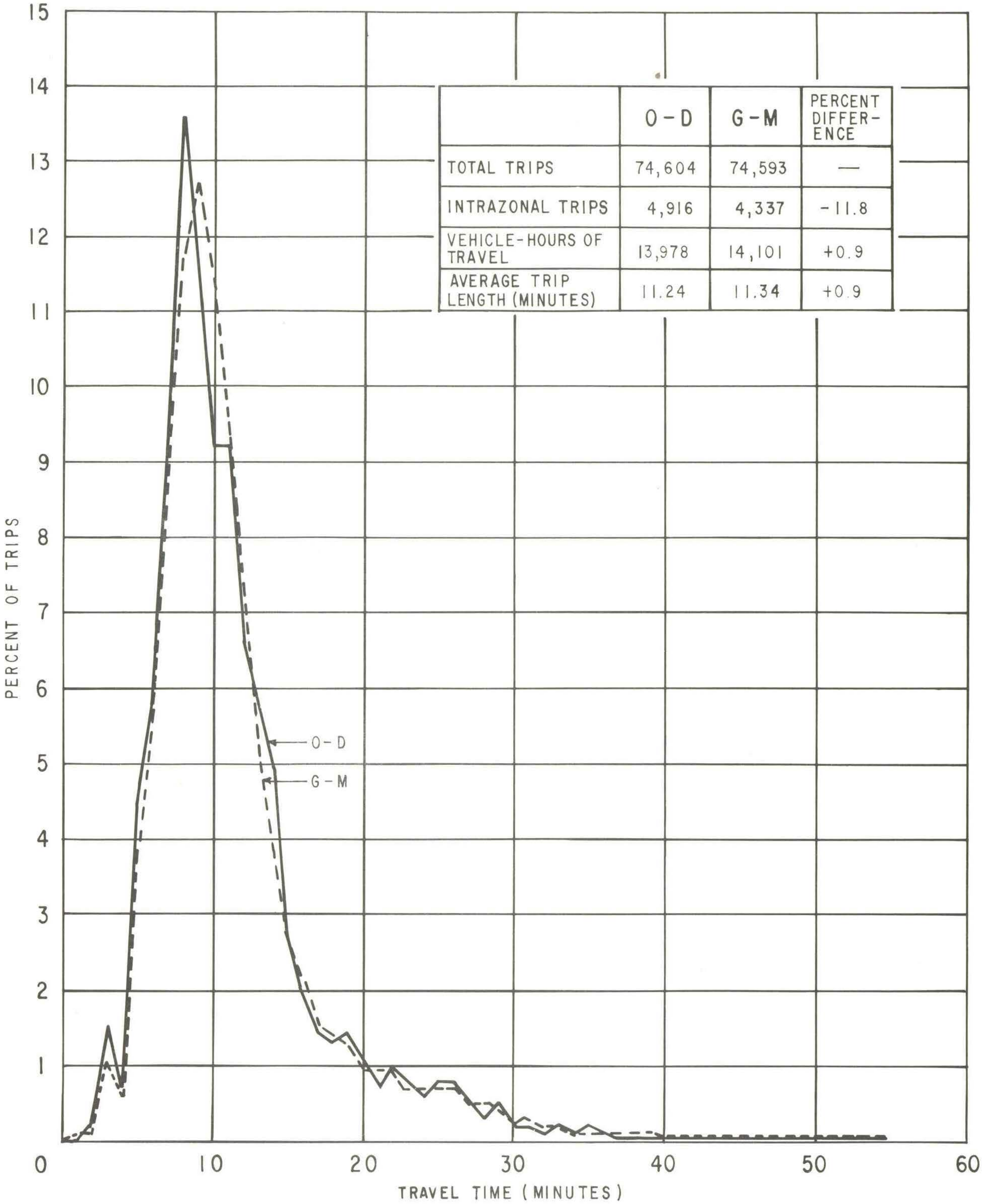
FIGURE 40



	O-D	G-M	PERCENT DIFFERENCE
TOTAL TRIPS	74,604	74,593	—
INTRAZONAL TRIPS	4,916	4,337	-11.8
VEHICLE-HOURS OF TRAVEL	13,978	14,101	+0.9
AVERAGE TRIP LENGTH (MINUTES)	11.24	11.34	+0.9

HOME BASED SHOP TRIPS

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URBANIZED AREA TRANSPORTATION STUDY

TRIP LENGTH FREQUENCY COMPARISON

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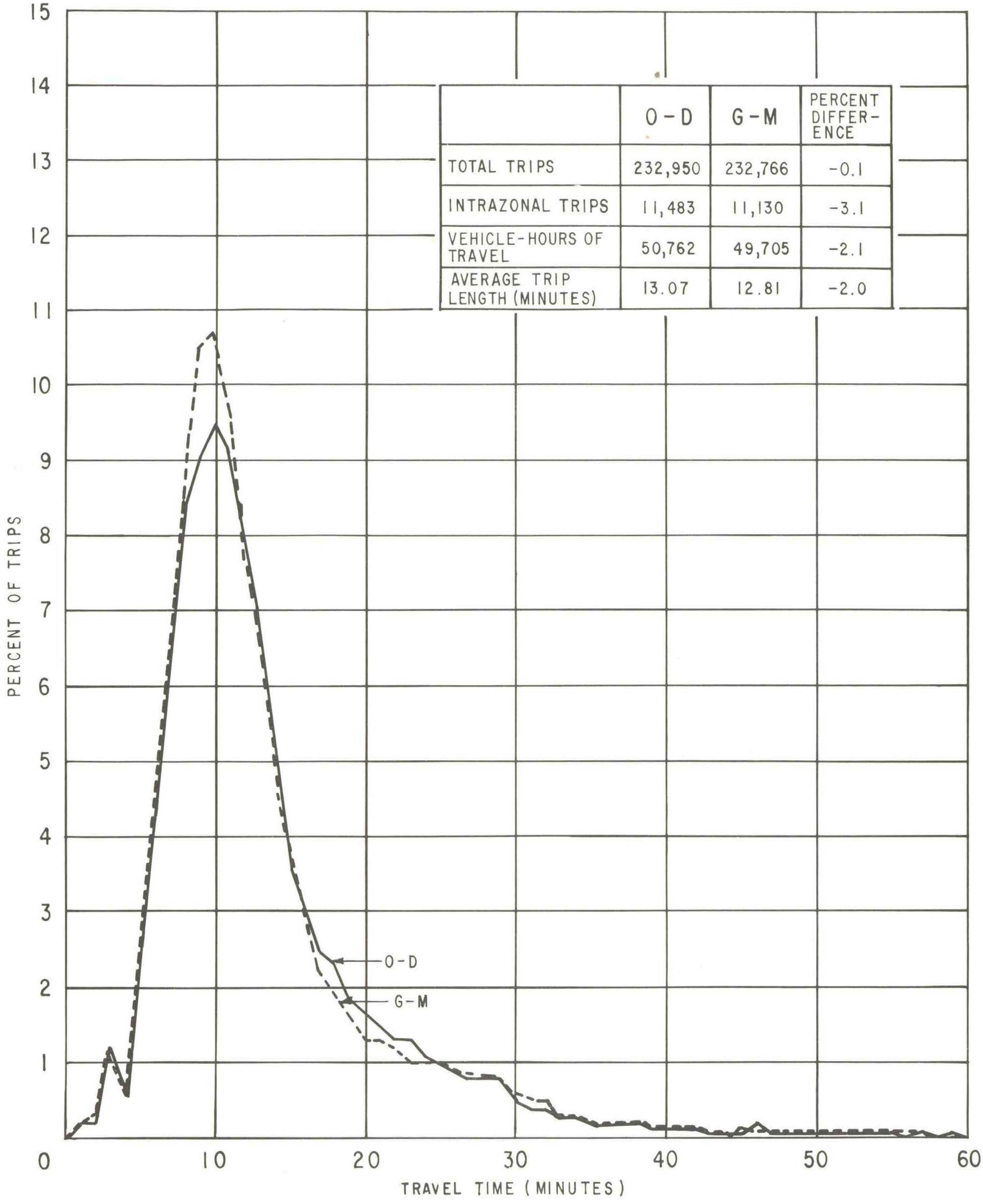
FIGURE 41



	O-D	G-M	PERCENT DIFFERENCE
TOTAL TRIPS	232,950	232,766	-0.1
INTRAZONAL TRIPS	11,483	11,130	-3.1
VEHICLE-HOURS OF TRAVEL	50,762	49,705	-2.1
AVERAGE TRIP LENGTH (MINUTES)	13.07	12.81	-2.0

HOME BASED OTHER TRIPS

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URBANIZED AREA TRANSPORTATION STUDY

TRIP LENGTH FREQUENCY COMPARISON

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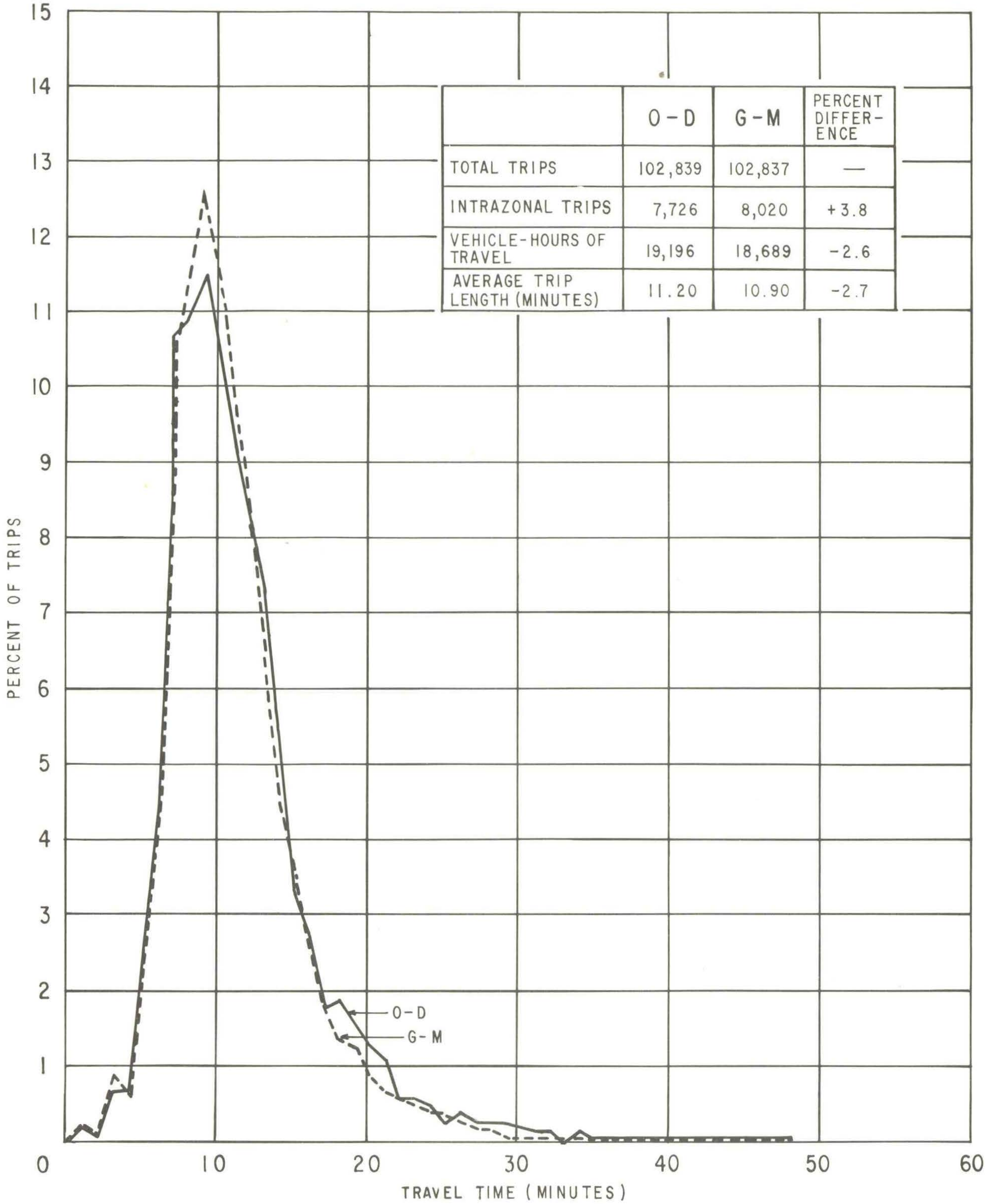
FIGURE 42



	O-D	G-M	PERCENT DIFFERENCE
TOTAL TRIPS	102,839	102,837	—
INTRAZONAL TRIPS	7,726	8,020	+3.8
VEHICLE-HOURS OF TRAVEL	19,196	18,689	-2.6
AVERAGE TRIP LENGTH (MINUTES)	11.20	10.90	-2.7

NON-HOME BASED TRIPS

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URBANIZED AREA TRANSPORTATION STUDY
TRIP LENGTH FREQUENCY COMPARISON
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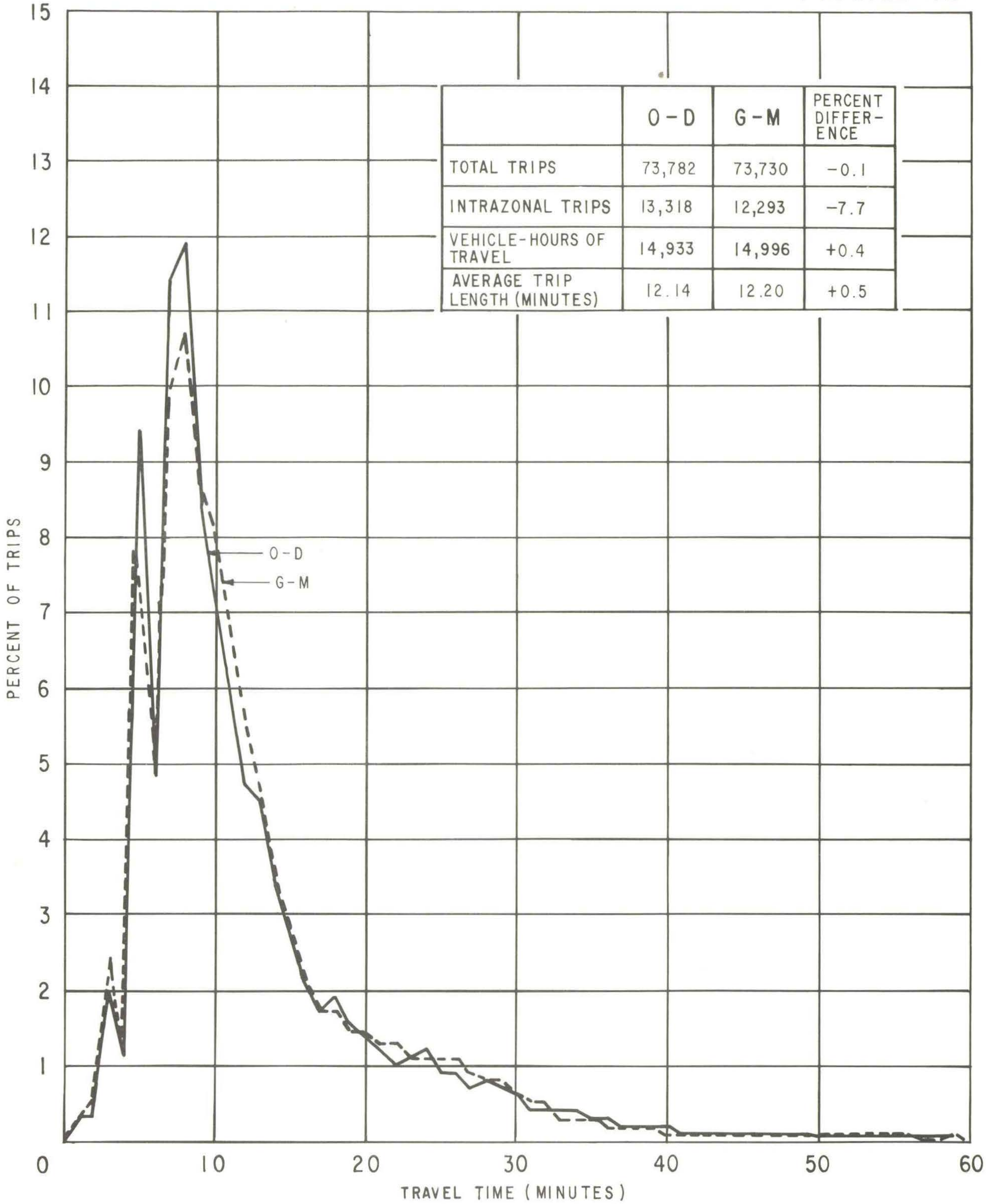
FIGURE 43



	O-D	G-M	PERCENT DIFFERENCE
TOTAL TRIPS	73,782	73,730	-0.1
INTRAZONAL TRIPS	13,318	12,293	-7.7
VEHICLE-HOURS OF TRAVEL	14,933	14,996	+0.4
AVERAGE TRIP LENGTH (MINUTES)	12.14	12.20	+0.5

TRUCK TRIPS

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TRIP LENGTH FREQUENCY COMPARISON

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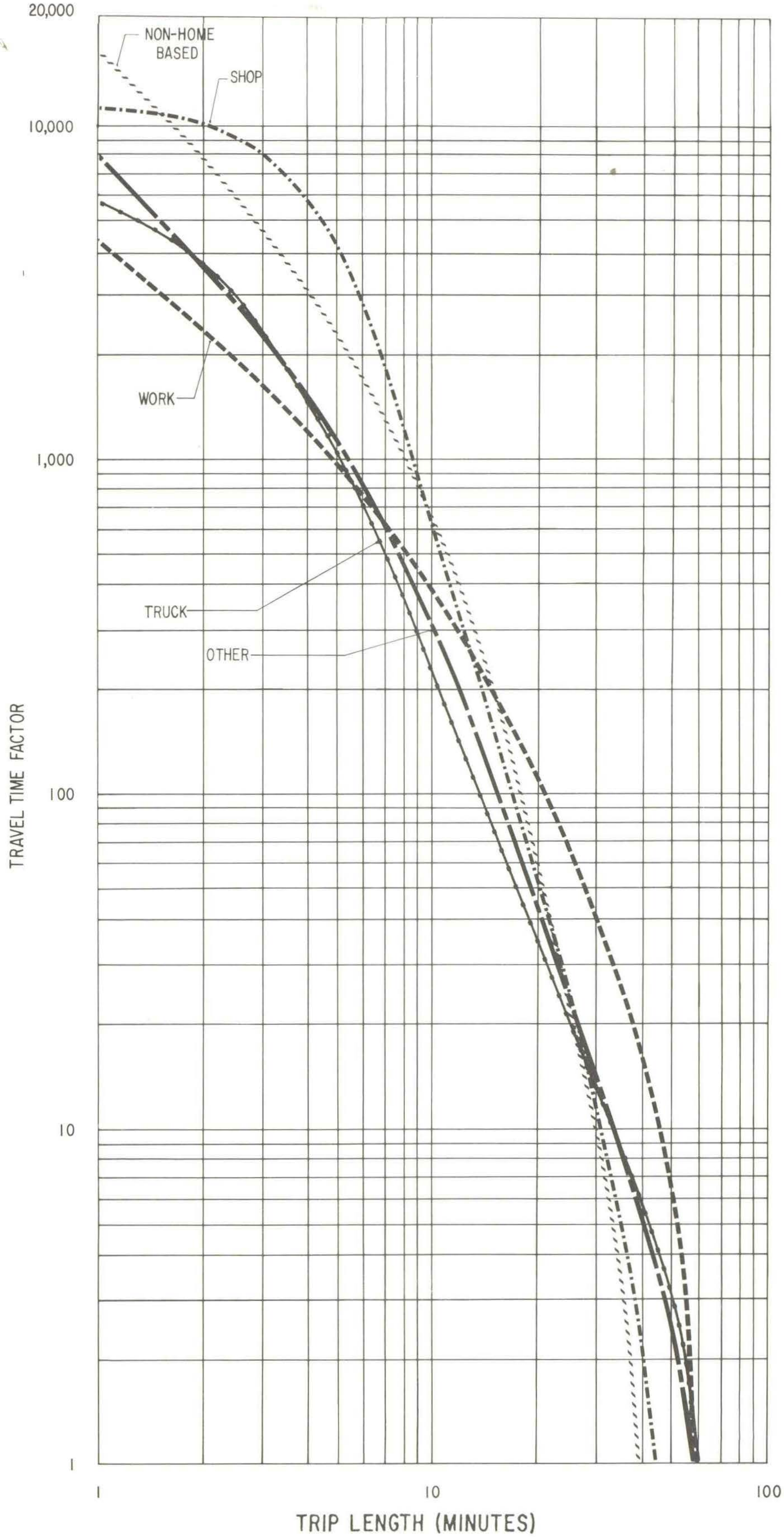
Table 18

COMPARISON OF ORIGIN-DESTINATION
AND GRAVITY MODEL TRIP LENGTHS
VEHICULAR TRIPS

Trip Lengths (Minutes)	Vehicle Trips O-D	Vehicle Trips GM	Percent of Total O-D	Percent of Total GM	Cumulative Percent O-D	Cumulative Percent GM
1	1,118	924	.2	.2	0.2	0.2
2	960	1,247	.1	.2	0.3	0.4
3	6,603	6,958	1.1	1.1	1.4	1.5
4	3,709	3,795	.6	.6	2.0	2.1
5	21,469	19,423	3.5	3.2	5.6	5.3
6	25,356	24,810	4.2	4.1	9.7	9.4
7	46,179	44,396	7.6	7.3	17.3	16.7
8	56,100	56,532	9.2	9.3	26.5	26.0
9	55,100	61,840	9.1	10.2	35.6	36.2
10	54,493	60,965	9.0	10.0	44.6	46.2
11	51,391	54,344	8.4	8.9	53.9	55.1
12	45,139	45,389	7.4	7.5	60.4	62.6
13	39,434	38,126	6.5	6.3	66.9	68.9
14	30,257	27,961	5.0	4.6	71.9	73.5
15	21,344	21,803	3.5	3.6	75.4	77.1
16	17,221	17,577	2.8	2.9	78.2	80.0
17	14,188	13,690	2.3	2.2	80.5	82.2
18	13,625	11,877	2.2	1.9	82.8	84.1
19	12,157	10,287	2.0	1.7	84.8	85.8
20	10,555	8,693	1.7	1.4	86.5	87.2
21	9,062	8,140	1.5	1.3	88.0	88.5
22	8,308	7,705	1.4	1.3	89.4	89.8
23	8,181	6,681	1.3	1.1	90.7	90.9
24	7,163	6,738	1.2	1.1	91.9	92.0
25	6,885	6,440	1.1	1.1	93.0	93.1
26	6,122	5,943	1.0	1.0	94.0	94.1
27	5,250	5,535	.9	.9	94.9	95.0
28	4,442	4,568	.7	.7	95.6	95.7
29	4,597	4,261	.8	.7	96.4	96.4
30	3,129	3,383	.5	.6	96.9	97.0
31	2,669	2,743	.4	.5	97.3	97.5
32	2,302	2,568	.4	.4	97.7	97.9
33	1,987	1,957	.3	.3	98.0	98.2
34	2,080	1,813	.3	.3	98.4	98.5
35	1,516	1,503	.2	.2	98.6	98.7
36	1,273	1,214	.2	.2	98.8	98.9
37	1,029	1,062	.2	.2	99.0	99.1
38	1,116	930	.2	.2	99.2	99.3
39	731	772	.1	.1	99.3	99.4
40	845	712	.1	.1	99.4	99.5
41 and Over	3,432	2,754	.6	.5	100.0	100.0
TOTAL	608,517	608,059	100.0	100.0		



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COMPARISON OF TRAVEL TIME FACTORS AND TRIP LENGTHS

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3. Finally, adjustment factors were used in calibration of the gravity model to account for more intrazonal travel by trucks than in other trip purpose categories.[1] This is common, however, since many trucks are used for multiple stop, pickup and delivery, therefore, increasing their relative proportion of intrazonal travel.

All zone-to-zone adjustment factors used in calibrating the gravity model are readily explained by these local conditions in the study area. Therefore, the factors can be applied with confidence in projecting traffic estimates.

Testing the Gravity Model

Further comparisons were made to test the ability of the gravity model to simulate present travel patterns accurately. Analyses described in a prior section of this report were intended primarily to adjust the model for bias resulting from topographic barriers and socio-economic characteristics of the area.

Vehicular trips in all purpose categories were combined after application of the gravity model program and assigned to the spider web network. A similar assignment was made of consolidated trip data from the 1961-1964 origin-destination surveys. The differences in absolute volumes on each link as well as the differences expressed as percentages were analyzed. Figure 45 compares the assignment of vehicular traffic to the spider web network from both the origin-destination survey and the gravity model.

Statistical and screen line tests supplemented visual comparisons. Table 19 compares volume groups statistically. Screen line comparisons are summarized in Table 20. Figure 46 shows the location of the screen lines.

Analyses and tests indicated that the gravity model, as calibrated, adequately synthesized origin-destination trip distribution.

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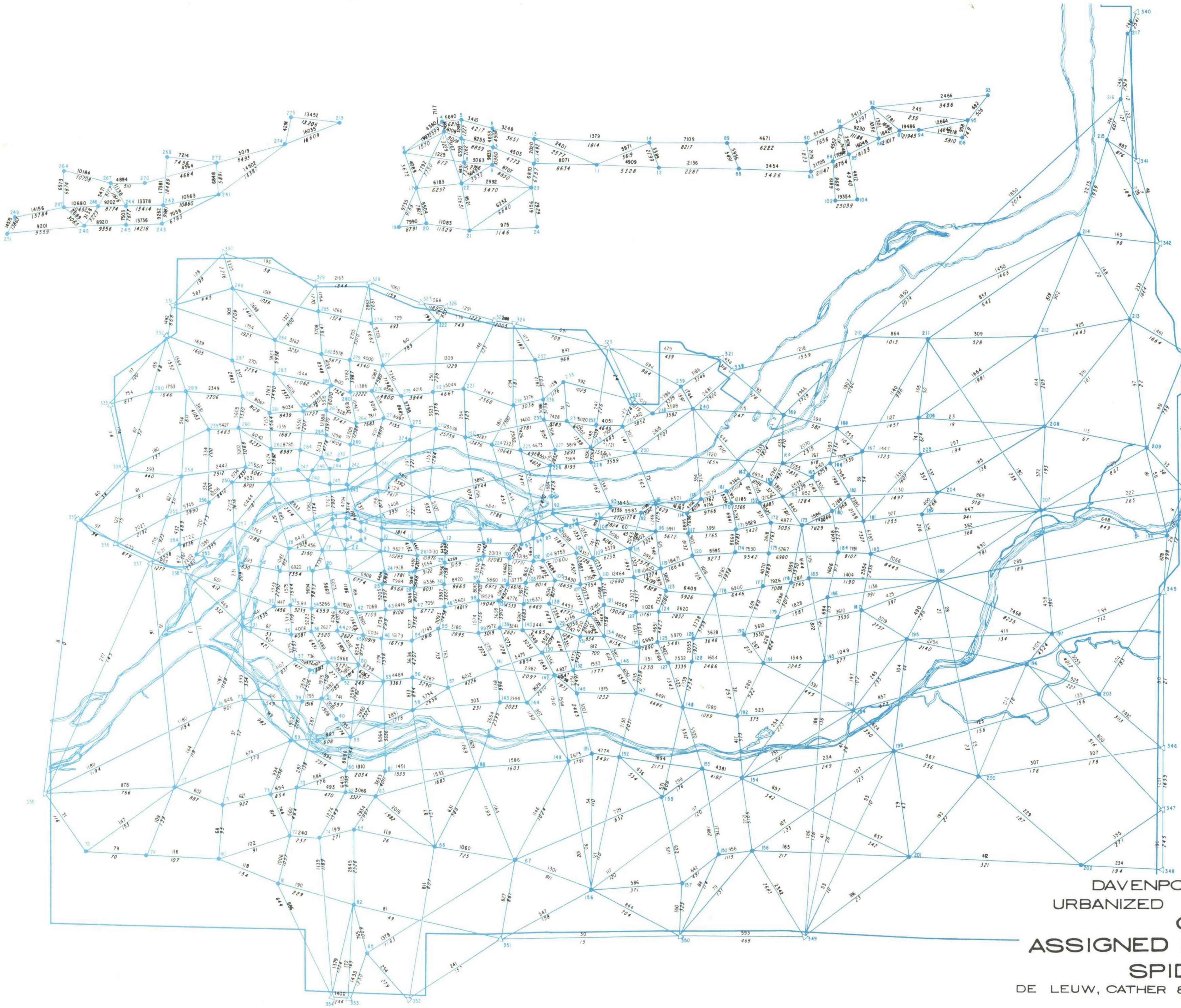
(1)-Intrazonal trips are those with both origin and destination in the same traffic zone.



LEGEND

00.0 - OD SURVEY VOLUME (VEHICLES PER DAY)

000 - GRAVITY MODEL VOLUME (VEHICLES PER DAY)

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COMPARISON OF ASSIGNED 1961-1964 OD AND GM TRIPS SPIDER WEB NETWORK

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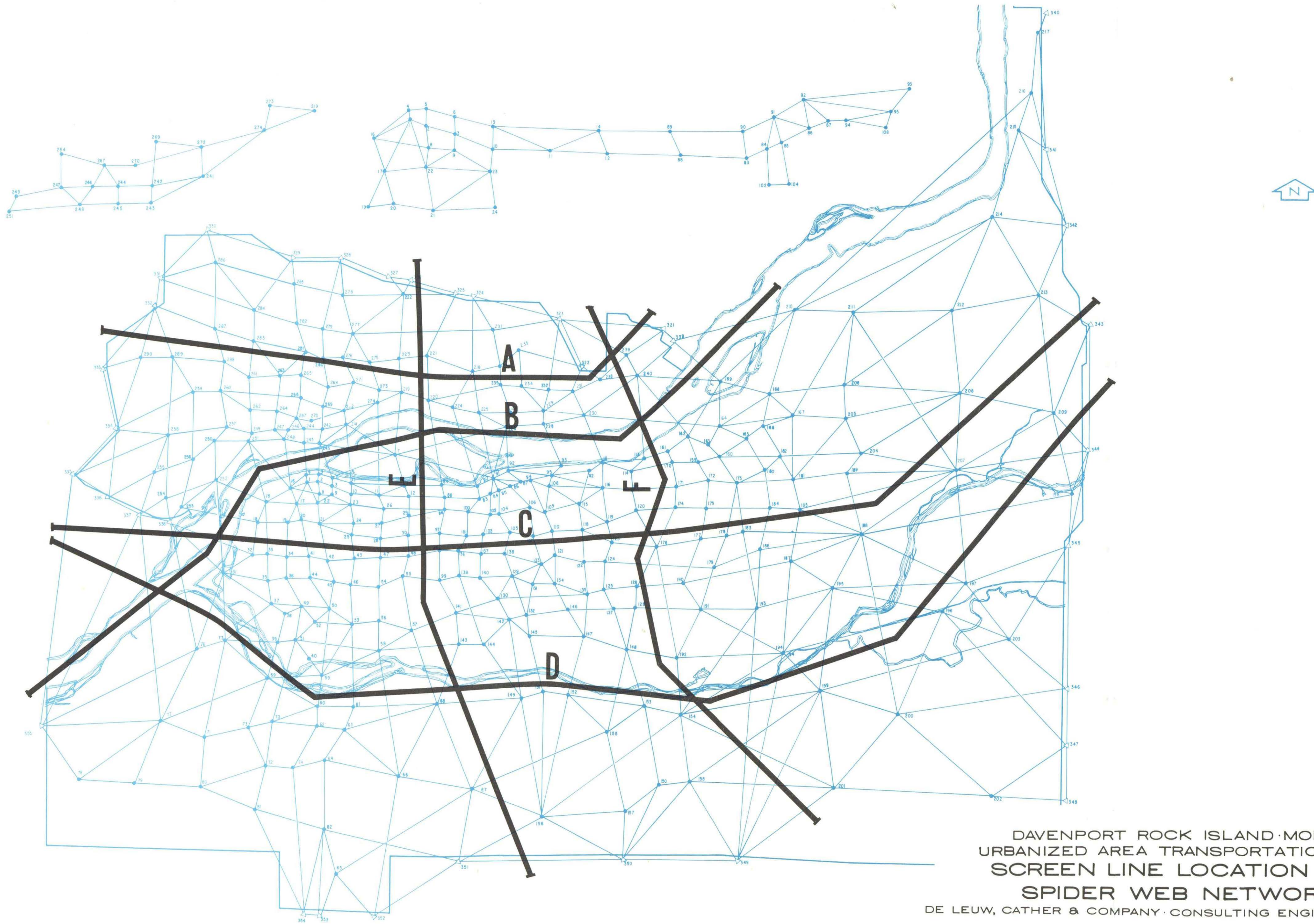
Table 19

STATISTICAL ANALYSIS OF 1961-1964 ORIGIN-DESTINATION AND GRAVITY MODEL ASSIGNMENTS TO SPIDER WEB NETWORK

Origin-Destination Volume Group	Number of Links	Average O-D Volume	Average GM Volume	Mean Difference	Root Mean Square (RMS) Error	Percent RMS Error (1)
0- 499	149	185.3	241.7	56.4	104.0	56.1
500- 999	87	741.6	824.5	82.9	215.4	29.0
1,000- 2,999	188	1853.2	1897.4	44.2	355.8	19.1
3,000- 4,999	109	3828.3	3800.4	-27.9	497.8	13.0
5,000- 6,999	70	5980.6	5860.4	-120.2	539.8	9.0
7,000- 9,999	84	8118.3	7813.5	-304.8	742.6	9.1
10,000-14,999	49	12499.2	11619.0	-880.2	1345.4	10.7
15,000 or more	20	19079.2	17422.2	-1657.0	2177.9	11.4
All Volume Groups	756	3905.3	3787.1	-	-	-

(1) 100(RMS Error/Average OD Volume)

FIGURE 46



DAVENPORT ROCK ISLAND·MOLINE
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SCREEN LINE LOCATION MAP
SPIDER WEB NETWORK
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Table 20

SCREEN LINE COMPARISON OF 1961-1964
ORIGIN-DESTINATION AND ADJUSTED
GRAVITY MODEL ASSIGNMENT TO SPIDER WEB NETWORK

Screen Line	Total Trips: Origin-Destination	Total Trips: Gravity Model	Difference: Trips	Difference: Percent
A	68,191	65,434	-2,757	-4.0
B	52,604	52,296	- 308	-0.6
C	161,848	155,570	-6,278	-3.9
D	50,880	53,969	+3,089	+6.1
E	108,294	109,744	+1,450	+1.3
F	70,443	68,002	-2,441	-3.5

TRIP GENERATION

The key to predicting future travel patterns is an understanding of the varied interacting relationships between travel characteristics and the surrounding urban environment. Trip generation is the term commonly used to denote the analysis of these relationships. It refers to the number of trips starting or ending in a particular area in relation to the land use or socio-economic characteristics of that area. A study of trip generation does not attempt to describe all of the characteristics of trips--that is, direction, length, or duration--but simply to identify and quantify the trip ends in each traffic zone.

Forecasts of future trip generation are based on existing relationships as well as on projections of the independent variables such as population, vehicle ownership, dwelling units, and employment. This assumes, of course, that the basic relationships by travel purpose will not change in the future. The assumption of the stability of the relationship between trips and land use and socio-economic variables over time, is basic to forecasting and, in fact, to the entire procedure. Hence it is extremely important that only variables with stable relationships be used.

The purpose of the trip generation analysis phase of the transportation study, therefore, is to provide a method of estimating the number of trips per average weekday that will begin or end in each traffic zone on the basis of the land use or socio-economic characteristics of that zone.

<u>Variations in Basic Data</u>

Some of the differences between the Iowa and Illinois studies which were particularly significant in the analysis of trip generation were:

1. The proportion of traffic zones in the Illinois portion of the study area exhibiting rural or non-urbanized land use characteristics was much greater than in the Iowa portion of the study area. Prior research has shown that variations in intensity of land activity have a distinct impact on a particular area.

2. Procedures used to adjust reported trips differed in the two studies. In the Iowa study, trips for all purposes obtained in the internal study were increased by 25 percent. Illinois internal trip reports were factored for all purposes except "work", the factors ranging from 1.90 to 4.88.

3. The Iowa study was made almost entirely during the summer months of 1961. The Illinois study began in the summer of 1964 and extended into the autumn of 1964. This seasonal inconsistency resulted in a discernible difference in generating rates of school trips and, to a lesser extent, social-recreation trips.

4. It was decided at the outset of the analysis that, if possible, trip generation relationships applicable to both the Iowa and Illinois portions of the study area would be established. Comparable socio-economic and land use data for each traffic zone are required for this purpose. Table 21 lists all the dependent variables known to affect trip generation by their source and availability.

Table 21

SOCIO-ECONOMIC AND LAND USE DATA

Factor	Source or Availability by Traffic Zone: Iowa	Source or Availability by Traffic Zone: Illinois
Population	O-D dwelling unit survey	O-D dwelling unit survey
Number of dwelling units	O-D dwelling unit survey	O-D dwelling unit survey
Residential density	Not available	O-D dwelling unit survey and land use inventory
Car ownership	O-D dwelling unit survey	O-D dwelling unit survey
Truck ownership	Not available	Truck survey
Employed residents	O-D dwelling unit survey	O-D dwelling unit survey
Personal or family income	Not available	Inventory of economic factors affecting development
Student residents	O-D dwelling unit survey	Not available
Employment	O-D dwelling unit survey	O-D dwelling unit survey or augmented employment security records
Land use	Not available	Land use inventory
School enrollment	O-D dwelling unit survey	Inventory of social and community value factors

Methodology

The trip generation analysis was made in terms of trip "productions" and "attractions". To define productions and attractions, it is first necessary to classify all trips as home based or non-home based. Home based trips are defined as those having one end at the residence of the trip maker. Non-home based trips have neither end at the residence of the trip maker.

All home based trips are taken to be produced at the zone of residence of the trip maker, whether the trip begins or ends in that zone, and all are attracted at the non-residential end of the trip. All non-home based trips are assumed to be produced by the zone of origin and attracted by the zone of destination. Truck trips were also considered to be non-home based.

Trips were stratified into five classifications: home based work; home based shop; home based other; non-home based; and truck.

The areal unit of analysis is the traffic zone, a relatively homogeneous section of the study area to which all trip origins and destinations were coded and within which inventories of socio-economic and land use factors were made. The data used were in terms of "person trips" and included all trips made on a weekday by residents of the area (except by walking) regardless of mode.

Among the many factors considered in the analysis of trip generation equations were:

1. Results of statistical evaluation measuring the degree of correlation and the stability of relationship between independent variables (various socio-economic and land use factors) and the dependent variables (trip generation).

2. Logic and reasonableness of the independent variables used in trip generation equations.

3. Avoidance of more than one independent variable per equation from a number of highly related variables.

4. Degree of accuracy with which the independent variable may be forecast.

5. Degree of urbanization of each zone and the number of trips generated in each.

6. Special trip generators such as airports, major shopping centers or other large facilities.

Development of Trip Generation Equations

Trip generation equations were developed for each of the five categories of trip end stratifications. With the exception of the equations for truck trip generation, all relationships are expressed in terms of person trips.

Initial equations were developed using data from all 290 traffic zones in the internal study area. Land activity measures, which were used in each of the estimating equations, are shown in Table 22. Productions and attractions included all trips which had either an origin or a destination in the internal study area. Table 23 gives the total number of internal trip ends in each trip purpose category.

Later in the analysis the equations were refined by eliminating zones which were non-urban in character as well as those which produced or attracted few trips or had land activity not applicable to a specific trip purpose.

The final equations developed for future trip generation are presented in Table 24. As this table illustrates, many factors affect the number of trips produced in and attracted to a particular area.

The number of home based work trips, for example, is a function of the population, number of dwelling units, number of cars owned, and employed residents in each traffic zone. Because of the close relationship between these variables, however, only one could be used in the estimating equation. The number of employed residents was selected on the basis of both statistical correlation and logic. Similarly, home based work person trip attractions were related to total employment at the zone of attraction.

Home based shop trip productions were found to be correlated with the number of cars owned in a traffic zone. The number of families owning one, two, three or more cars was also tested as a possible independent variable. Statistical results were similar, but use of total

Table 22

TRIP PRODUCTIONS AND ATTRACTIONS
VS.
LAND ACTIVITY MEASURES USED IN EQUATIONS

	Independent Variables										
									Enrolled Students		
Dependent Variables	Population	Dwelling Units	Cars Owned	Employed Residents	Retail Employment	Manufacturing Employment	Other Employment	Total Employment	Grades 1-8	Grades 9-12	Enrolled Students College
HB Work Person Productions				X							
HB Work Person Attractions								X			
HB Shop Person Productions			X								
HB Shop Person Attractions					X						
HB Other Person Productions			X								
HB Other Person Attractions		X			X		X		X	X	X
NHB Person Productions		X			X		X		X	X	X
NHB Person Attractions		X			X		X		X	X	X
Truck Vehicle Productions		X			X	X					
Truck Vehicle Attractions		X			X	X					
Total Productions			X		X						

Table 23

INTERNAL TRIP ENDS BY PURPOSE
ORIGIN-DESTINATION DATA

Trip Purpose	Number of Trip Ends	Percent of Total	Cumulative Percentage
Person Trips, Home Based:			
Work	302,332	17.3	
Shop	228,066	13.1	
Other	786,139	44.9	
Sub-Total Home Based Trips	1,316,537		75.3
Person Trips, Non-Home Based:	293,107	16.8	
Sub-Total Person Trips	1,609,644		92.1
Truck Trips	138,697	7.9	
Total Trips	1,748,341		100.0

Note: Each individual trip has two trip ends. The table excludes trip ends at external stations.

Table 24

SUMMARY OF TRIP GENERATION EQUATIONS
PERSON TRIPS PER ZONE

Home Based Work

Productions = 41.85 + 1.58 (Emp Res)

Attractions = 62.84 + 1.51 (Tot Emp)

Home Based Shop

Productions = 64.17 + 1.13 (Cars)

Attractions
- CBD = 1096.5 + 2.74 (Ret Emp)
- Shopping Center = 821.9 + 16.72 (Ret Emp)
- Strip Development = 14.4 (Ret Emp)
- Other Areas = 4.3 (Ret Emp)

Total (For control total checks only)

Productions = 596.83 + 7.13 (Cars) + 5.06 (Ret Emp)

Home Based Other

Productions = 45.74 + 4.72 (Cars)

Attractions
- Personal Business = 485.7 + 2.52 (Ret Emp) + 0.98 (Oth Emp)
- Social-Recreation = 325.1 + 0.70 (DU) + 0.95 (Ret Emp) + 0.24 (Oth Emp)
- School (1-8) = 0.89 (Stu 1-8)
- School (9-12) = 1.52 (Stu 9-12)
- School (College) = 1.24 (Stu Col)

Non-Home Based

Productions = Attractions = 80.0 + 0.25 (HBO Att + HBS Att)

Truck

Productions = Attractions = 75.14 + 0.33 (DU) + 0.13 (Mfg Emp) + 1.03 (Ret Emp)

Where:

Emp Res	=	Employed Residents
Tot Emp	=	Total Employment
Ret Emp	=	Retail Employment
Mfg Emp	=	Manufacturing Employment
Oth Emp	=	Other Employment
Cars	=	Cars Owned
DU	=	Dwelling Units
Stu 1-8	=	School Enrollment (1-8)
Stu 9-12	=	School Enrollment (9-12)
Stu Col	=	School Enrollment (College)

cars owned per traffic zone gave the best results. In addition, total cars owned could be forecasted by traffic zone with greater reliability than the number of one-car families, two-car families, etc.

Home based shop trip attractions were found to correlate best with the number of retail employees in each traffic zone. The initial equation tested indicated, however, that trip making rates varied widely and that stratification would be required to establish satisfactory relationships.

Analyses of the rate of shopping trip attraction per retail employee indicated that there were four distinct categories of retail activity with diverse trip making rates:

1. Central business districts;
2. Shopping centers and outlying business districts;
3. Strip commercial developments; and
4. Other areas.

The home based other category of travel included trips for purposes of personal business, medical-dental, school, social-recreation, change travel mode, eat meal, and serve passenger. The aggregation of so many diverse types of travel into a single category posed difficulties in determining both production and attraction equations.

Analysis of the data indicated a significant difference in home based other trip making rates between the Iowa and Illinois portions of the study area. In view of the obvious differences, particularly in the category of school trips, it was decided that a home based other trip production equation could not be developed to reflect a true relationship for the combined study area. Instead, the equation was derived on the basis of Illinois data alone and was intended for application to the entire study area when forecasting future travel.

The number of cars owned in each traffic zone was found to be the best indicator of home based other person trip productions. The final estimating equation was based on Illinois data alone.

Examination of the initial equation for home based other person trip attractions indicated that, because of the large number of trips (393,564) for diverse purposes, the equation should be divided into a combination of a few basic purposes. New trip attraction summaries were made, therefore, to produce the required data breakdown. A combination of personal business, medical-dental, change travel mode, and serve passenger trips (181,251), all referred to hereafter as the personal business group, was used as the basis of one equation. Social-recreation and eat meal trips (159,125), later referred to as social-recreation trips, were combined into another equation. School trips (53,188) were treated separately.

Non-home based trip productions were found to be highly correlated with non-home based trip attractions. Attractions were assumed to equal productions, therefore, for this category of trip making.

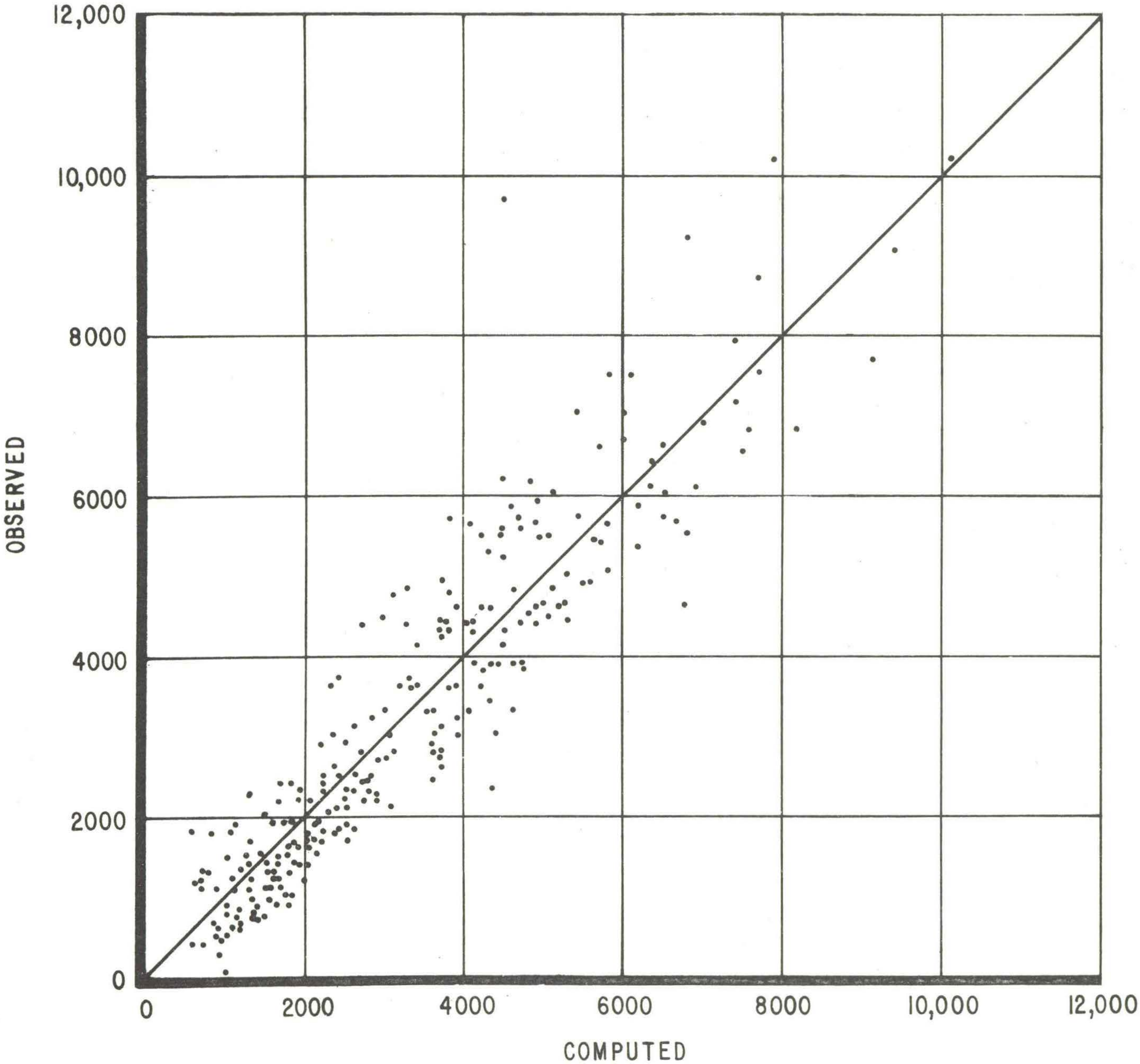
Non-home based trips, by definition, must begin at the attraction of a home based trip or another non-home based trip. The simple correlation matrix verified the correlation of non-home based trip attractions with home based other and home based shop trip attractions. The final estimating equation was based on this premise.

Because of the nature of truck movements, productions and attractions by traffic zone are usually equal. This was found true of truck movements in the Davenport-Rock Island-Moline study area. The correlation coefficient was 0.994, indicating a strong relationship between truck productions and attractions.

In predicting the future number of truck trips, a measure of both non-residential and residential activity is normally used. In this study, truck trips were related to dwelling units, manufacturing employment, and retail employment.

An equation to estimate total trip productions is desirable, both to give a control total on areawide trip productions and to check estimated productions for logic at the zonal level. Such an equation should include both residential and non-residential measures of land activity.

An estimating equation for total trip productions was determined using cars owned and retail employment as the independent variables. Statistical tests of the equation indicated that it was a reliable method for checking travel forecasts. Observed and estimated trips for the total production equation are compared in Figure 47.



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PLOT OF OBSERVED VERSUS ESTIMATED VALUES OF THE DEPENDENT VARIABLE TOTAL PRODUCTION

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Statistical tests of the final estimating equations indicated that the relationships compared favorably with those of similar analyses in other areas. Independent variables used in the equations were logically related to the dependent variables and were limited to measures of activity which could be forecast with confidence.

MODAL SPLIT AND CAR OCCUPANCY

The final step in development of travel forecasting procedures is the division of travel demand into two components, i.e., demand for public transportation and demand for private transportation. This procedure has been named "modal split". Companion analyses are also required to translate person trip generation into vehicular trips.

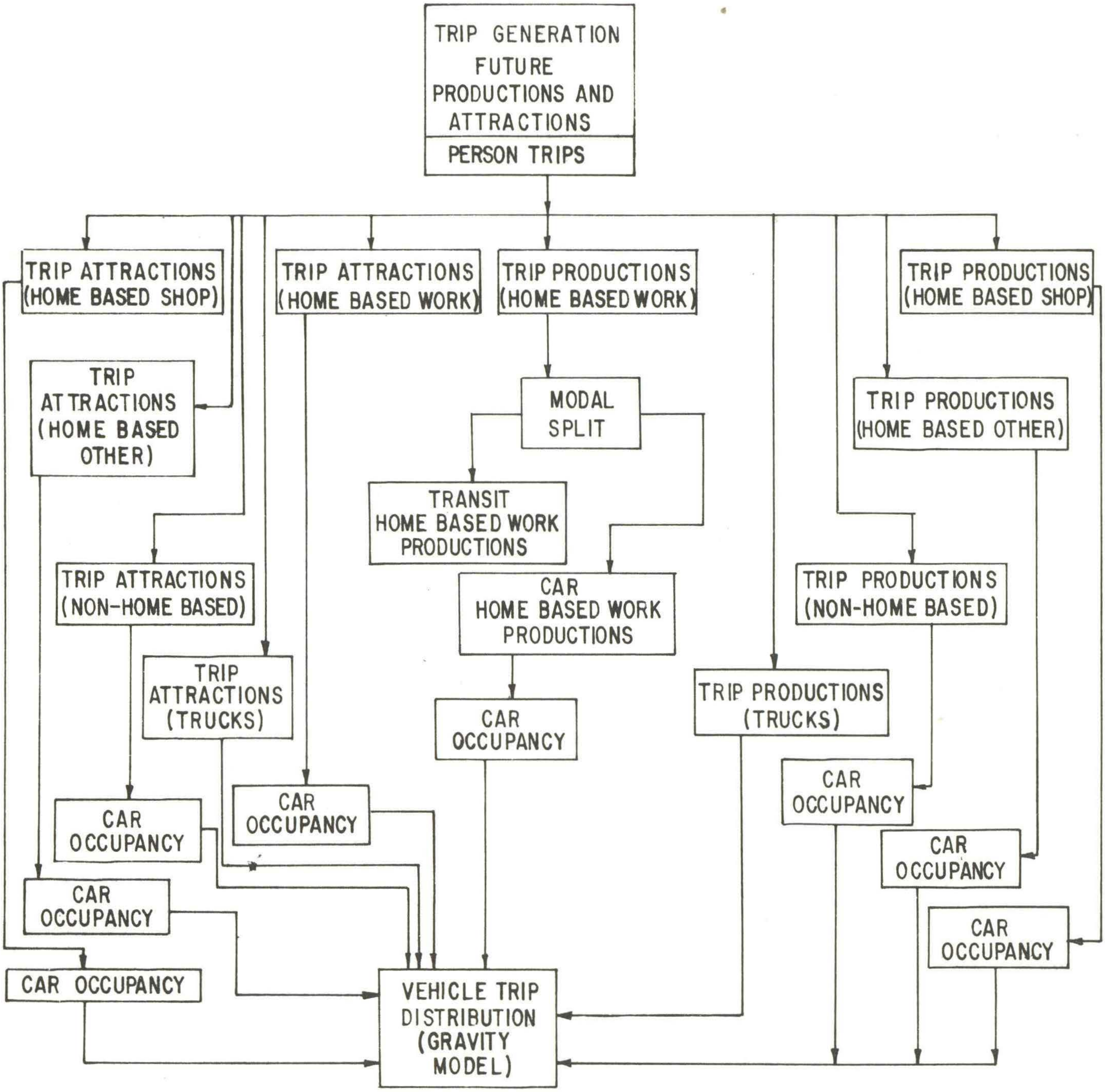
Modal Split

Transit usage in the Davenport-Rock Island-Moline transportation study area was found to be a minor component of total person travel. The origin-destination studies indicated that only 9,572 or 1.19 percent of the daily trips were made by transit. Travel to and from work accounted for 46.2 percent of the total daily trips by bus.

The transportation study work program specified use of the "Erie" modal split model to estimate future transit usage. Figure 48 shows the flow diagram for this procedure. It is a "trip end" model which recognizes the quality of service provided by the alternative modes of travel through use of accessibility of employment indices. The model postulates that work trips are of primary importance since they place a concentrated demand on the system, whereas trips for other purposes are more widely dispersed both geographically and by time of day.

The ratio of transit/highway accessibility to employment, a measure of quality of service provided by alternative modes of travel, was plotted against percent transit usage for trips to and from work as reported in the 1961 and 1964 origin-destination surveys. See Figure 49. Separate curves were derived for the Iowa portion of the study area, the Illinois portion of the study area, and the combined total.

Comparison of the curves shown in Figure 49 indicates that there was proportionately more transit travel in the Iowa portion



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URBANIZED AREA TRANSPORTATION STUDY

ERIE MODAL SPLIT PROCEDURE

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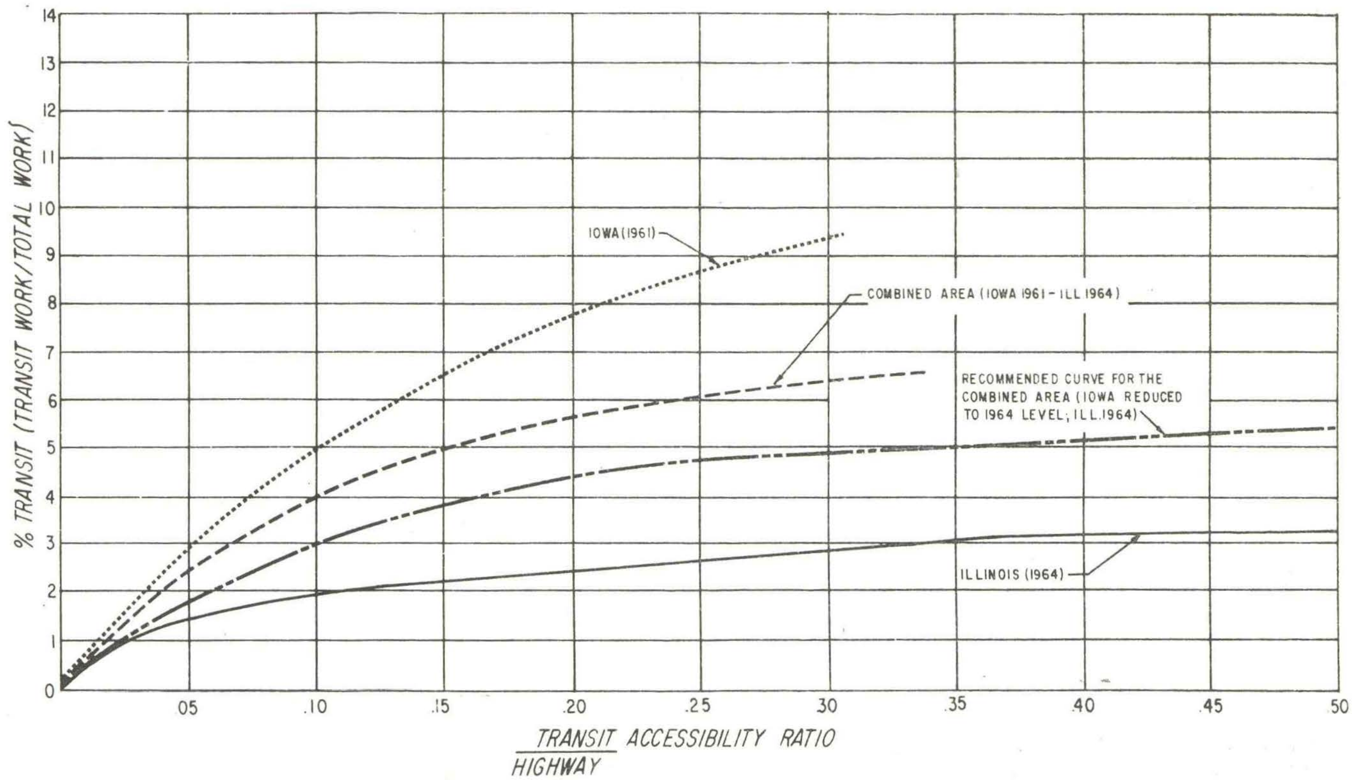

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PERCENT TRANSIT AND ACCESSIBILITY RATIO

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of the study area than in Illinois. This is explained primarily by the three-year interval between the two origin-destination studies. Bus company records indicate that transit usage decreased by 16 percent between 1961 and 1964. Therefore, the Iowa transit work productions were reduced by 16 percent and a new curve for the combined area was plotted. This was deemed to be the best curve which could be developed to express modal split of person work trip productions.

Caution should be exercised in using derived relationships between percent of person trips by transit and the transit/highway accessibility ratio. Such a relationship would appear to be logical, but there were too few transit trips in the base year to determine a statistically sound correlation at the zonal level. More realistic forecasts of future transit travel might be developed from trends in transit usage, taking into account proposed extensions and improvements.

If extensive transit improvements, i.e., rapid transit or express bus operation, evolve in the planning process, forecasts should be based on the findings of demonstration studies in other comparable urban areas.

In conclusion, it is suggested that future transit travel estimates be based more on judgment and experience than on statistical analyses.

Car Occupancy

The final step in travel forecasting is to convert productions and attractions from person trips into vehicle trips. To do this, relationships are determined which express car occupancy for each purpose category of person trip productions and attractions.

Car occupancy of home based work trip productions in each traffic zone in the Davenport-Rock Island-Moline area was calculated by dividing total person trips (except transit) by the total number of auto driver trips. For all other purpose categories, total person trips, including those by transit, were divided by auto driver trips to determine car occupancy.

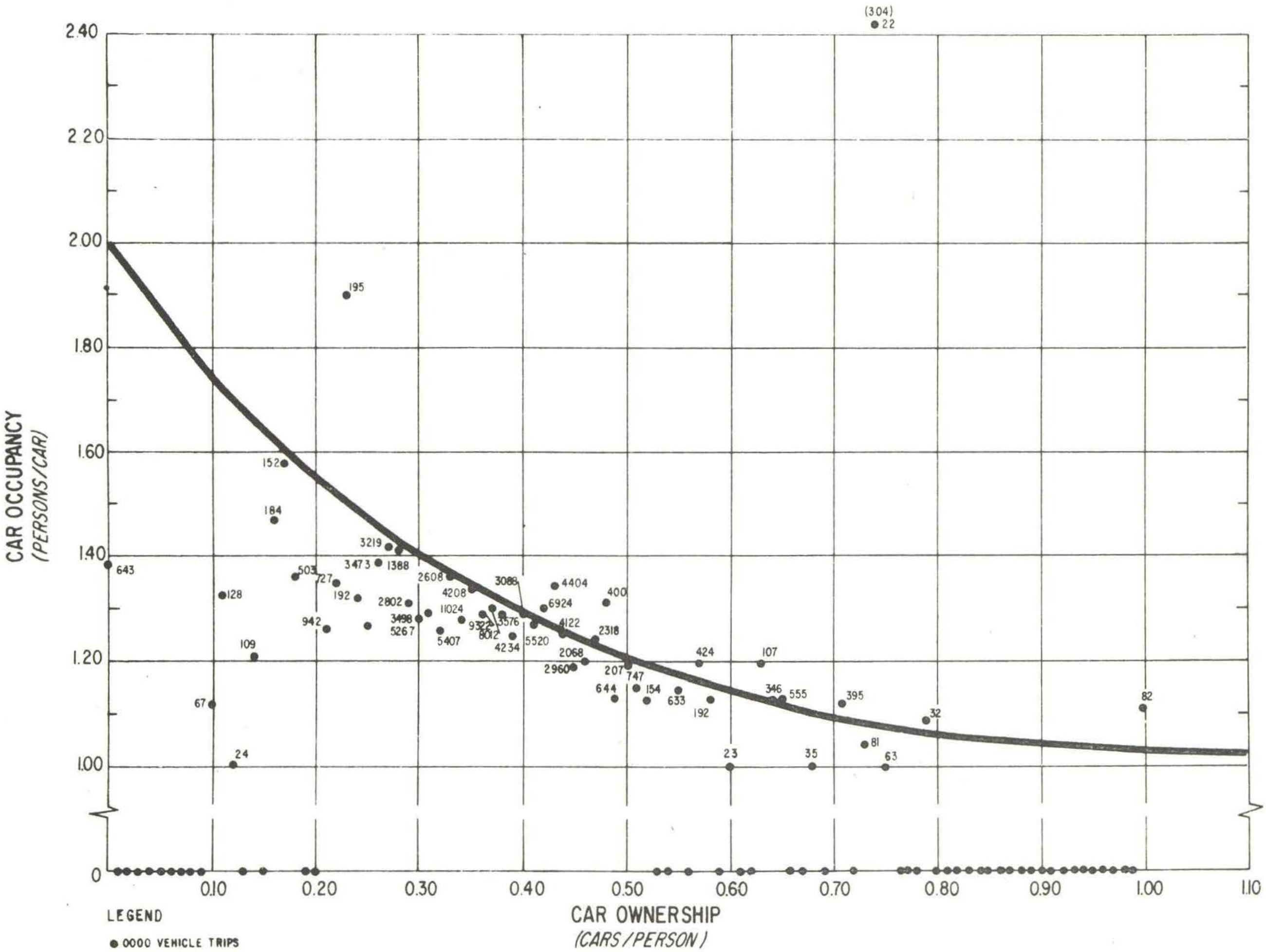
Analysis of trip productions in each purpose category showed a correlation between car occupancy and vehicle ownership expressed in terms of cars owned per person. Average car occupancy weighted by the total number of vehicle trip productions was calculated and plotted at one-hundredth increments of car ownership. Figures 50 through 53 show curves fitted to these values for home based work, home based shop, home based other, and non-home based trip productions, respectively.

A similar procedure was used to convert person trip attractions to vehicle trip attractions. Analyses showed that employment density was the single variable most closely associated with car occupancy at trip attraction. Even with this variable, however, home based work, shop and other trip purposes exhibited constant car occupancy relationships. In the case of non-home based trip attractions, which were highly correlated (R^2 equals 0.937) with non-home based productions, the car occupancy determined for the productions was used.

Based on this analysis, average car occupancy was calculated from origin-destination trip data for the combined Iowa and Illinois study area for home based work and home based shop trip attractions. Because of substantial differences between Iowa and Illinois survey data in the category of home based other trips, average car occupancy for this category of travel was based on Illinois data alone. Average car occupancies for the base year were as follows:

Home based work attractions	1.307
Home based shop attractions	1.567
Home based other attractions	1.830

Car occupancy relationships for trip attractions adequately define base year conditions. The relationships are constant, however, and the absolute value is likely to change in the future. In projecting travel, therefore, the car occupancy constant for trip attractions will be determined from forecasts of person and vehicle trip productions.



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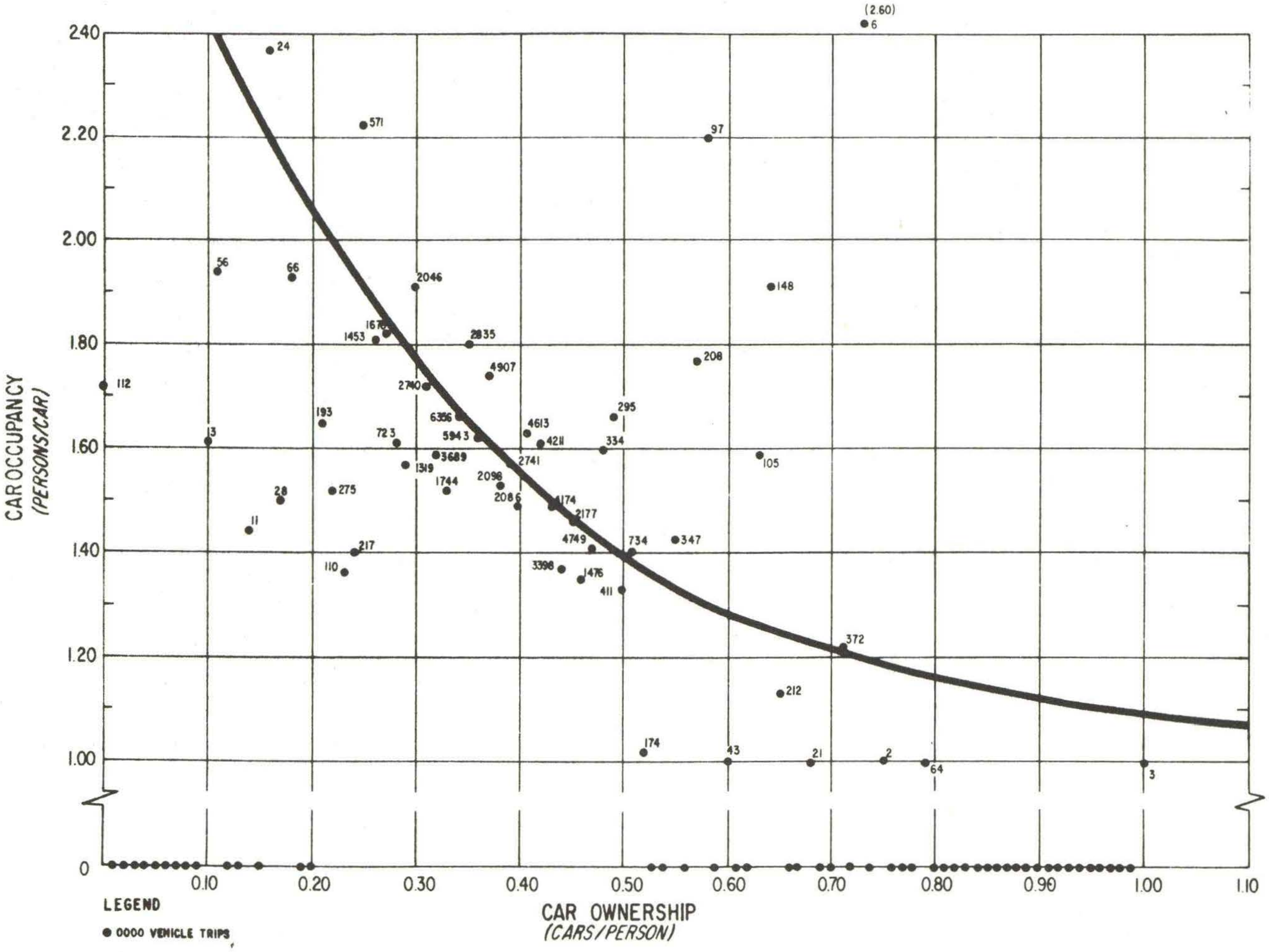
URBANIZED AREA TRANSPORTATION STUDY

CAR OCCUPANCY AND CAR OWNERSHIP
HOME BASED WORK PRODUCTIONS

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO



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CAR OCCUPANCY AND CAR OWNERSHIP
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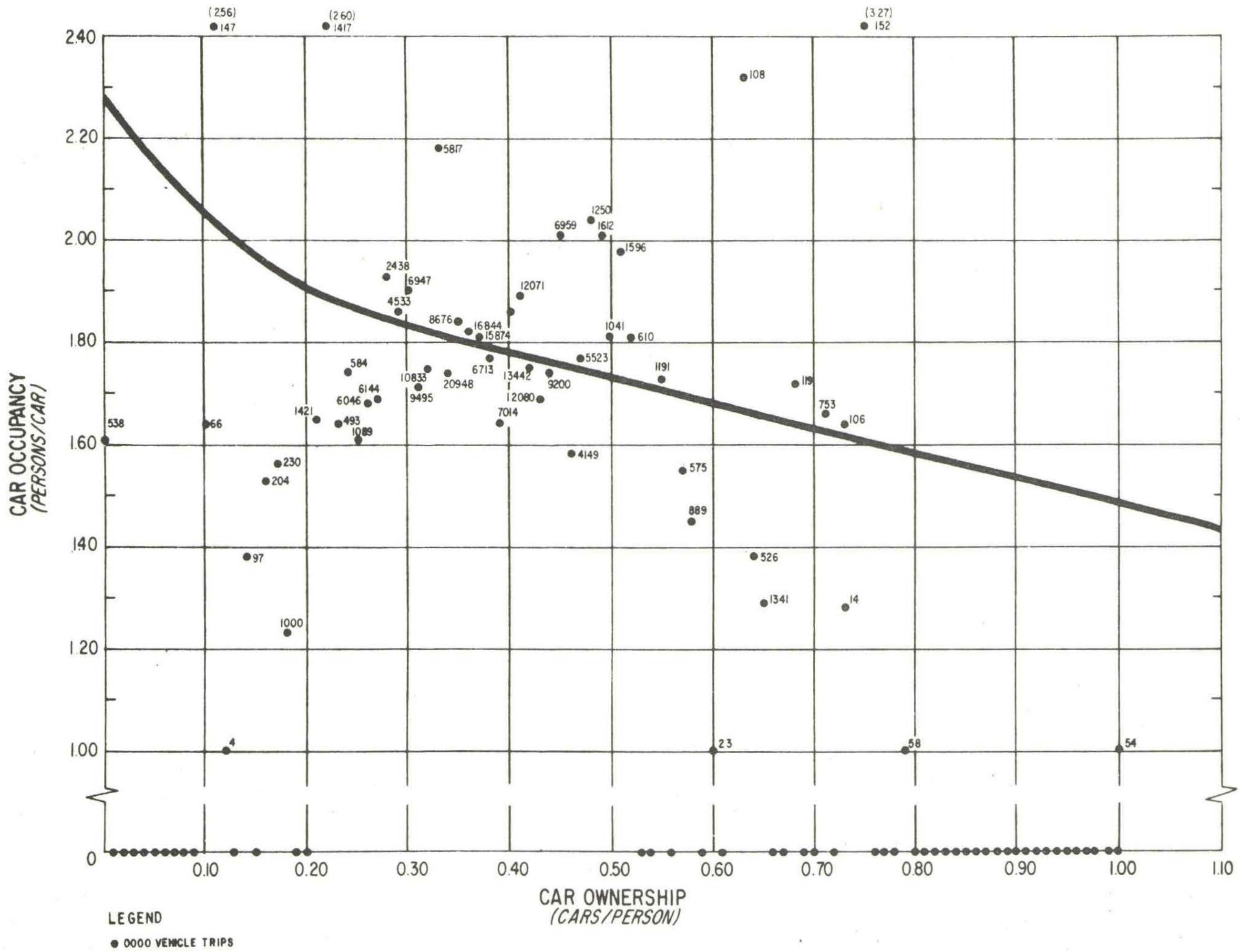

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CAR OCCUPANCY AND CAR OWNERSHIP
HOME BASED OTHER PRODUCTIONS

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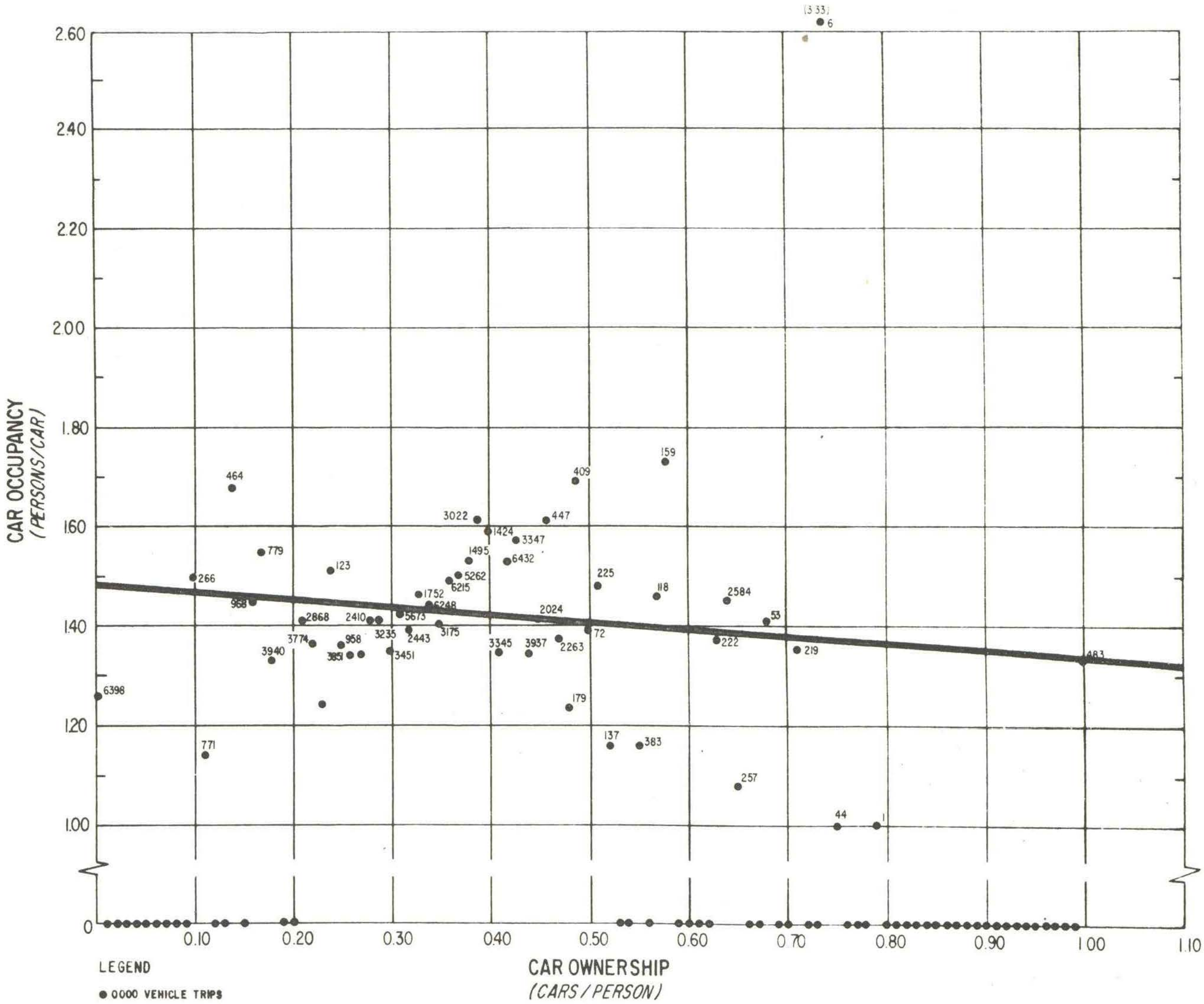

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

CAR OCCUPANCY AND OWNERSHIP
NON-HOME BASED PRODUCTIONS

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Chapter VI

FUTURE TRAVEL PATTERNS

The transportation plan for the Davenport-Rock Island-Moline Metropolitan Area was based on, and closely associated with, a definitive land use plan. Various land use alternatives were developed by the Bi-State Metropolitan Planning Commission. These were reviewed and evaluated by the Policy, Technical and Citizens Advisory Committees and by the Planning Commission. A concept plan was adopted in January 1968 and a more definitive land use plan was adopted in August 1969.

The elements and characteristics of the selected land use plan provided the basic data for projection of travel to 1985 levels.

GOALS AND OBJECTIVES

The Bi-State Metropolitan Planning Commission's Citizens Advisory Committee (CAC) played a vital role in developing the metropolitan goals and objectives which appear below. Each of the six CAC subcommittees met three times to discuss problems and issues facing the metropolitan area. Minutes and recommendations resulting from the CAC subcommittee meetings were reviewed by the Metropolitan Planning Commission. Basic goals and a general outline of action for accomplishing each goal were adopted by the Metropolitan Planning Commission to guide future development of the metropolitan community. Following are the basic goals:

<u>Residential</u>. Encourage for all metropolitan residents areas of adequate design and quality to produce a healthful and satisfying environment.

<u>Commerce and Industry.</u> Expand the metropolitan economy and provide additional employment opportunities by improving existing commercial and industrial establishments and by attracting new commercial and industrial activities to the area.

Transportation. Develop a transportation system in the metropolitan area to provide for the safe, efficient, and economical movement of people and goods.

Recreation and Open Space. Determine future recreational demands and methods for providing the necessary facilities to fulfill these needs.

Government and Public Facilities. Promote governmental facilities and programs which will adequately serve the present and future needs of the metropolitan community.

Urban Design. Provide an environment with attractive and convenient living and working conditions.

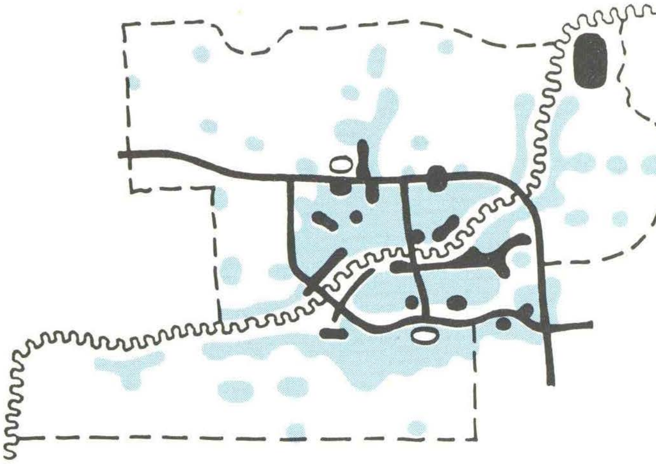
Each of these goals was further refined to guide development of various plans. Several of those directly related to transportation planning are cited under Transportation Plan Development.

CONCEPT PLANS

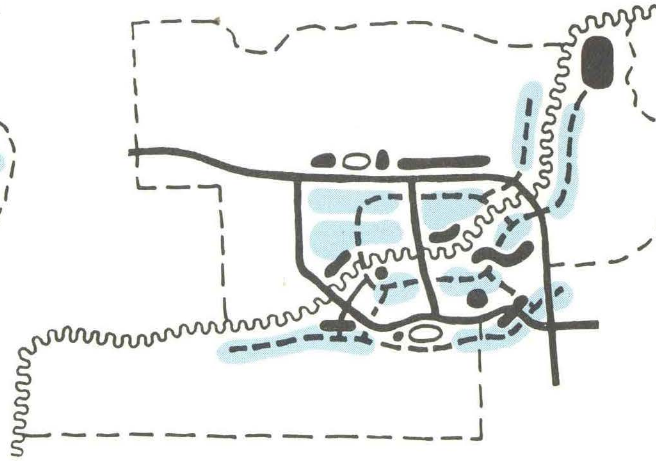
Four alternative concept plans were evaluated prior to adoption of a recommended plan. See Figure 54. The following is a brief general description of each concept.

The Trend Plan Concept illustrates future development patterns likely to result from continuation of current local planning efforts and plan controls. New residential development would continue to be guided essentially by zoning and would occur haphazardly wherever roads, schools or utilities were available or imminent. Regional planning efforts would be directed primarily toward commercial, recreational, institutional and industrial development.

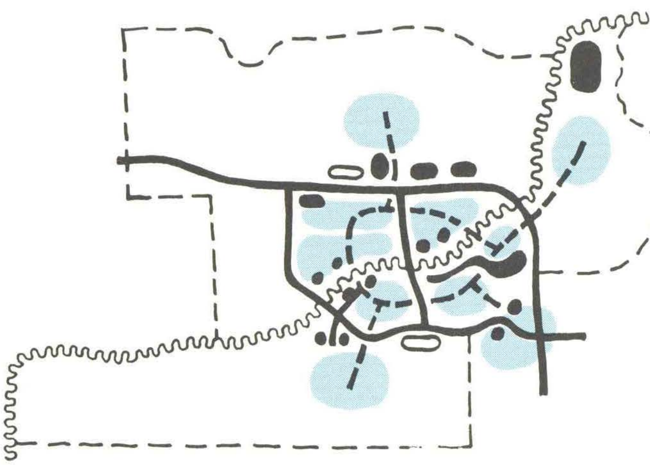
The Satellite Concept illustrates future development which might result from major new incentives and controls on new development in outlying areas. New development would be encouraged to fill in vacant areas within the Interstate Freeway Loop. Outside the Freeway Loop, new development would occur as satellites in planned new towns or in expanded existing settlements. Green space and other low density uses would be established to separate and buffer new towns from the metropolitan nucleus. Commercial and industrial development would be



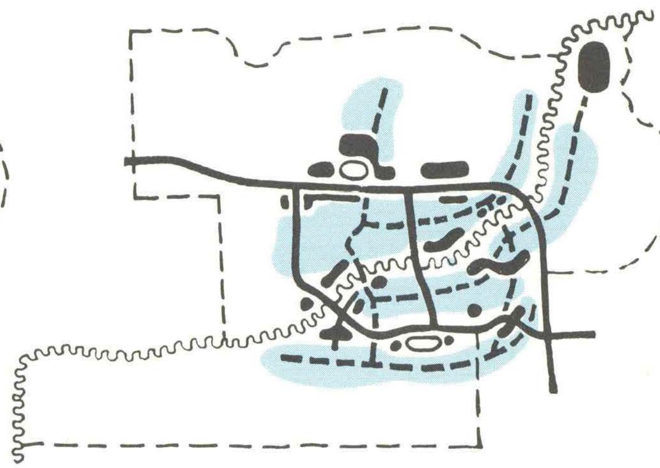
TREND PLAN CONCEPT



CORRIDOR CONCEPT



SATELLITE CONCEPT



MODIFIED CORRIDOR CONCEPT

LEGEND

- RESIDENTIAL
- INDUSTRIAL
- COUNTY BOUNDARY
- MISSISSIPPI RIVER
- INTERSTATE HIGHWAY
- AIRPORT
- CIRCULATION CORRIDOR

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ALTERNATIVE CONCEPT PLANS

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planned in locations which would strengthen the Satellite Concept as well as serve the metropolitan area.

The Corridor Concept illustrates still another form of future development which might result from major new incentives and controls on new development in outlying areas. New development would be directed to fill in remaining vacant areas within the Interstate Freeway Loop. New development outside the Freeway Loop would occur in linear form (corridors) on the river bluffs or along existing major highways. Such corridors would be planned as new towns or restricted to low density development with limited commercial expansion, thereby strengthening the metropolitan core area.

The Modified Corridor Concept--adopted as the recommended plan--represents the evaluation and accepted changes resulting from consideration of the three alternative concept plans discussed above. The plan envisions growth in the following corridors:

Along Interstate Route 80 in Scott County.

Parallel to and on the south banks of the Mississippi and Rock Rivers.

North along U.S. Route 61.

Northeast along the Mississippi River.

Other growth will probably occur on vacant land skipped over by past development. Such areas, for the most part, already have utility services and community facilities. Future development could be guided through the judicious extension of water and sewer systems. It would be prudent to extend municipal services fast enough to assure orderly urban development, but not so fast that good agricultural land would be taken prematurely.

The major concepts of the Bi-State Area plan involve:

Concentration of new development within or adjacent to the areas which already have urban services.

Direction of other new development into corridors which would extend from existing development and which could feasibly be provided with municipal services.

Allocation of abundant and suitable industrial land to attract prospective developers.

Provision of highways, utilities, and community services to meet the needs of the corridor development pattern.

Retention of extensive open space.

Maximization of benefits from the new Gateway to the West provided by Interstate 80 crossing the Mississippi River.

THE LAND USE PLAN

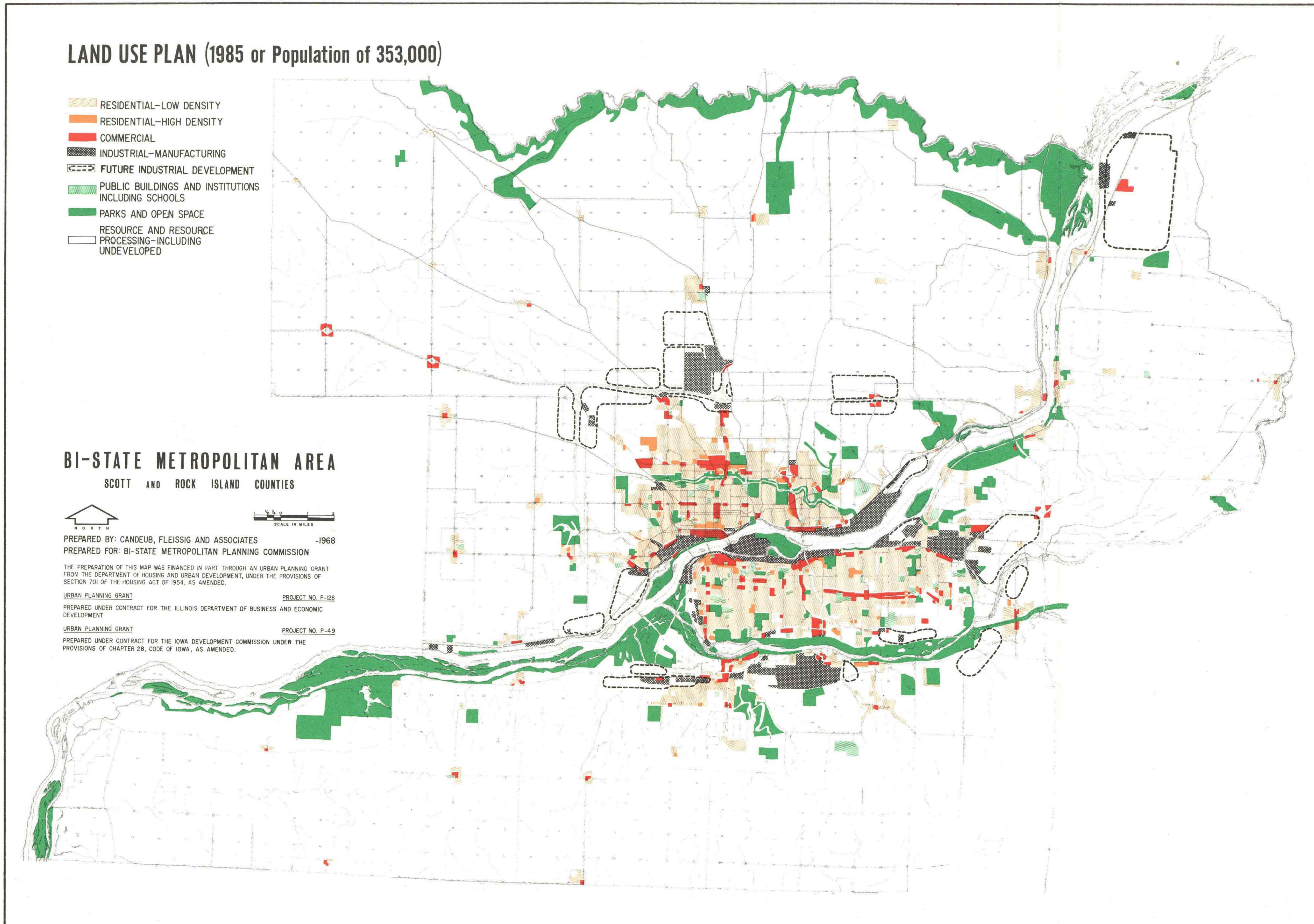
The 1985 land use plan for the study area is shown in Figure 55. The land use plan proposes the following:

Residential Development. Nearly 25,000 new residences are proposed to be distributed among rural areas (1,500 dwellings); low density development (17,900 new residences); and recently built urban areas and high density developments (5,500 units) generally adjacent to downtown business districts, along major arterials, on the bluff where services are available, and close to industrial areas.

Commercial Uses. Existing central business districts will remain the major commercial centers of the area. Further development of commercial activity is also envisioned near major traffic arteries in the north sector of Davenport and in South Moline.

Industrial Land. The Plan allocates 1,000 acres for new industrial use. Industrial growth is proposed to be accommodated near freeway interchanges; adjacent to the area's major airports; in expansion of existing industrial areas along the Mississippi River; and in continued expansion of the Cordova Industrial Park.

An effort will be made to divert urban growth away from prime agricultural land.


LAND USE PLAN (1985 or Population of 353,000)
RESIDENTIAL-LOW DENSITY
RESIDENTIAL-HIGH DENSITY
COMMERCIAL
INDUSTRIAL-MANUFACTURING
FUTURE INDUSTRIAL DEVELOPMENT
PUBLIC BUILDINGS AND INSTITUTIONS INCLUDING SCHOOLS
PARKS AND OPEN SPACE
RESOURCE AND RESOURCE PROCESSING-INCLUDING UNDEVELOPED
BI-STATE METROPOLITAN AREA
SCOTT AND ROCK ISLAND COUNTIES
NORTH
1 ½ ¼ 0 1 2
SCALE IN MILES
PREPARED BY: CANDEUB, FLEISSIG AND ASSOCIATES -1968
PREPARED FOR: BI-STATE METROPOLITAN PLANNING COMMISSION
THE PREPARATION OF THIS MAP WAS FINANCED IN PART THROUGH AN URBAN PLANNING GRANT FROM THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, UNDER THE PROVISIONS OF SECTION 701 OF THE HOUSING ACT OF 1954, AS AMENDED.
URBAN PLANNING GRANT
PROJECT NO. P-128
PREPARED UNDER CONTRACT FOR THE ILLINOIS DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT
URBAN PLANNING GRANT
PROJECT NO. P-49
PREPARED UNDER CONTRACT FOR THE IOWA DEVELOPMENT COMMISSION UNDER THE PROVISIONS OF CHAPTER 28, CODE OF IOWA, AS AMENDED.

FORECASTS OF FACTORS WHICH INFLUENCE TRAVEL

The land use plan was the basis for forecasts of the level of land use and development expected to be reached by 1985. Table 25 summarizes base year and estimated 1985 study area totals of factors used in predicting trip generation.

Table 25

FORECASTED GROWTH OF PLANNING FACTORS
BASE YEAR TO 1985

	Year of Inventory	Base Year Value	Estimated 1985	Percent Increase
Population	*	293,656	361,000	23
Dwelling Units	*	92,211	115,589	25
Automobile Ownership	*	107,670	167,907	56
Employed Residents	*	101,383	142,459	41
Total Employment	1964	106,079	134,349	27
Retail Employment	1964	15,600	20,553	32
Manufacturing Employment	1964	45,089	50,399	12
Other Employment	1964	45,390	63,396	40
School Enrollment	1966	85,242	118,649	39

*-1964 for Illinois; 1966 for Iowa.

Population of the study area is expected to increase by about 23 percent by 1985. While the numerical growth will be about the same in Scott County and Rock Island County, the Iowa portion will experience a faster rate of increase. The area north of Interstate 80 and along U.S. 61 will dominate the growth in Scott County. In Rock Island County the growth will take place generally all along the fringe of the presently urbanized area, with special emphasis on the area south of Rock River.

Employment is expected to increase by 27 percent with no shift in distribution between Scott and Rock Island Counties. Marked changes will take place in the industrial mix with manufacturing employment becoming a smaller component of the total.

While growth of employment in Scott County will be confined largely to built up areas (except north of Interstate 80), in Rock Island County it will be spread out more among the presently less developed areas. The number of employed residents will increase by 40 percent, reflecting a much higher ratio of employed persons to total population.

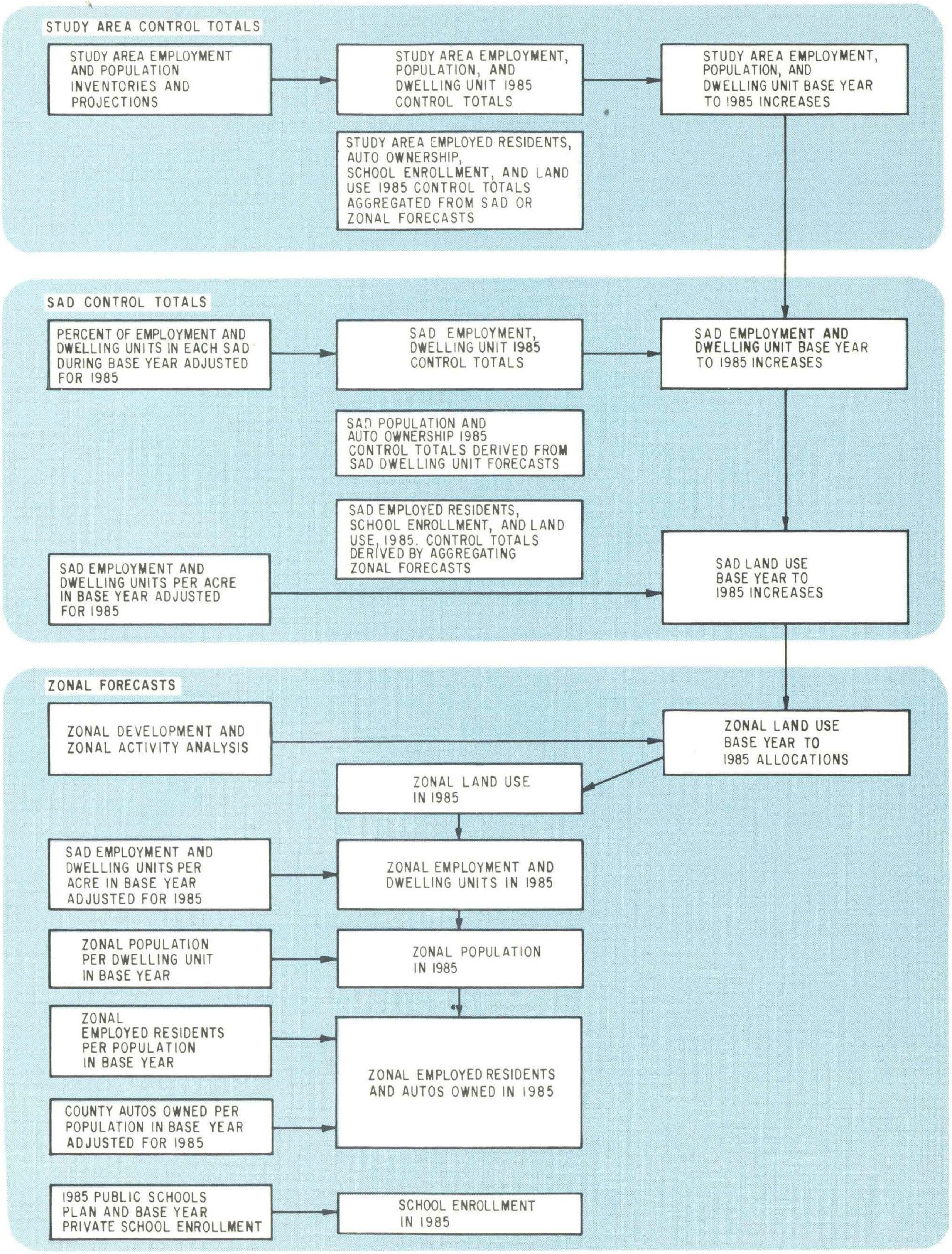
The largest increase of all variables which influence travel will be experienced in automobile ownership. The estimated increase of 56 percent reflects a growing number of families owning more than one car by 1980. The ratio of persons to automobiles is expected to decline from 2.73 in the base year to 2.15 in 1980. Growth in automobile ownership in Scott County will greatly exceed that in Rock Island County (76 percent vs. 42 percent).

A detailed description of the methodology used for deriving small area forecasts and a complete summary of all variables are available in the Small Area Forecasts report produced by Candeub, Fleissig and Associates.

The projections on which these estimates were based were prepared initially in 1965. At that time they accurately reflected the trends and outlook for the Bi-State Metropolitan Area. Subsequent developments in both the national and local economies have made these projections appear increasingly conservative and understated. This presents the possibility that the level of development projected might occur before 1985. The land use plan as well as plans for streets and highways and other facilities should then be adjusted to the new pace of growth, and the projections for 1985 would have to be raised in later phases of the continuing planning process.

Areawide control totals were used to forecast changes, by traffic zone, of each factor used to predict trip generation. Figure 56 gives a general overview of the methodology used in deriving small area forecasts. As an intermediate step between study area and zonal forecasts, the data were broken down by Statistical Analysis District (SAD). SAD's were aggregations of adjoining traffic zones used as medium size geographic areas among which total land use, population, employment, and other factors for the entire study area could be distributed.

Changes in the base year internal study area (see Figure 2) as well as traffic zone boundaries were required. It was recognized that,



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SUMMARY OF SMALL AREA FORECASTING METHODOLOGY

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by 1985, the urbanized area in Iowa would extend well beyond the limits defined by the 1961 origin-destination survey cordon line. It was necessary, therefore, to enlarge the Iowa internal study areas as well as to reduce the size of some of the outlying zones. In the Illinois portion of the study area, one zone was split to separate distinctly different land uses. An additional external station was added where Interstate 74 crosses the study area boundary. Figure 57 is a traffic zone map for 1985. The total number of traffic zones was increased from 290 in the base year to 322 in the internal planning area for 1985.

ESTIMATES OF TRIP GENERATION--1985

Projected zonal values of planning factors were applied to trip generation equations, described in Chapter V, to forecast 1985 person trip productions and attractions. Zones considered to be special generators in the model calibration process were treated separately.

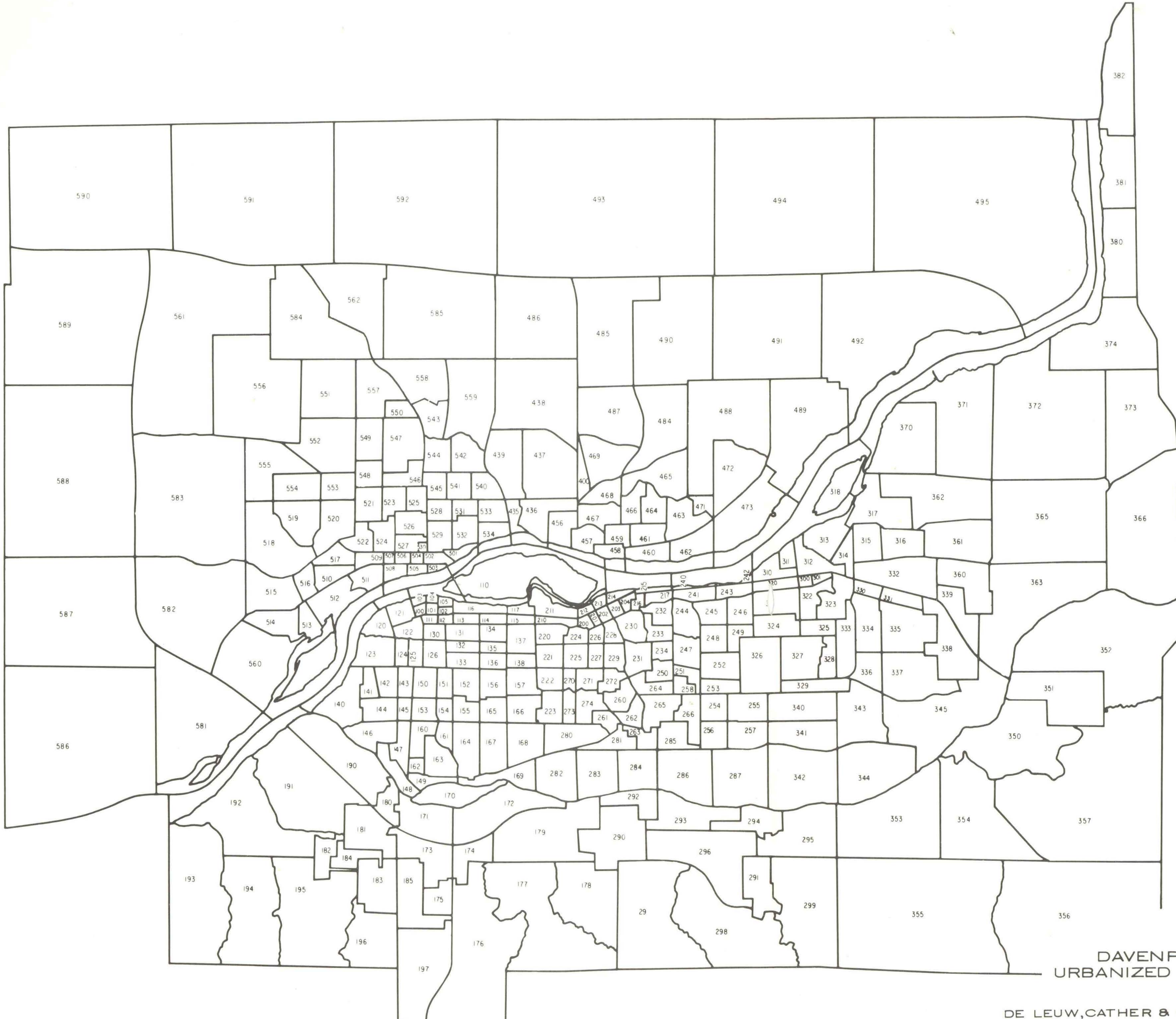
Base year and 1985 daily trip productions by mode (exclusive of truck and through trips) are given in Table 26. Since the survey area used for projections to 1985 was larger than the one used for the base year, base year productions should not be compared directly with 1985 forecast numbers shown in this table.

Non-work trips, particularly those for personal business as well as those for social and recreation purposes (home based other), are expected to increase at a faster pace than work trips. This will reflect increasing car ownership with many families owning more than one car.

Use of public transit is expected to decrease slightly from the base years to 1985. Because there was a decline in transit patronage between 1964 and 1969, however, the estimate for 1985 represents an increase in number of bus riders over the actual number in 1969.

Auto occupancy relationships, also described in Chapter V, were applied to person trip productions and attractions (less transit) to determine the future number of vehicle trips. Total forecasted daily vehicular trips in the internal study area may be summarized as follows:

FIGURE 57



N

SCALE IN FEET

0 4000 8000 16,000

LEGEND

ZONE BOUNDARY

000 ZONE NUMBER

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1985 ZONE MAP

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Table 26

SUMMARY OF MODAL SPLIT RESULTS

Trip Purpose	1961-1964 Trip Productions by Mode (Base Year Internal Study Area - 290 Zones): Auto and Taxi Driver Number	Auto and Taxi Driver Per-cent	Auto, Truck and Taxi Passenger Number	Auto, Truck and Taxi Passenger Per-cent	Transit Passenger Number	Transit Passenger Per-cent	Total Person Trips Number	Total Person Trips Per-cent
Home Based Work	124,331	77	32,353	20	4,424	3	161,108	100
Home Based Shop	74,608	64	40,895	35	1,559	1	117,062	100
Home Based Other	232,955	57	171,122	42	2,928	1	407,005	100
Non-Home Based	102,852	70	43,069	29	661	1	146,582	100
Total All Purposes	534,746	64	287,439	35	9,572	1	831,757	100

Trip Purpose	1985 Trip Productions by Mode (Forecast Year Internal Study Area - 322 Zones): Auto and Taxi Driver Number	Auto and Taxi Driver Per-cent	Auto, Truck and Taxi Passenger Number	Auto, Truck and Taxi Passenger Per-cent	Transit Passenger* Number	Transit Passenger* Per-cent	Total Person Trips Number	Total Person Trips Per-cent
Home Based Work	178,147	90	14,987	8	3,724	2	196,858	100
Home Based Shop	144,473	73	52,764	27	-		197,237	100
Home Based Other	454,373	60	299,582	40	-		753,955	100
Non-Home Based	186,343	70	79,344	30	-		265,687	100
Total All Purposes	963,336	68	446,677	32	3,724	0	1,413,737	100

*-Erie Mode Split Procedure used in this study applies to Home Based Work trips only. Total number of 1985 transit trips for all purposes estimated at approximately 9,000.

Note: Through trips and trucks are excluded.

	Estimated Vehicle Trips Average Weekday--1985	
	Number	Percent of Total
Trips made wholly within the internal survey area	972,800	91
Trips made to and from the internal survey area	85,600	8
Through trips with no stop in the survey area	9,600	1
Total	1,068,000	100

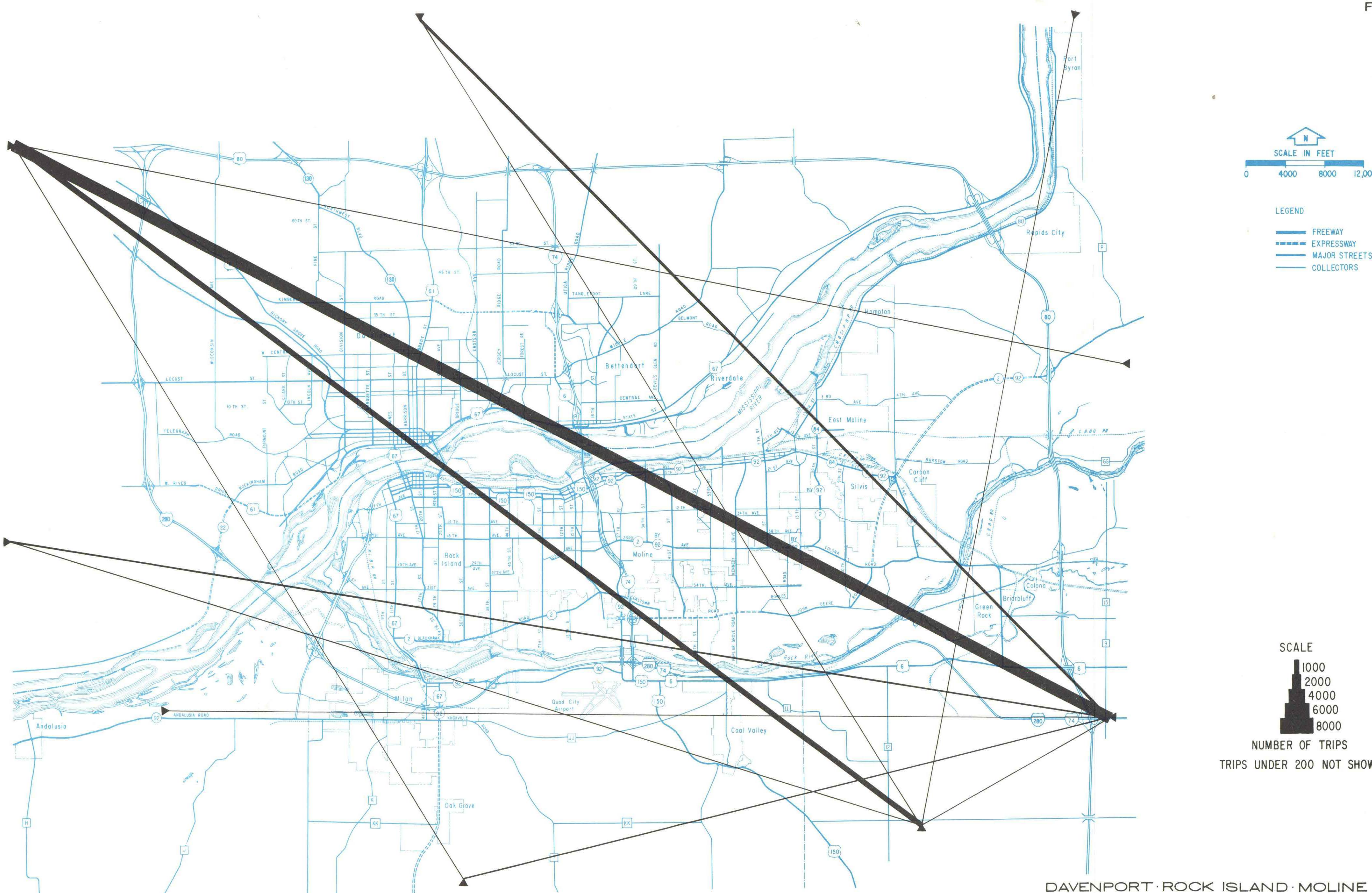
The above total includes approximately 95,000 daily truck trips projected for the internal study area. A detailed summary of 1985 trip generation forecast as well as a description of future travel patterns can be found in joint Interim Report Number 7 entitled "Transportation Facilities and Travel Pattern Forecasts."

FORECASTED 1985 TRAVEL PATTERNS

The gravity model (Chapter V) was used to distribute forecasted vehicle trips between traffic zones. Through trips were distributed among the external stations by a method of successive approximations (Fratar Method).

Figures 58, 59, 60 and 61 are desire line charts portraying forecasted 1985 trip distribution. Trips between pairs of internal districts (groups of traffic zones) are indicated by a straight line connecting the centroids of the districts. Widths of the bands are proportionate to the estimated number of trips.

Desire lines of forecasted through trips--those with no stop in the internal survey area--are shown in Figure 58. The heaviest bands of travel are expected to be between Interstate 80 in Iowa and Interstate Highways 74 and 80 in Illinois.



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ESTIMATED 1985
DESIRE LINES OF TRAVEL
EXTERNAL-TO-EXTERNAL

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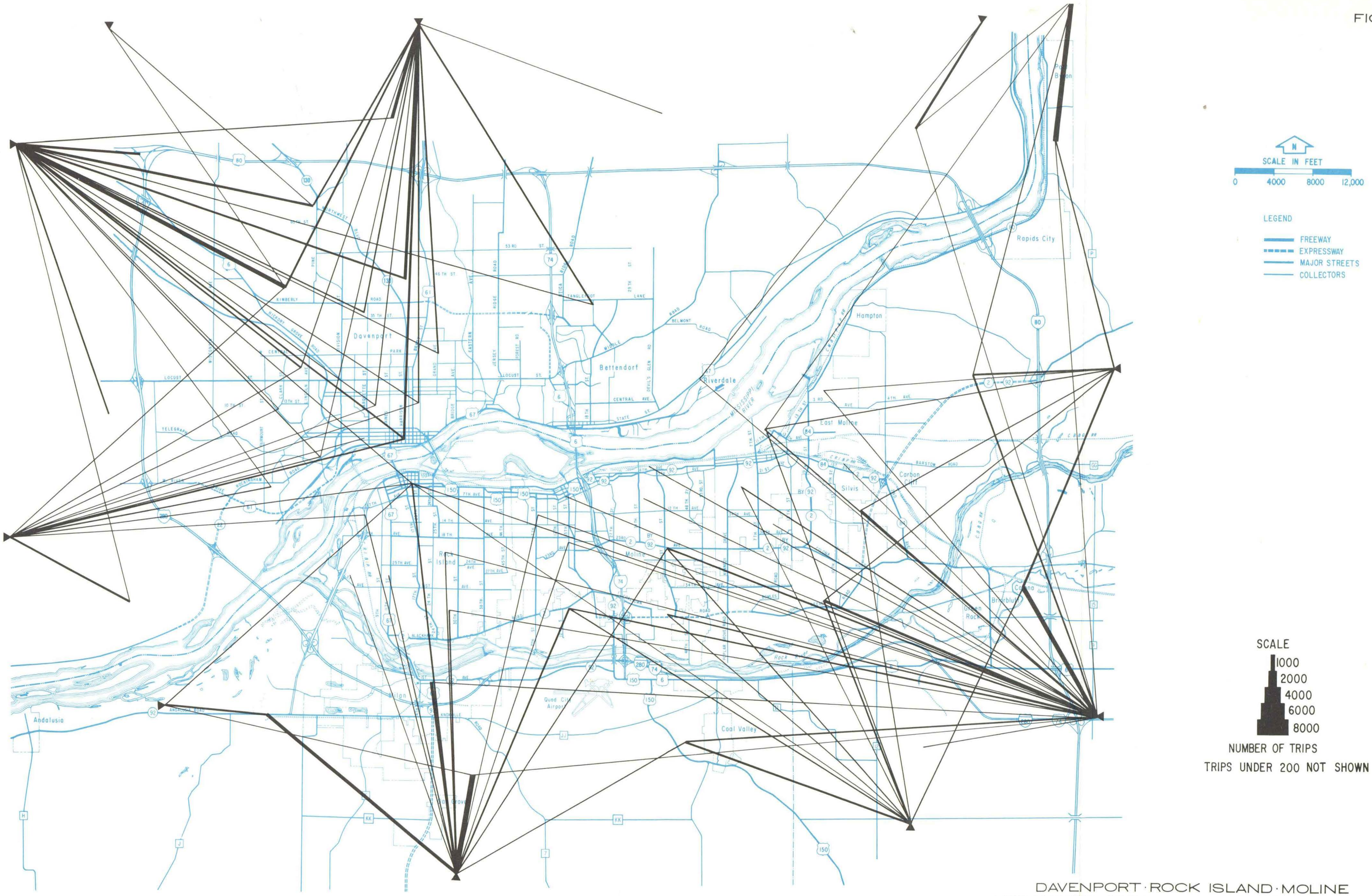

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URBANIZED AREA TRANSPORTATION STUDY

ESTIMATED 1985
DESIRE LINES OF TRAVEL
EXTERNAL-TO-INTERNAL

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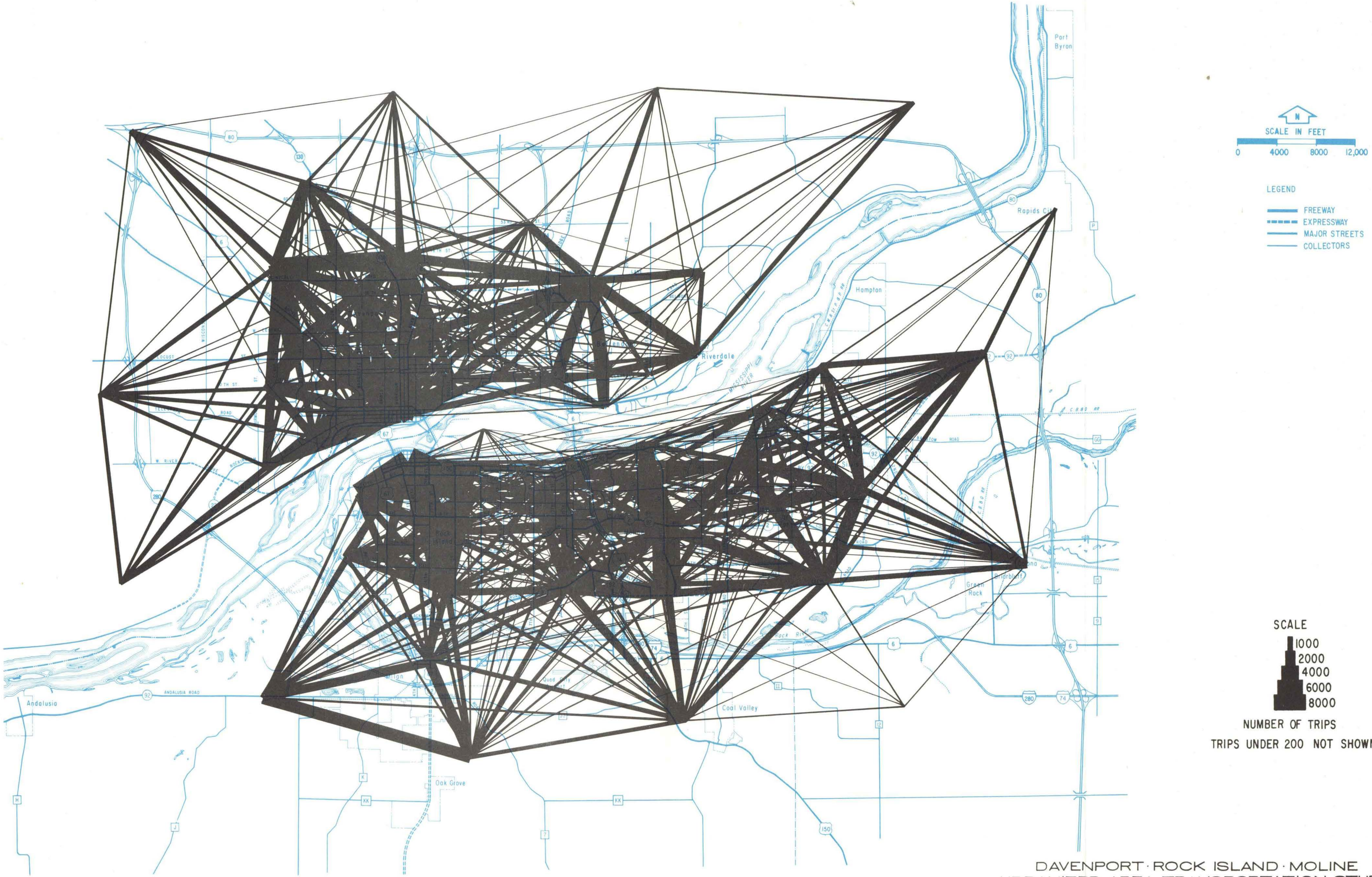

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URBANIZED AREA TRANSPORTATION STUDY

ESTIMATED 1985
DESIRE LINES OF TRAVEL
IOWA INTERNAL-ILLINOIS INTERNAL

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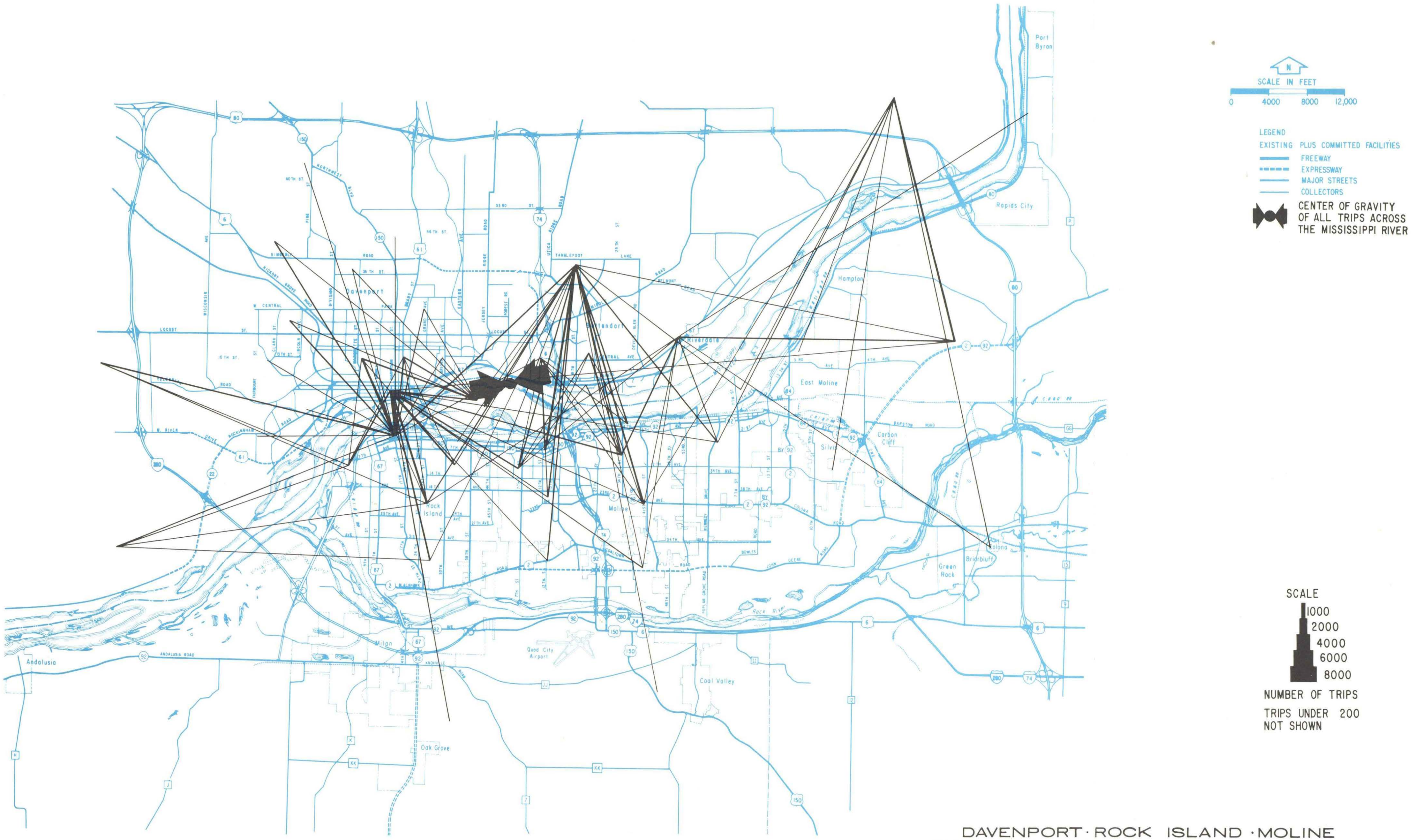

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URBANIZED AREA TRANSPORTATION STUDY

ESTIMATED 1985 DESIRE LINES OF TRAVEL ACROSS THE MISSISSIPPI RIVER

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Anticipated 1985 desire lines of trips made to and from the internal survey area are shown in Figure 59. The heaviest bands radiate from U.S. 61 and Interstate 80 in the Iowa portion and U.S. 150, Interstate 74, and Interstate 80 in Illinois.

Figure 60 shows estimated 1985 desire lines of travel of trips made wholly within either the Iowa or Illinois portion of the internal survey area. The lines form nearly solid masses in built-up areas, but distinct corridors of travel desires are discernible. In Iowa, heavy bands of travel desires can be traced along the riverfront and Kimberly Road corridors as well as in a north-south direction from the Davenport central business district. There are three major east-west corridors of travel desires in the Illinois portion of the area--one along the riverfront, another at the approximate location of the John Deere Expressway, and another about midway between these two. North-south corridors of travel desires radiate from each of the three central business districts.

Desire lines of forecasted 1985 trips crossing the Mississippi River between the Iowa and Illinois portions of the internal survey area are shown in Figure 61. The heaviest band is between the Davenport and Rock Island central business districts. The centroid of all river crossings, however, is at Arsenal Island.

Forecasted growth in travel across various screen lines is illustrated in Figure 62. Daily trips crossing the Mississippi River between the Iowa and Illinois portions of the internal survey area are expected to increase to approximately two and one-half times the base year volume by 1985. It was also estimated that north-south trips across a line generally along Kimberly Road in the Iowa portion of the internal survey area will nearly triple. North-south travel across the Rock River in Illinois will more than double. Intercity trips between communities in the Iowa portion of the area and similar trips in Illinois are expected to grow by 70 to 80 percent.

Figure 63 portrays travel growth on the spider web network described in Chapter II (Figure 16). The spider web network has been enlarged to encompass an expanded internal study area. Base year trips, however, were not available in the added area.

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ESTIMATED GROWTH OF TRAVEL ACROSS SCREEN LINES 1964-1985

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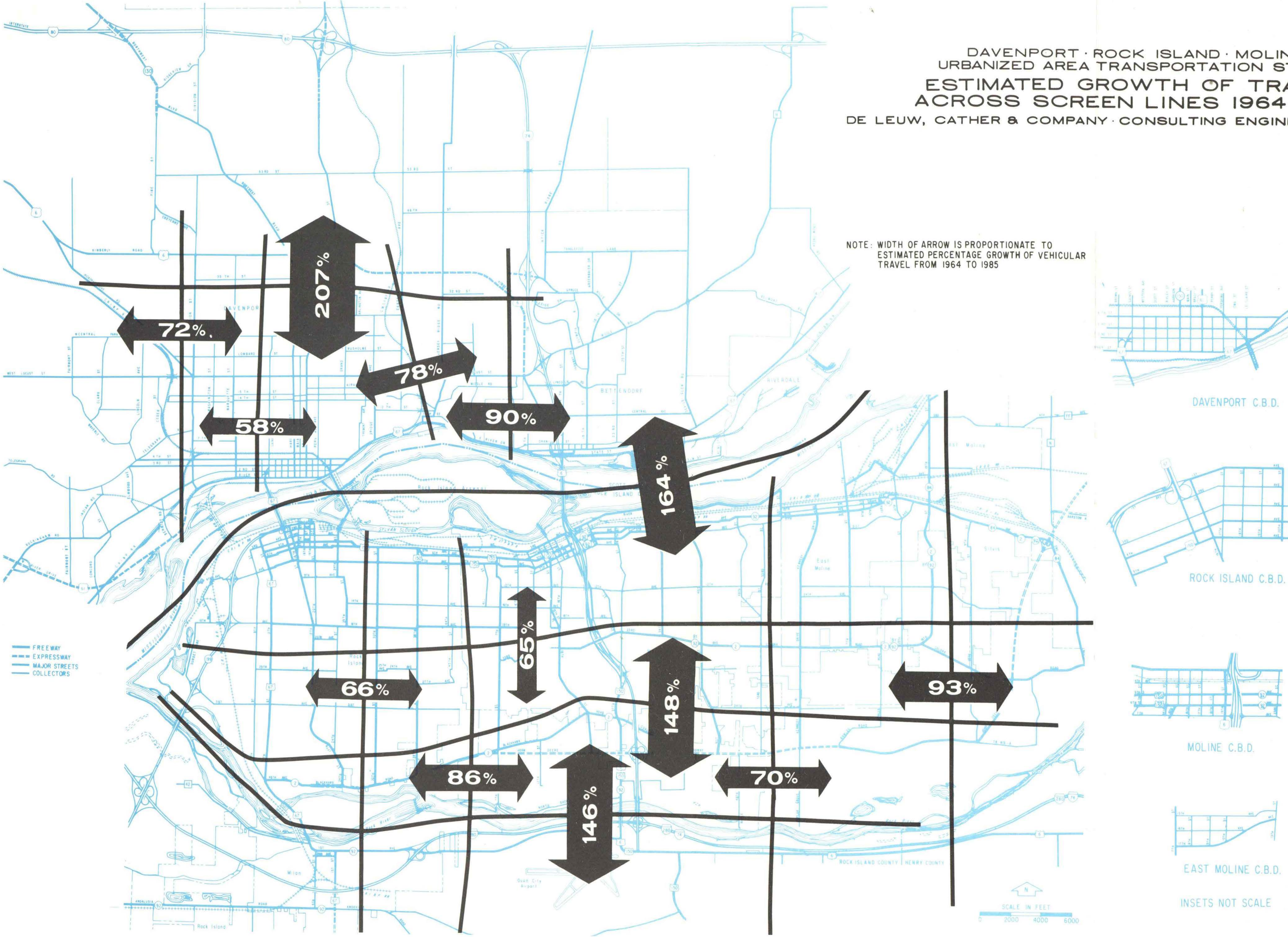
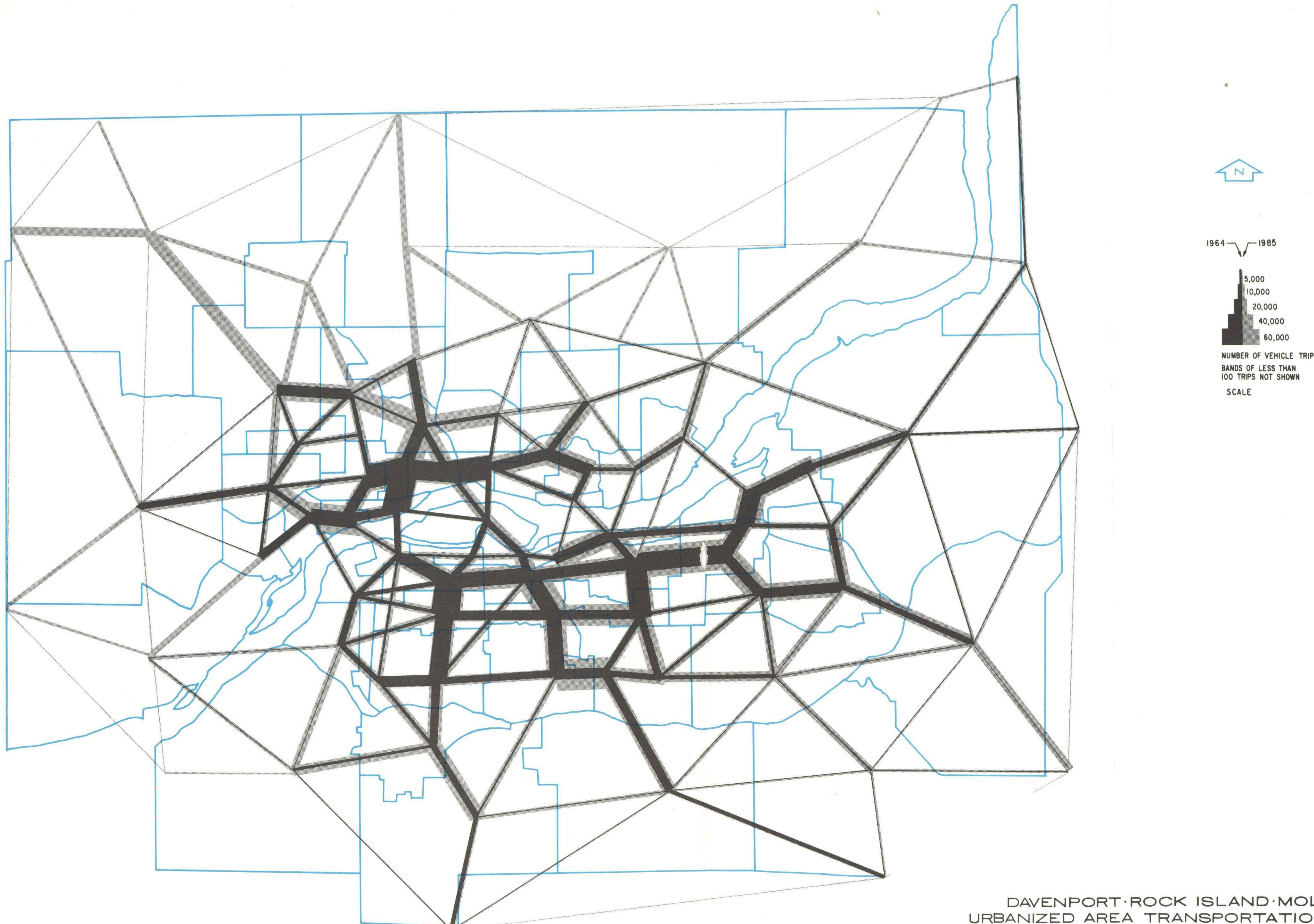


FIGURE 63



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URBANIZED AREA TRANSPORTATION STUDY

GROWTH OF TRAVEL 1964-1985
SPIDER WEB NETWORK

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Chapter VII

TRANSPORTATION PLAN DEVELOPMENT

This phase of the transportation study deals with the development of a recommended street and highway system to accommodate traffic in the Davenport-Rock Island-Moline Urbanized Area until at least 1985. Various network systems were tested for traffic service, physical feasibility, and cost as well as for compatibility with community goals and objectives. Close contact was maintained with the local planning agencies during the testing.

The basic transportation goal, as stated by the Citizens Advisory Committee, was to "develop a transportation system in the metropolitan area to provide for the safe, efficient, and economic movement of people and goods." The Committee also set forth a general outline of action covering 15 specific areas of concern. Of these, the following are especially pertinent to evaluation of various networks and alternatives described in this report:

1. Provide for the ease of movement within the metropolitan area by coordinating the various local street systems.

2. Develop streets with consideration of the requirements of existing and future land uses being served.

3. Design highways to provide convenient access to and from high traffic generating land uses such as schools, parks, commercial complexes and industrial areas.

4. Use transportation programs to encourage desired development patterns.

5. Preserve the integrity of residential neighborhoods by discouraging through traffic in such areas.

6. Enhance the central business districts by developing bypasses to carry through traffic around the core of these areas.

7. Provide for the safe and convenient movement of traffic by constructing railroad viaducts and overpasses on highly traveled arteries.

These items, as well as others suggested by the Citizens Advisory Committee, guided development of the proposed street and highway plan.

CAPACITY DEFICIENCIES OF EXISTING AND COMMITTED NETWORK

Plan development started with an analysis of the existing street and highway network together with committed facilities, as discussed in Chapter II.

Forecasted 1985 trips were first distributed among the zones using travel times from the 1970 network described in Chapter II. They were then assigned to the "existing plus committed" network. The general corridors in which improvements will be required were revealed by this analysis.

The following deficiencies became apparent:

1. Major north-south streets in Davenport, both north and northwest of the downtown area, would be inadequate for the traffic assigned to them.

2. All three major east-west corridors in Davenport--East River Drive, Locust Street and especially Kimberly Road--would be loaded far beyond their capacity by 1985.

3. The greatest deficiency in the Illinois portion of the study area would be in a corridor paralleling the presently planned John Deere Expressway which would be inadequate for projected traffic.

4. Traffic assignments also indicated a definite need for additional Rock River crossings.

5. Future large increases in number of trips across the Mississippi River would not be satisfied even with the addition of the planned Interstate 280 Bridge.

PRELIMINARY FUTURE NETWORKS

The deficiencies revealed by analyses of the 1970 network were used as a guide in developing the first trial network as well as subsequent alternative networks.

Trial Network A

The first trial network for 1985 entitled "1985 Trial Network A" (Figure 64) included the following important highway improvements designed to enhance system continuity and to alleviate capacity deficiencies:

In the Iowa portion of the study area

A north-south freeway in Davenport from the Centennial Bridge to Interstate 80.

Improvement and extension of Fairmount Street and Wisconsin Avenue.

Addition of major east-west streets such as 46th and 53rd Streets north of Kimberly Road; extension of Tanglefoot Lane to U.S. 67; construction of Central Park Avenue west of Fairmount Street and east of Brady Street; and extension of 10th and 13th Streets in the west end of Davenport.

In the Illinois portion of the study area

Construction of a riverfront expressway connecting Rock Island and East Moline.

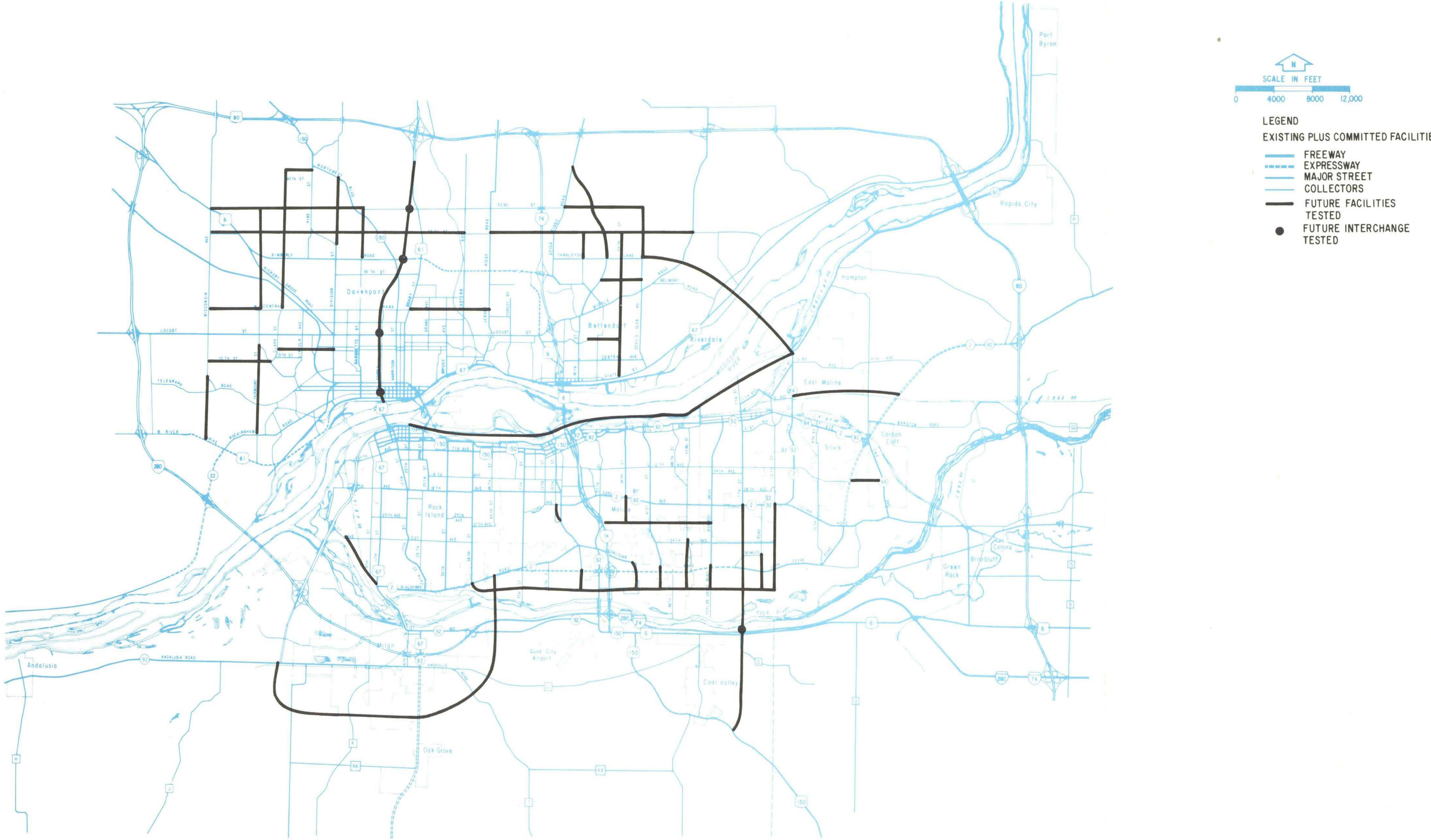
Extension of 30th Avenue in East Moline.

Improvement of 26th Avenue in Moline.

Extension of the John Deere Expressway westerly to the 31st Street interchange with the Centennial Expressway, and construction of a system of collector streets south of John Deere Expressway in Moline and East Moline.

Two new crossings of the Rock River--the westernmost of which would be connected to 92nd Avenue Expressway, another new facility.

FIGURE 64



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1985 TRIAL NETWORK A

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Mississippi River Bridge

Alternative locations for a new Mississippi River bridge were studied. Such a bridge, it was decided, should either cross Campbell's Island or connect 53rd Street, Moline, with Devil's Glen Road, Bettendorf.

Analyses of 1985 traffic assignments to Network A indicated that three major problems remained:

1. Additional relief would be required for East River Drive from Bettendorf through the Davenport central business district. In addition, distribution of traffic through downtown Davenport would be potentially troublesome.

2. The John Deere Expressway would still be overloaded. Need was indicated for another major east-west facility between the John Deere Expressway and the river.

3. Neither of the alternative locations for a new Mississippi River bridge would attract enough traffic to preclude overloads on the Iowa-Illinois Memorial Bridge (I-74).

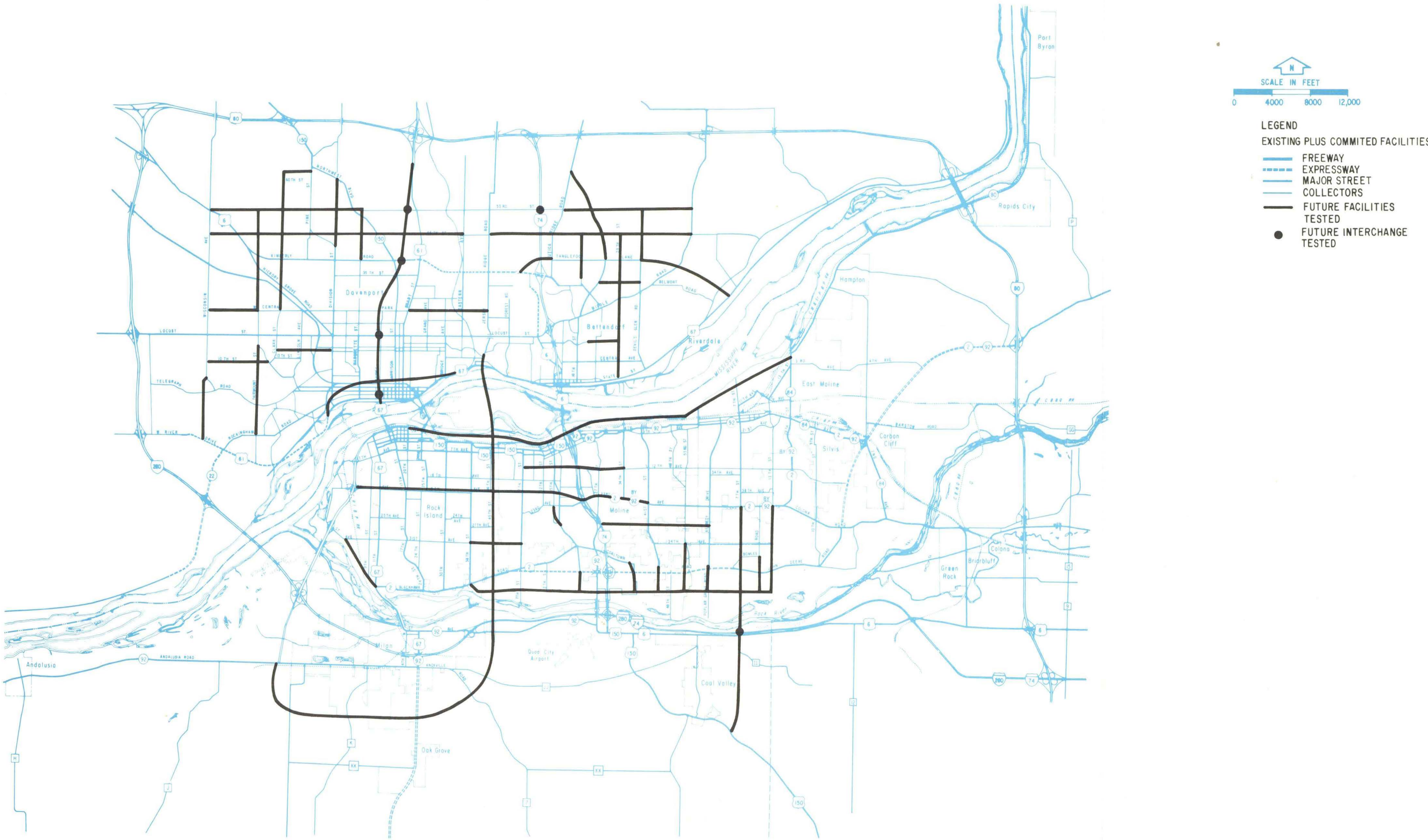
Trial Network B

These findings and other less pronounced problems were discussed with the Technical Committee. Particular emphasis was given to the location of an additional Mississippi River bridge. A test Network B was made with a new bridge at the approximate center of Arsenal Island, as shown in Figure 65, along with the following additional major facilities:

In the Iowa portion of the study area

A bypass north of the Davenport central business district. Alternative alignments along 5th and 12th Streets were studied.

Direct connection of Tanglefoot Lane with Kimberly Road including a grade separation with I-74 north of Kimberly Road interchange.



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

1985 TRIAL NETWORK B

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In the Illinois portion of the study area

Connection of 18th and 19th Avenues through Rock Island and Moline and 23rd Avenue, Moline, with Colona Road, East Moline. A high-type east-west facility through this corridor between the Riverside and John Deere Expressways was assumed.

A continuous north-south route approximately at the Rock Island-Moline city limits (1st Street, Moline) between the westernmost Rock River crossing and the Riverside Expressway.

Analyses of 1985 traffic assignments indicated that all the additional facilities, except the Mississippi River crossing, would successfully preclude traffic congestion. A Mississippi River bridge across Arsenal Island would serve better than either of the alignments tested earlier, but it still involved too much adverse travel to satisfactorily accommodate the heavy Davenport-Moline traffic demand. In addition, it was apparent that the easterly Rock River crossing would be more effective if it were connected with 19th Street rather than with 7th Street, East Moline.

INITIAL STREET AND HIGHWAY NETWORK

After additional changes had been made to Network B, the Initial 1985 Street and Highway Network, shown in Figures 66 and 67, was established for a more comprehensive analysis. Typical cross sections for the recommended types of improvements are shown in Figure 68. Two major changes from Network B were:

1. A new Mississippi River bridge at approximately the location of the existing Government Bridge was postulated.

2. The easternmost Rock River crossing was connected with 19th Street, East Moline.

Estimated 1985 traffic assigned to the Initial Network is shown in Figures 69 and 70. The adequacy of this network to handle projected traffic volumes was tested by analyzing the capacity of each link. The analysis showed that there would be no deficiencies which could not be resolved either by special treatment of intersections or by parking restrictions.

DAVENPORT · ROCK ISLAND & MOLINE URBANIZED AREA TRANSPORTATION STUDY

INITIAL 1985 STREET AND HIGHWAY NETWORK

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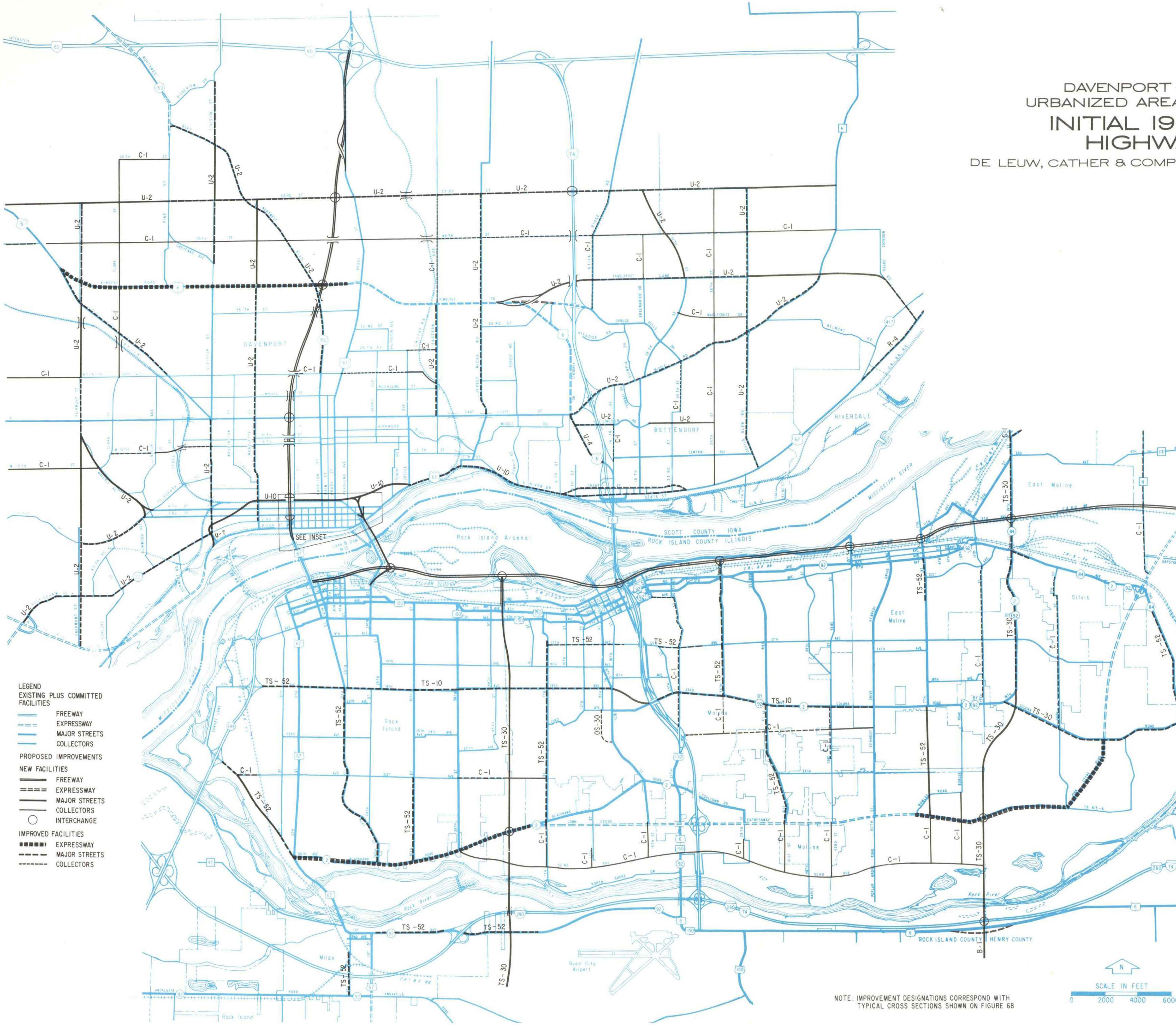
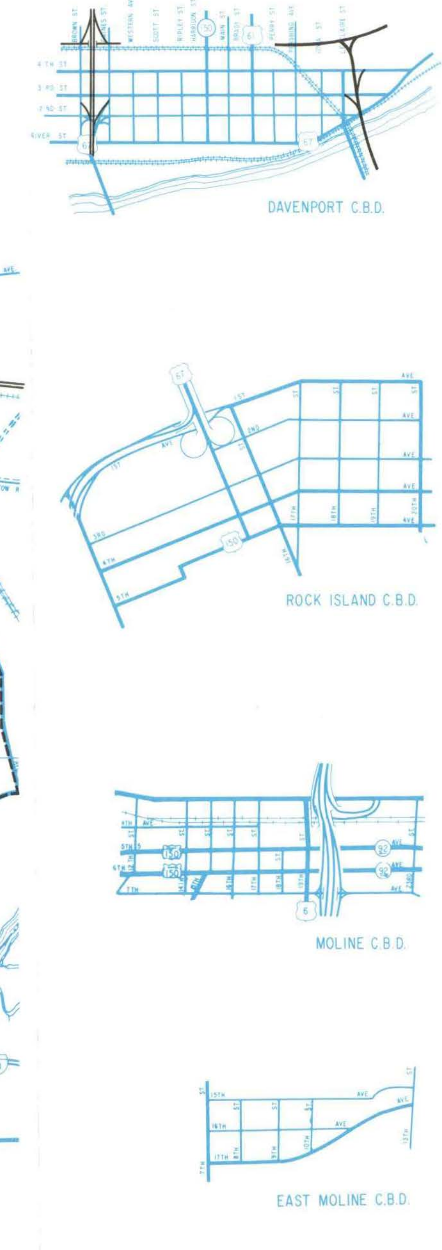
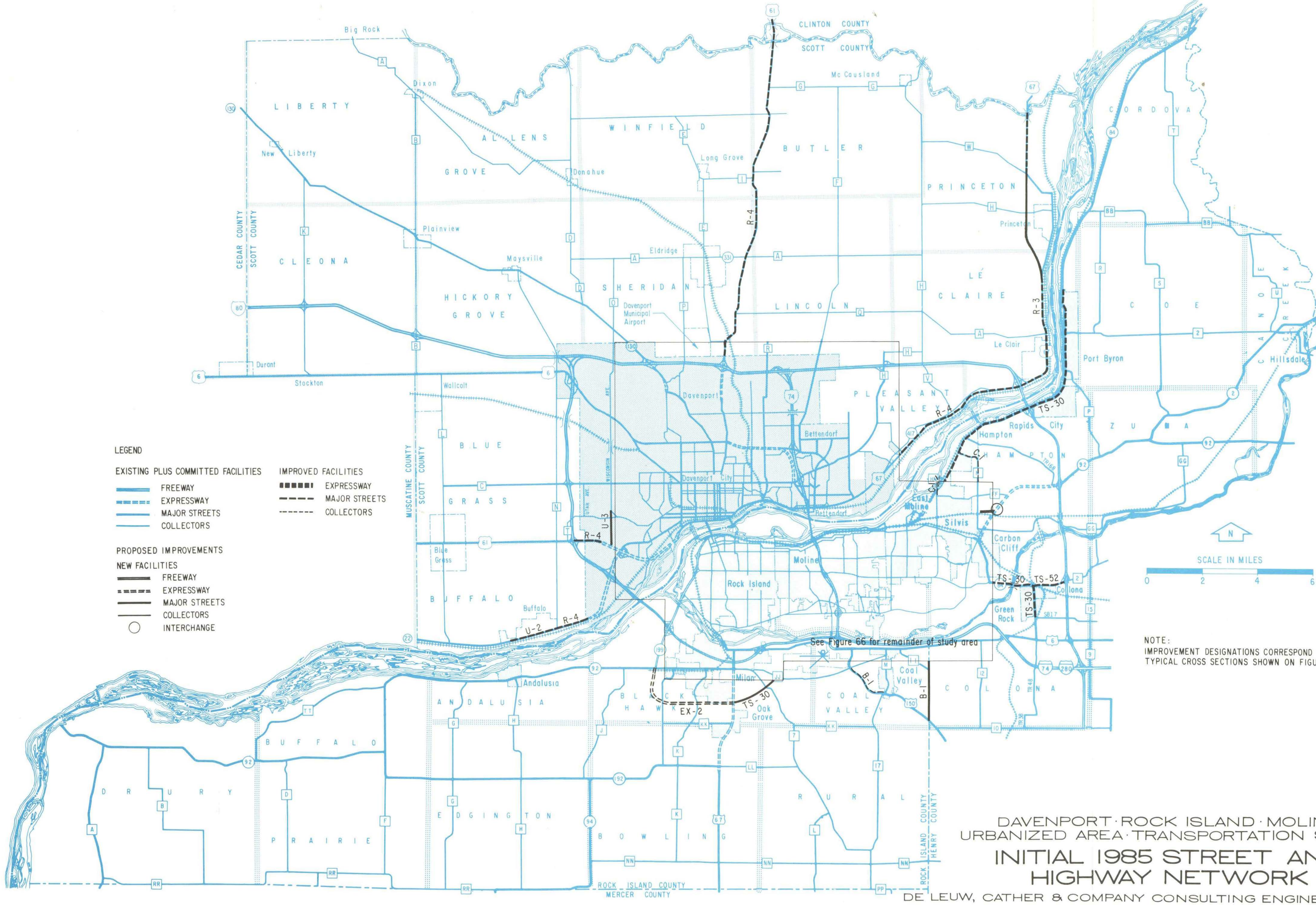




See Figure 67 for remainder of study area

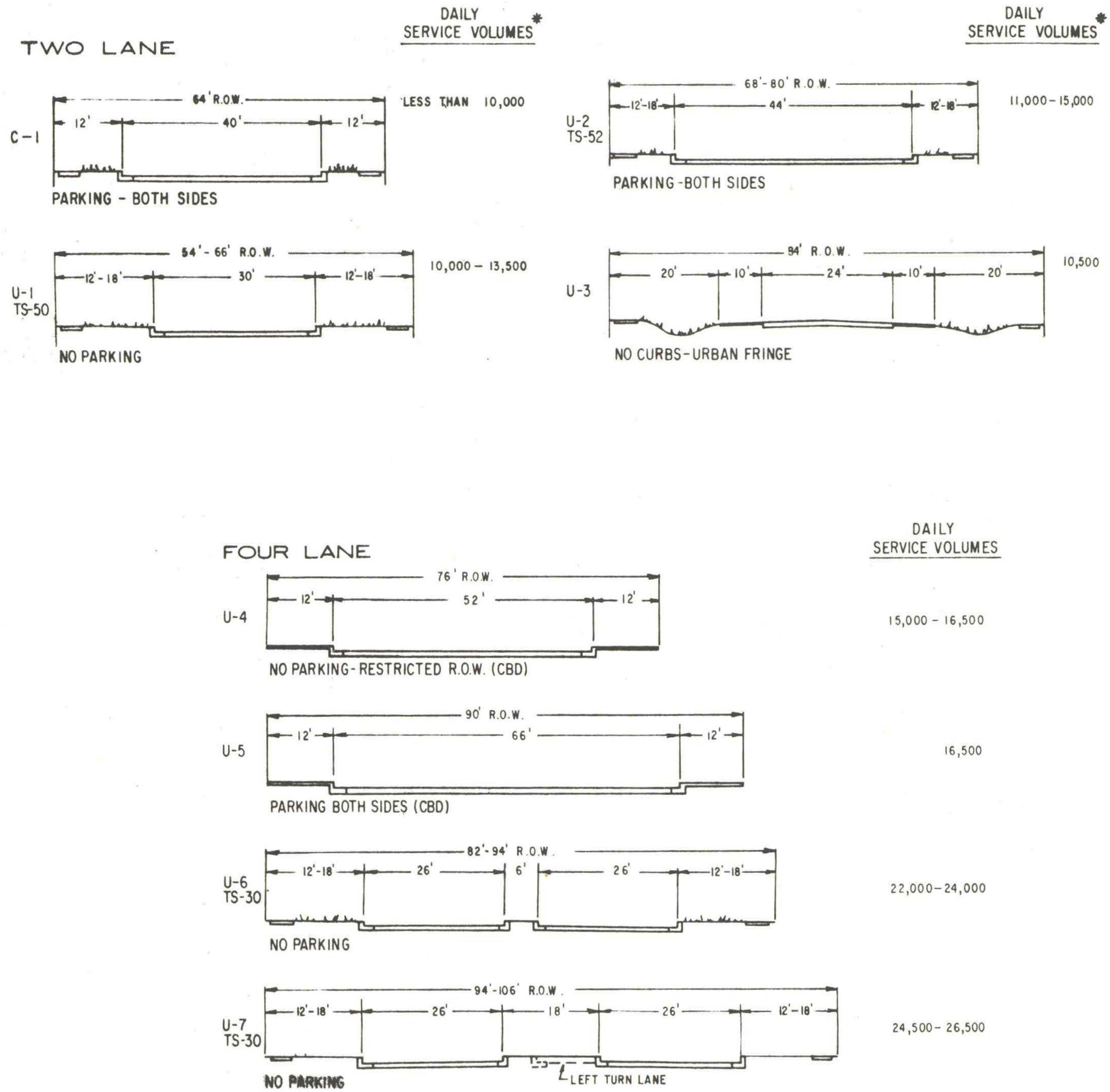


DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA · TRANSPORTATION STUDY

INITIAL 1985 STREET AND HIGHWAY NETWORK

DE LEUW, CATHER & COMPANY CONSULTING ENGINEERS · CHICAGO

TWO-WAY STREETS



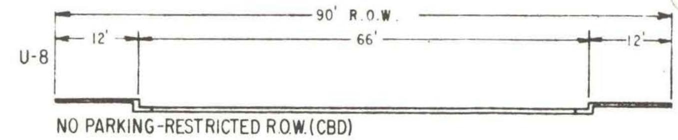
*
DAILY SERVICE VOLUMES FOR URBAN STREETS APPROXIMATE 60 PERCENT GREEN TIME.
LOW VOLUME IS REPRESENTATIVE OF CBD (OR FRINGE WITH MEDIAN) CHARACTERISTICS.
HIGH VOLUME ASSUMES RESIDENTIAL CHARACTERISTICS.

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

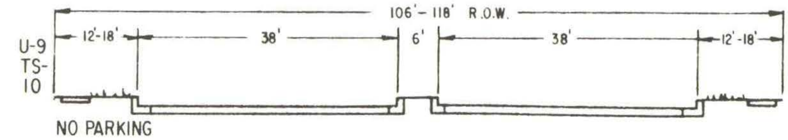
TYPICAL CROSS SECTIONS

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

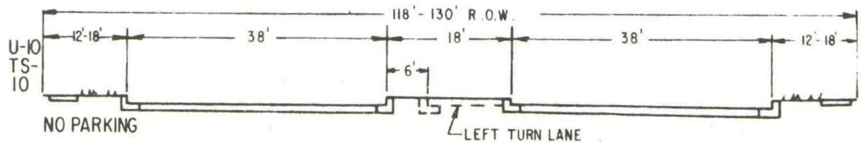
SIX LANE



20,000 – 22,500

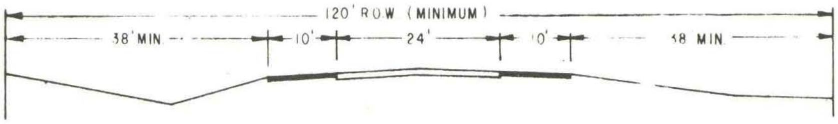


32,000 – 35,000



35,000–
37,000

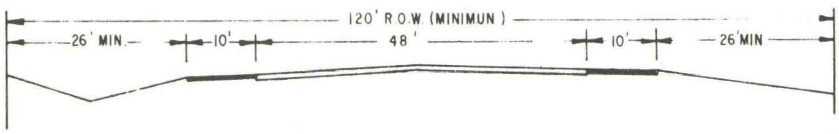
TWO LANE HIGHWAY (R – 3)



DAILY
SERVICE VOLUMES

2,000 – 8,000

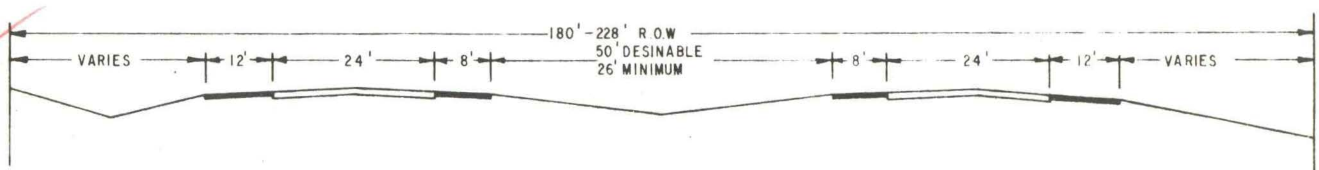
FOUR LANE HIGHWAY (R – 4)



15,000

FOUR LANE EXPRESSWAY (EX – 2)

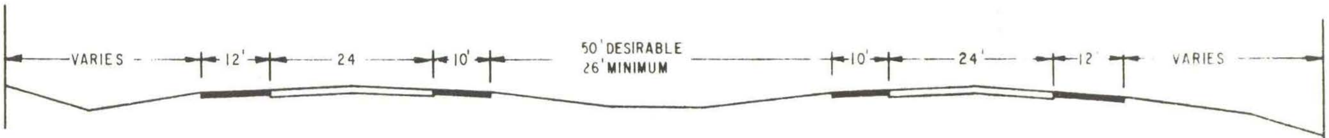
30,000



FOUR LANE FREEWAY (FR – 3)

RURAL R.O.W. – 250' DESIRABLE 200' MINIMUM
URBAN R.O.W. – 220' DESIRABLE 170' MINIMUM

25,000
36,000



*
DAILY SERVICE VOLUMES FOR URBAN STREETS APPROXIMATE 60 PERCENT GREEN TIME.
LOW VOLUME IS REPRESENTATIVE OF CBD (OR FRINGE WITH MEDIAN) CHARACTERISTICS.
HIGH VOLUME ASSUMES RESIDENTIAL CHARACTERISTICS.

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

TYPICAL CROSS SECTION

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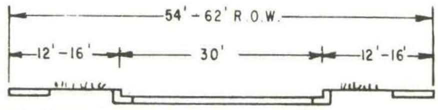
ONE - WAY STREETS

DAILY SERVICE VOLUMES *

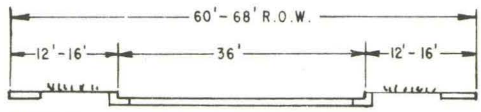
TWO LANE

0-2 — 12,500 - 16,500



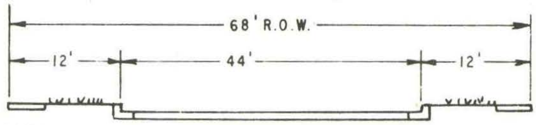
NO PARKING

0-2P — 10,500 - 14,000



PARKING ONE SIDE

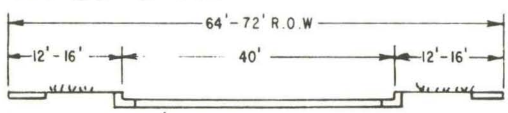
0-2B
OS-32 — 11,500 - 16,000



PARKING BOTH SIDES

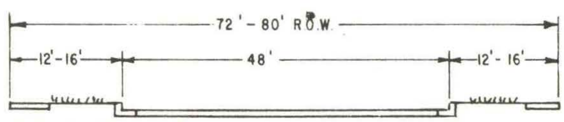
THREE LANE

0-3 — 17,000 - 22,000



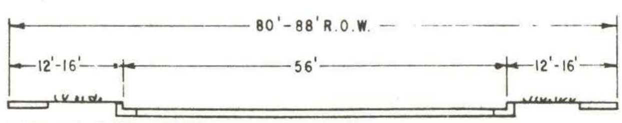
NO PARKING

0-3P — 15,000 - 20,000



PARKING ONE SIDE

0-3B
OS-22 — 15,500 - 21,500



PARKING BOTH SIDES

* DAILY SERVICE VOLUMES ASSUME A COMPLEMENTARY STREET OF SIMILAR CROSS SECTION IS PROVIDED FOR TRAFFIC IN THE OPPOSITE DIRECTION.

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

TYPICAL CROSS SECTION

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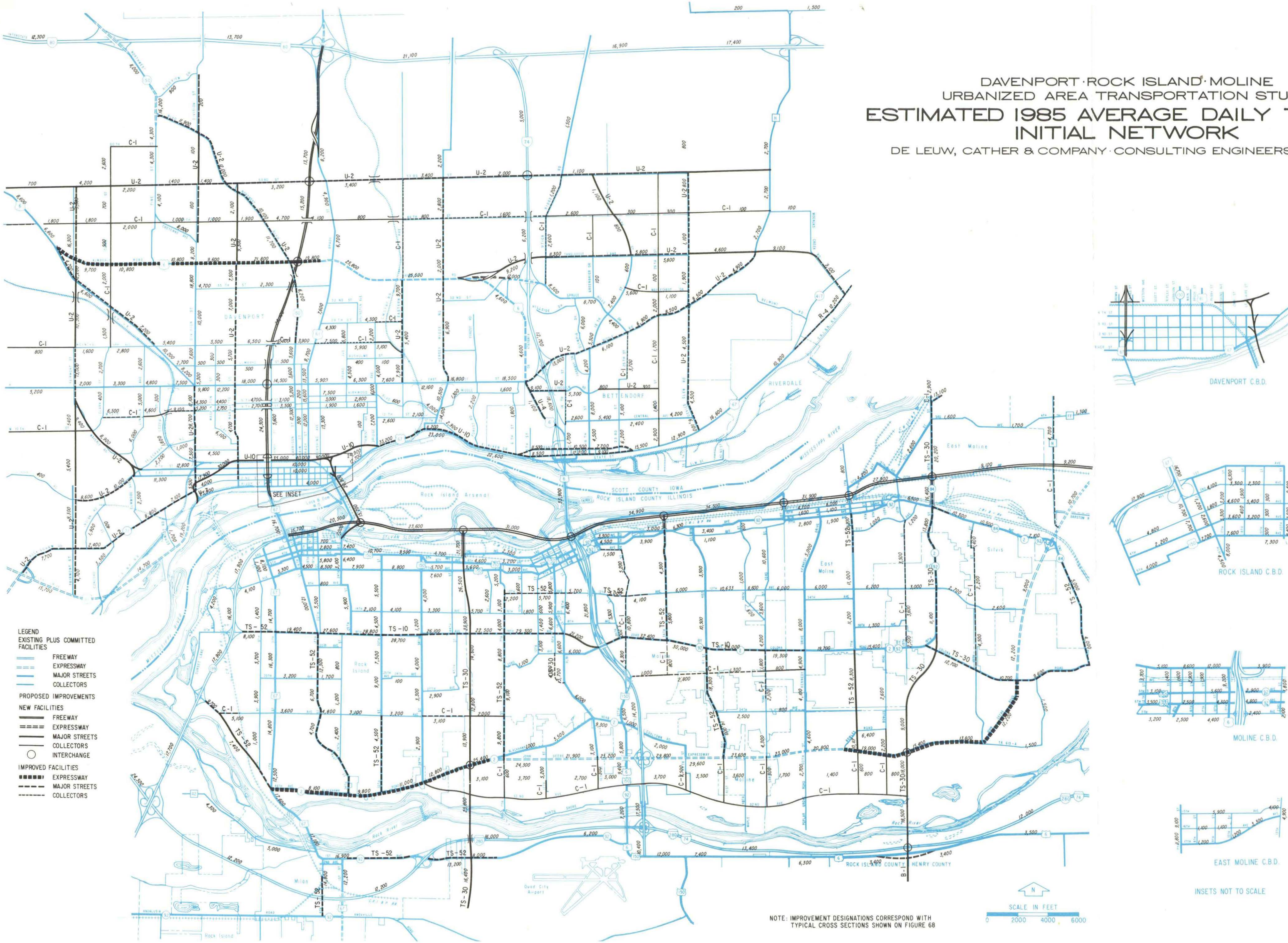
FIGURE 69

DAVENPORT · ROCK ISLAND · MOLINE URBANIZED AREA TRANSPORTATION STUDY

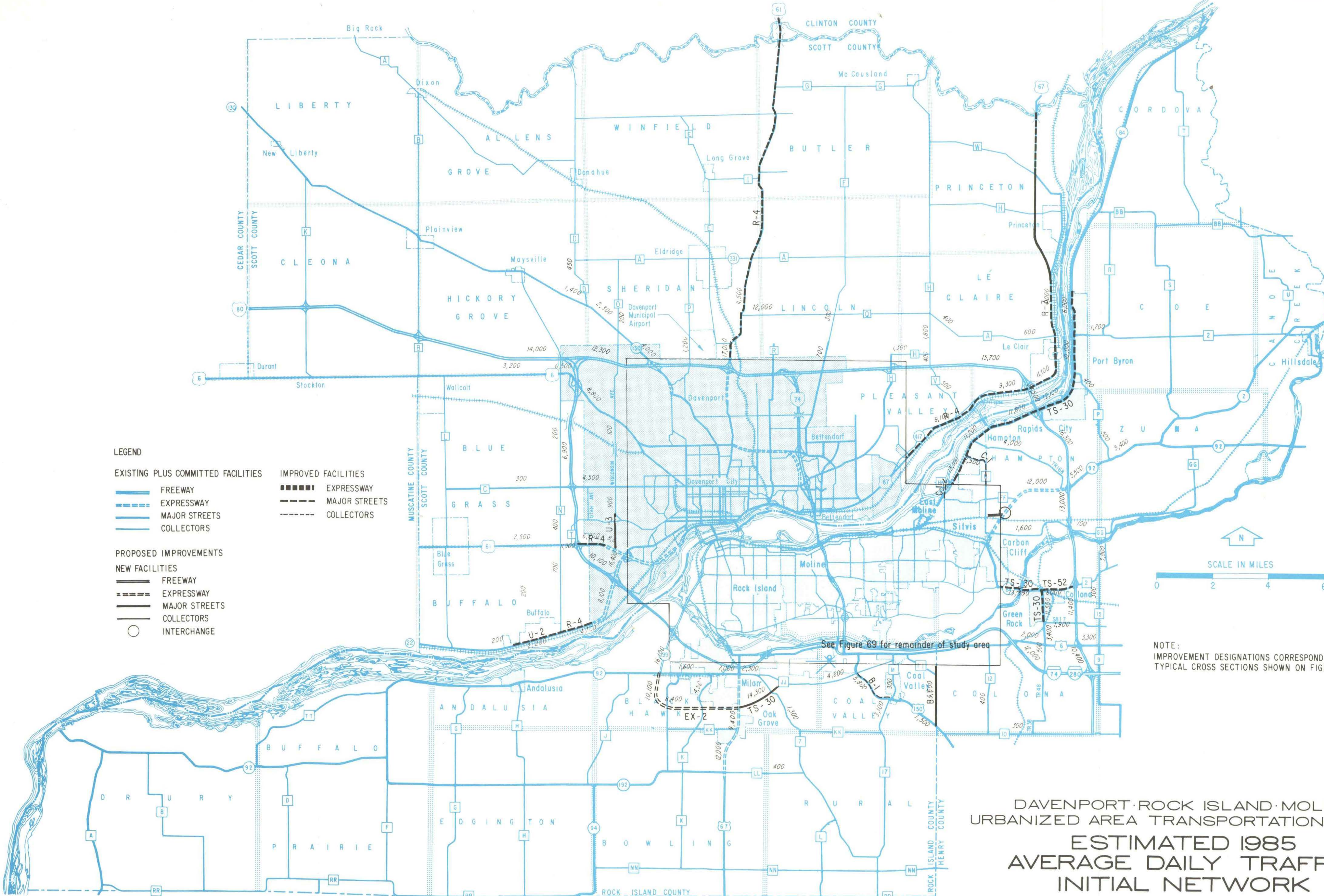
ESTIMATED 1985 AVERAGE DAILY TRAFFIC INITIAL NETWORK

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO



See Figure 70 for remainder of study area

FIGURE 70



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

ESTIMATED 1985 AVERAGE DAILY TRAFFIC INITIAL NETWORK

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Preliminary cost estimates were made of each planned improvement in the Initial Network. Rights of way and construction for the entire study area would cost approximately $193 million. Of this, $83 million pertained to the Iowa portion of the study area, while improvements in Illinois would cost approximately $110 million.

This initial network, which would meet the transportation needs of the area and be compatible with future land use plans, was then presented to the various planning agencies, governmental bodies, and citizen groups for review and comments.

ALTERNATIVE TESTING

Meetings with city councils, planning commissions, county boards and technical committee members elicited suggestions for alternatives to the Initial 1985 Street and Highway Network. These alternatives, shown in Figures 71 and 72, were submitted to the Consultant for examination as to cost, impact on travel patterns, and compatibility with sound transportation planning.

Procedures followed in testing each alternative were similar to those used in development of the Initial 1985 Street and Highway Network.

Since there were many alternatives, and since they were widely distributed throughout the study area, it was apparent that a number of network modifications could be grouped and tested together to determine their effect on traffic distribution. After a thorough review of all alternatives, it was decided that three basic traffic assignments would suffice to analyze each alternative's impact on travel patterns.

The trip table based on travel times derived from the Initial Network was assigned to the three alternative networks shown in Figures 73 through 75. Traffic volumes from these assignments were used to compare alternatives with the Initial Network. The advantages and disadvantages of each alternative were then weighed in light of the traffic service provided, cost and compatibility with community goals and objectives. For example, some facilities were not recommended or were relocated because they would disrupt existing residential neighborhoods or would interfere with present or proposed parks. Other segments of the system were added to assure convenient access to developing commercial and residential areas. The need for continuity of major streets,

DAVENPORT·ROCK ISLAND·MOLINE URBANIZED AREA TRANSPORTATION STUDY

INITIAL 1985 STREET AND HIGHWAY NETWORK WITH ALTERNATIVES

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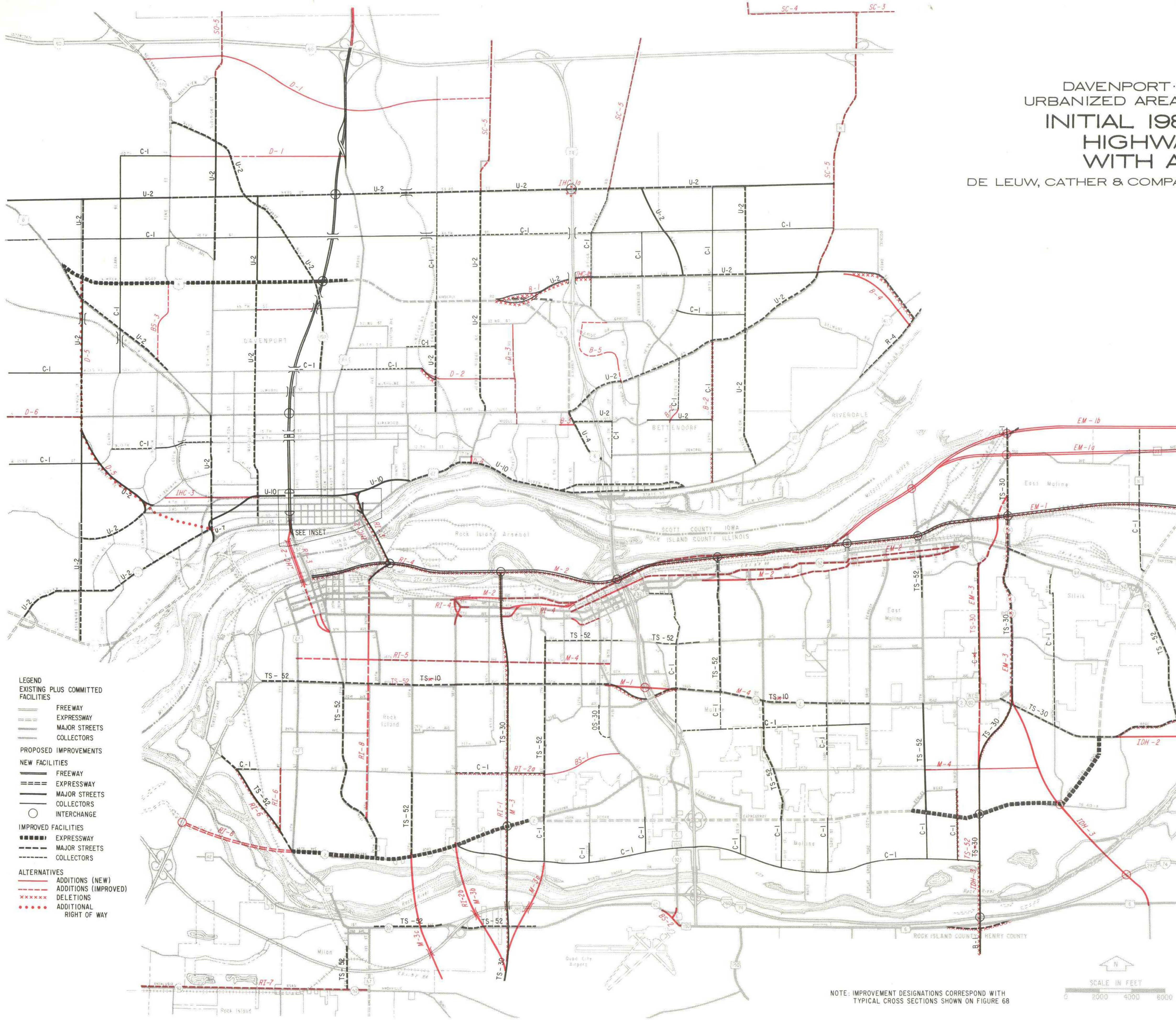
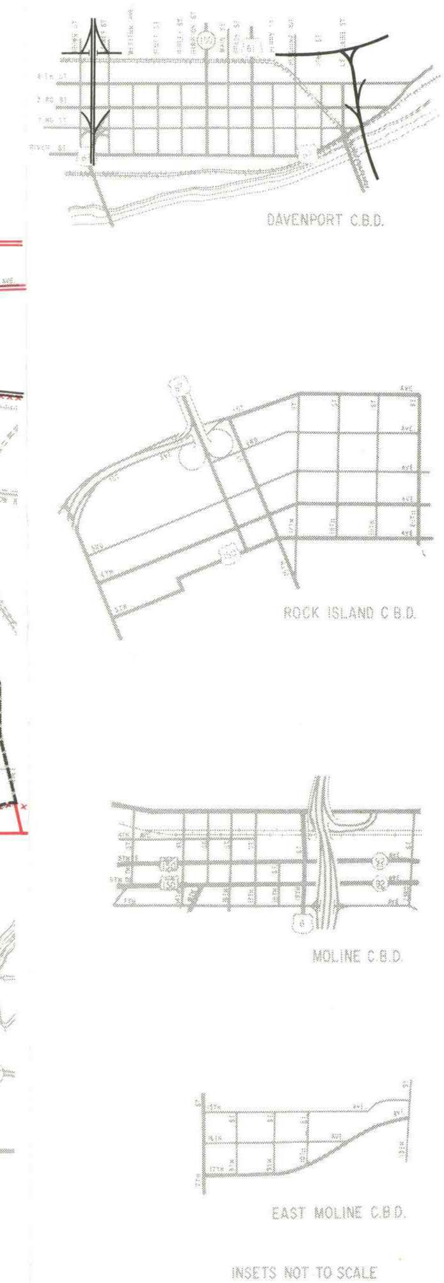
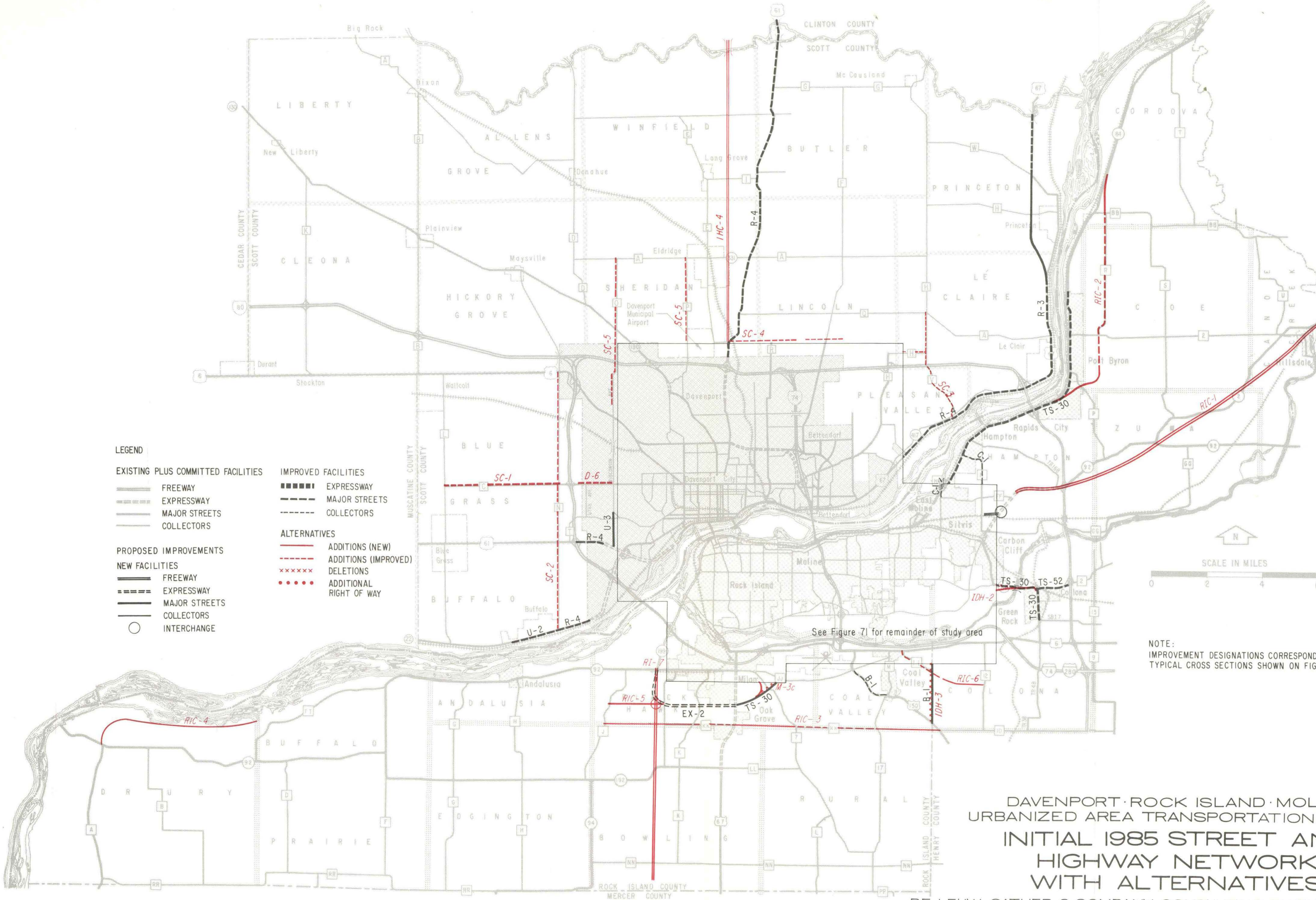




See Figure 72 for remainder of study area



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

INITIAL 1985 STREET AND HIGHWAY NETWORK WITH ALTERNATIVES

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FIGURE 73

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY
1985 ALTERNATE NETWORK D
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DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

1985 ALTERNATE NETWORK E

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

1985 ALTERNATE NETWORK F

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the desirability of providing bypasses to carry through traffic around central business districts, and the requirement for separation of highways and railroads were recognized and considered in evaluating each alternative.

Detailed results of the alternative testing, as presented to the Policy Committee, are described in Interim Report Number 8--Trip Assignments - Alternative Networks. The decisions of the Policy Committee were then reflected in the final network to form the Recommended 1985 Street and Highway Plan.

Chapter VIII

RECOMMENDED TRANSPORTATION PLAN

The recommended transportation plan is basically highway-oriented. Transit trips are a small component of total person travel, and the number of bus passengers is not expected to increase above 1964 levels by 1985. The importance of transit as a public service has been recognized, but major elements of the plan are directed toward improvement of streets and highways to afford better service for the vast majority of persons who travel as drivers or passengers in cars and trucks. Inasmuch as buses will also use these streets, transit will be improved.

1985 STREET AND HIGHWAY PLAN

The recommended 1985 street and highway plan for the Davenport-Rock Island-Moline urbanized area is indicated on Figures 76 and 77. New facilities have been classified either as freeways and expressways or as major or collector streets and highways on the basis of access control and service to abutting land. Locations were selected for new facilities to make cost estimates meaningful and to assure physical practicality. These alignments should be interpreted only as general corridors, however, since final siting should be based on more detailed land use and engineering considerations.

The recommended plan is relatively straightforward. A circumferential freeway system together with a north-south freeway bisecting the area had been planned as part of the Interstate Highway System before the transportation study was begun. The typical companion pattern of arterial highways extending radially from a major city center was found to be unsuitable, however, since this requires a single strong focal point which does not exist in the Quad City area. The recommended program, therefore, gives primary attention to upgrading existing thoroughfares, connecting presently discontinuous streets, and extending present streets and highways into areas where development is expected to occur.

DAVENPORT · ROCK ISLAND · MOLINE URBANIZED AREA TRANSPORTATION STUDY

RECOMMENDED 1985 STREET AND HIGHWAY PLAN

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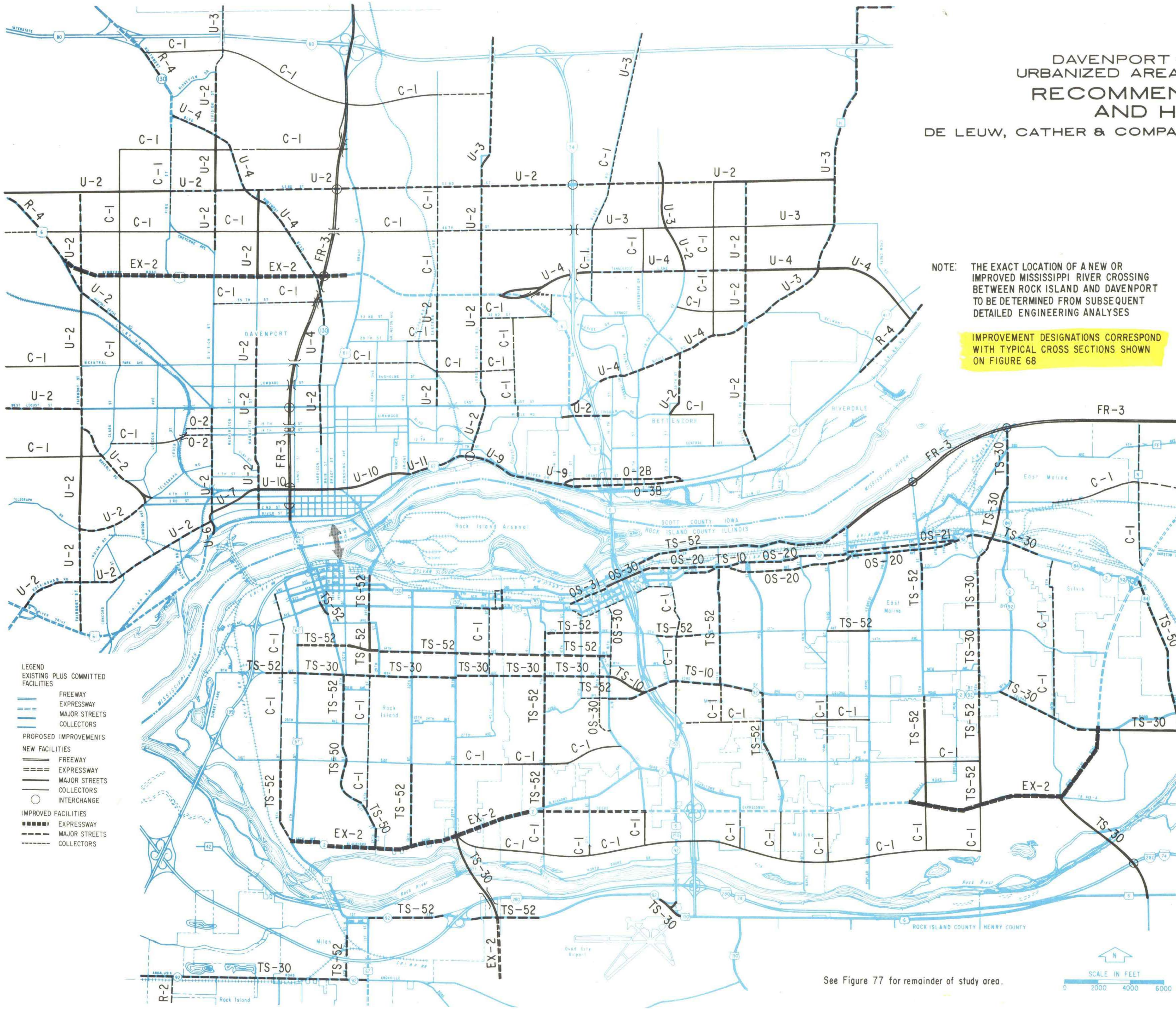
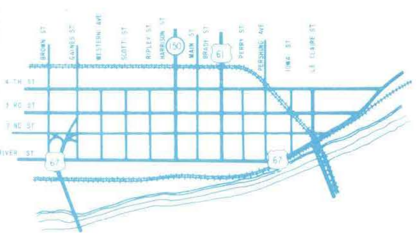
NOTE: THE EXACT LOCATION OF A NEW OR IMPROVED MISSISSIPPI RIVER CROSSING BETWEEN ROCK ISLAND AND DAVENPORT TO BE DETERMINED FROM SUBSEQUENT DETAILED ENGINEERING ANALYSES

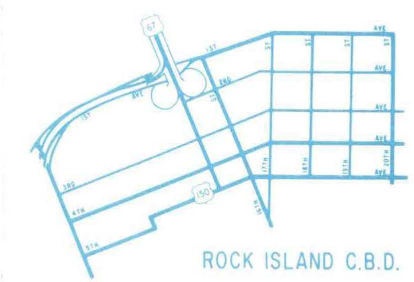
IMPROVEMENT DESIGNATIONS CORRESPOND WITH TYPICAL CROSS SECTIONS SHOWN ON FIGURE 68



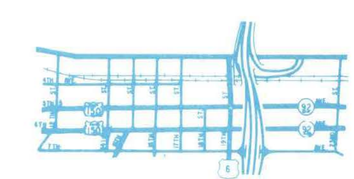
See Figure 77 for remainder of study area.



DAVENPORT C.B.D.



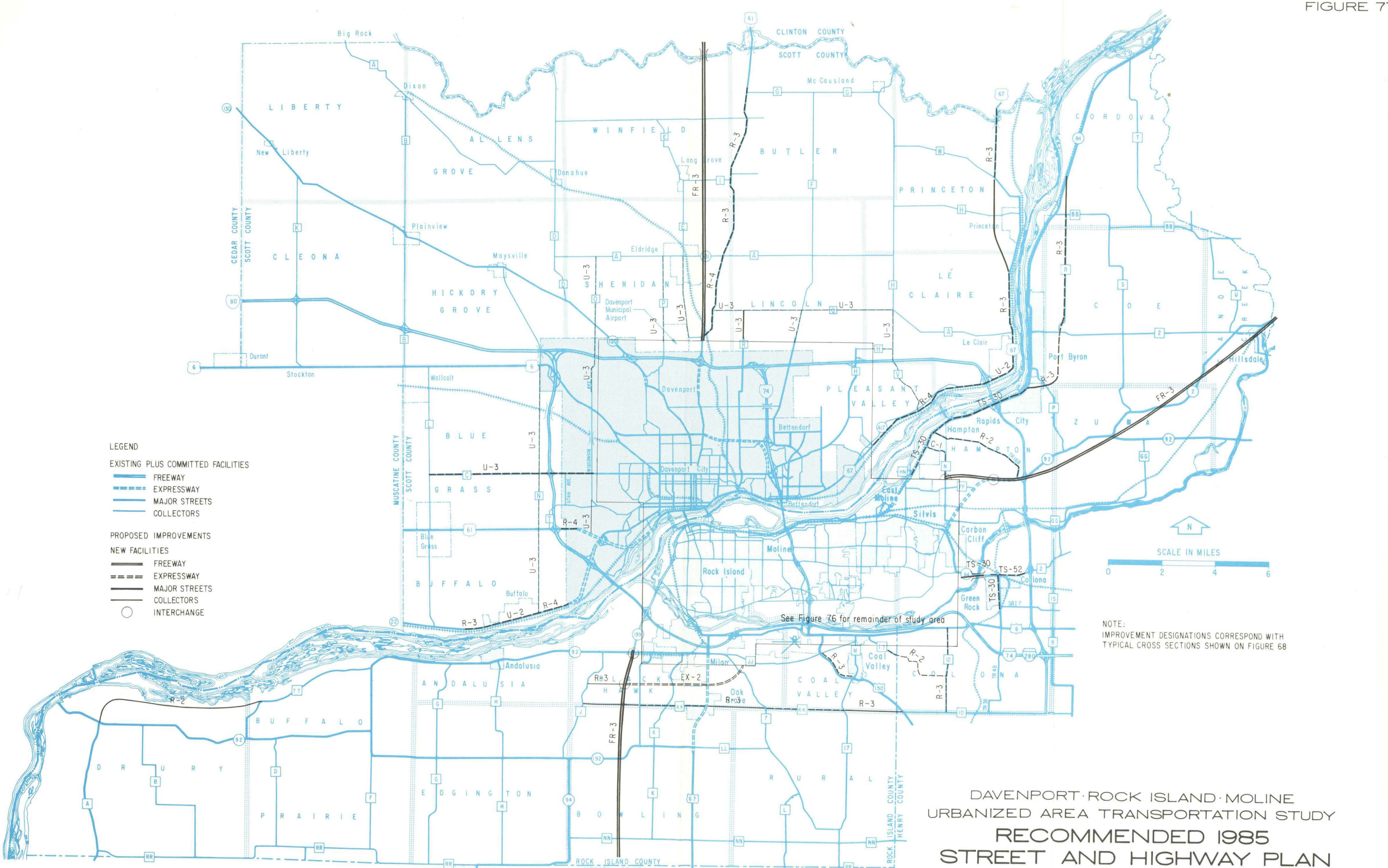
ROCK ISLAND C.B.D.



MOLINE C.B.D.

EAST MOLINE C.B.D.

INSETS NOT SCALE



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

RECOMMENDED 1985
STREET AND HIGHWAY PLAN

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

Disturbance of existing neighborhoods and business areas was kept to a minimum. Residential dislocations were kept to a minimum considering the magnitude of the proposed plan. It promises to raise the level of transportation service in presently developed areas while providing for the needs of growing areas.

For clarity in describing the plan, names were assigned to some of the planned facilities. The names generally refer to location or features, and are in no sense official or even suggested.

Recommendations for continuous routes over several existing streets also created problems of nomenclature. Kimberly Road, for example, would be extended over a portion of Tanglefoot Lane; and 18th Avenue, Rock Island, would continue as 19th and 23rd Avenues, Moline, to Colona Road, East Moline. It is suggested that local governmental bodies assign single names, as deemed appropriate, to such projects as they are implemented.

Committed Improvements

Street and highway improvements completed while the transportation study was in progress or committed for construction in the near future were described in Chapter II and are shown in Figure 9. All such facilities are included in the recommended plan, but their completion has been assumed in discussing recommendations.

Recommended Street and Highway Improvements--Iowa

The three most important traffic requirements in the Iowa portion of the study area are:

1. Provision of additional traffic capacity in a north-south corridor between the Davenport central business district and I-80.

2. More adequate facilities for east-west traffic along the riverfront--particularly from the Bettendorf central business district to and through the Davenport central business district.

3. Construction of a high-type, continuous, east-west highway approximately midway between the Mississippi River and I-80.

The proposed Gaines Street Freeway would be a limited access highway between the Centennial Bridge and I-80. On- and off-ramps would serve traffic on the west side of the Davenport central business district with other interchanges at Locust Street, Kimberly Road and 53rd Street. The planned Iowa Supplemental Freeway from Dubuque would meet the Gaines Street Freeway at the present interchange of U.S. 61 and I-80. Traffic to and from Davenport and Rock Island would be afforded an alternative route to relieve already-congested Harrison and Brady Streets.

The recommended Davenport CBD Bypass would replace River Drive as the major east-west thoroughfare between approximately Bridge and Division Streets. This facility would assist in relieving downtown traffic congestion as well as in distributing business district traffic. An improvement to East River Drive (U.S. 67) is proposed between the Bypass and about 6th Street, Bettendorf. State and Grant Streets in downtown Bettendorf, functioning as a one-way pair, would extend the riverfront improvement.

Kimberly Road would be continued as an expressway from near Brady Street westerly to Hickory Grove Road. The route would be extended to the east as a four-lane facility across I-74 and along Tanglefoot Lane to U.S. 67 near the west side of Panorama Park. If further consideration is given to another Mississippi River Bridge near Campbell's Island, the Kimberly Road improvement and extension would constitute an excellent connection to the bridge.

Improvement of Middle Road as a four-lane facility from Kimberly Road, Davenport, to Tanglefoot Lane would afford another major route for east-west traffic. This facility would extend Locust Street which is recommended for widening from I-280 to Zenith Avenue, and County Highway C from I-280 to County Highway L.

Other continuous east-west facilities proposed in north Davenport and north of Bettendorf would include 46th, 53rd, 60th and 65th-67th Streets. Of these 53rd Street would be a major, four-lane facility; the others would be collector streets.

In Davenport's west end, Fairmount Street would be upgraded and extended as a four-lane facility between 53rd Street and U.S. 61. Waverly Road would be reconstructed to provide a direct connection between 3rd and 4th Streets (a one-way pair) and Fairmount Street.

Hickory Grove, Telegraph, and Rockingham Roads would also be improved. Wisconsin Avenue (County Highway O) and County Highway N would serve as continuous north-south arteries on the east and west sides, respectively, of I-280.

It is recommended that Division and Marquette Streets be improved and extended. Until the proposed Gaines Street Freeway was completed, these facilities would assist in accommodating the heavy north-south traffic burden in Davenport. After the Freeway was built, they would continue to function as continuous connections between downtown Davenport and the rapidly growing northwest section of the city. County Highway P, an extension of Division Street northerly to Eldridge, would be widened. Northwest Boulevard would also be improved from Pine Street to Kimberly Road along with Harrison Street from Kimberly Road to 12th Street.

On the east side of Davenport, Jersey Ridge Road would be extended southward to an interchange with East River Drive. North of Locust Street, Jersey Ridge Road would be widened to its terminus at County Highway Q. Eastern Avenue would be widened to four lanes between Locust Street and Kimberly Road. Between Kimberly Road and 53rd Street, Eastern Avenue would be a collector street. Other collector streets to be improved and/or extended in this portion of the study area are East Central Park Avenue, Forest Road and 29th Street.

Major streets proposed for improvement in Bettendorf include Lincoln, Devil's Glen and 18th Street. Extension of 18th Street northward from Tanglefoot Lane to 53rd Street and widening of Devil's Glen Road would give continuity to the north-south thoroughfare system in north Bettendorf. Twenty-ninth Street, Crow Creek Road (46th Street) and Maplecrest and Greenbrier Drives would serve as collector streets. Utica Ridge Road would also be improved as a collector street between Spruce Hills Drive and County Highway Q.

Other collector streets in Bettendorf recommended for improvement include 14th and 23rd-25th Streets.

Proposed street and highway projects in Scott County, outside of Davenport and Bettendorf, are shown in Figure 77. U.S. 67 would be relocated to the west of Princeton with the remainder of the route widened between Riverdale and the county line. Iowa 22 would be widened to four lanes through, and to the east of, Buffalo. County Highways H, V and Q would also be upgraded.

Recommended Street and Highway Improvements--Illinois

Analyses of base year and projected traffic demand in the Illinois portion of the study area emphasized the need for additional east-west traffic arteries with continuity. Except in the I-280-John Deere Expressway corridor, east-west routes of travel are characterized by discontinuity--particularly at the city limits of adjoining communities. When I-74 is completed between I-280 and Memorial Bridge, there will be interchanges at 3rd, 7th and 23rd Avenues in Moline. The recommended plan provides improved streets, however, to distribute freeway traffic.

A corridor centered on 18th Avenue, Rock Island, 19th and 23rd Avenues, Moline, and Colona Road is the recommended location for a major east-west traffic artery. This four- to six-lane facility would extend from an interchange with the Centennial Freeway to Colona. A new connection between 19th Avenue, Moline, and the 23rd Avenue interchange on I-74 would be constructed. Colona Road would be widened and realigned with a new bridge across the Rock River.

Along the riverfront, a connection would be made between 6th and 7th Avenues, Rock Island, and 3rd Avenue, Moline, extended. Third Avenue would continue east on widened River Drive to the East Moline city limits where it would meet the proposed Riverfront Freeway. The latter would continue eastward to a junction with Illinois Routes 2 and 92 as well as with the proposed Supplemental Freeway to Rock Falls and Chicago.

A more immediate improvement in this corridor would be provided by the 4th and 5th Avenues one-way couplet in Moline extended along 16th and 17th Avenues in East Moline. Later, the one-way system in downtown Moline would be changed with completion of 4th Avenue from 17th Street to 23rd Street.

Substantial relief would be provided in the 18th Avenue corridor by the 13th-14th Avenues, Rock Island, improvement from 11th Street to 25th Street. East-west traffic movements would be further eased by extension of 31st Avenue, Rock Island, to 34th Avenue, Moline, as far as 16th Street. On the east end of Moline, 34th Avenue would serve the new Blackhawk College campus.

South of John Deere Expressway, a system of collector roads, including 52nd Avenue, would provide access to the new development in that area. Access to John Deere Expressway from the north would be greatly improved by the planned upgrading of 17th-24th Street and 30th Street in Rock Island and 7th Street and 41st Street in Moline as well as by the construction of 70th and 80th Streets in Moline.

Two new Rock River crossings would handle the increased traffic from residential and industrial areas south of the Rock River and from increased external traffic entering the Quad City area on Interstate 280. The West Rock River crossing would connect the Milan Southeast Beltway and the 92nd Avenue Expressway with the John Deere Expressway. The 92nd Avenue Expressway would interchange with the north-south Supplemental Freeway from St. Louis at its western extremity. The 92nd Avenue Extension would continue west as far as Taylor Ridge Road.

Another Supplemental Freeway planned for the study area would begin at Interstate 80 and generally follow Illinois 2 to Rock Falls, Illinois, where it would connect with the proposed extension of the East-West Tollway from Chicago.

Major renovation of Illinois 84 is planned in East Moline and northerly along the Mississippi River. It would include a railroad grade separation in East Moline and a bypass around Port Byron.

Evaluation of the Recommended Street and Highway Plan

The quality of service afforded by the recommended street and highway plan may be expressed in terms of driver safety, comfort and convenience; freedom from traffic delays and other irritations; and minimum travel time consistent with the environment for transit buses as well as for general street traffic. The sufficiency of such a system may be evaluated in terms of compatibility of streets and highways with goals and objectives of the study; the relationship of thoroughfares to corridors or travel desire; and the relationship of capacity to anticipated traffic.

The recommendations resulting from this study include a system of arterial streets and highways capable of serving presently developed areas and extension of that network into areas expected to develop by 1985. The network is consistent with the proposed land use plan and is predicated on the study goals and objectives. Many of the recommendations were originally proposed in task force meetings of the Citizens Advisory Committee.

Two important facilities suggested by a concensus of the Citizens Advisory Committee are not included in the plan. One, a bridge across the Mississippi River in the vicinity of Campbell's Island could not be justified by projected 1985 traffic. The other, a limited access highway along the riverfront in Illinois, could not be suitably located because of conflicts with railroad facilities. Moreover, such a highway could not be financed during the initial implementation period due to fund limitations. Both proposals should be reevaluated, however, in future updating of the street and highway plan.

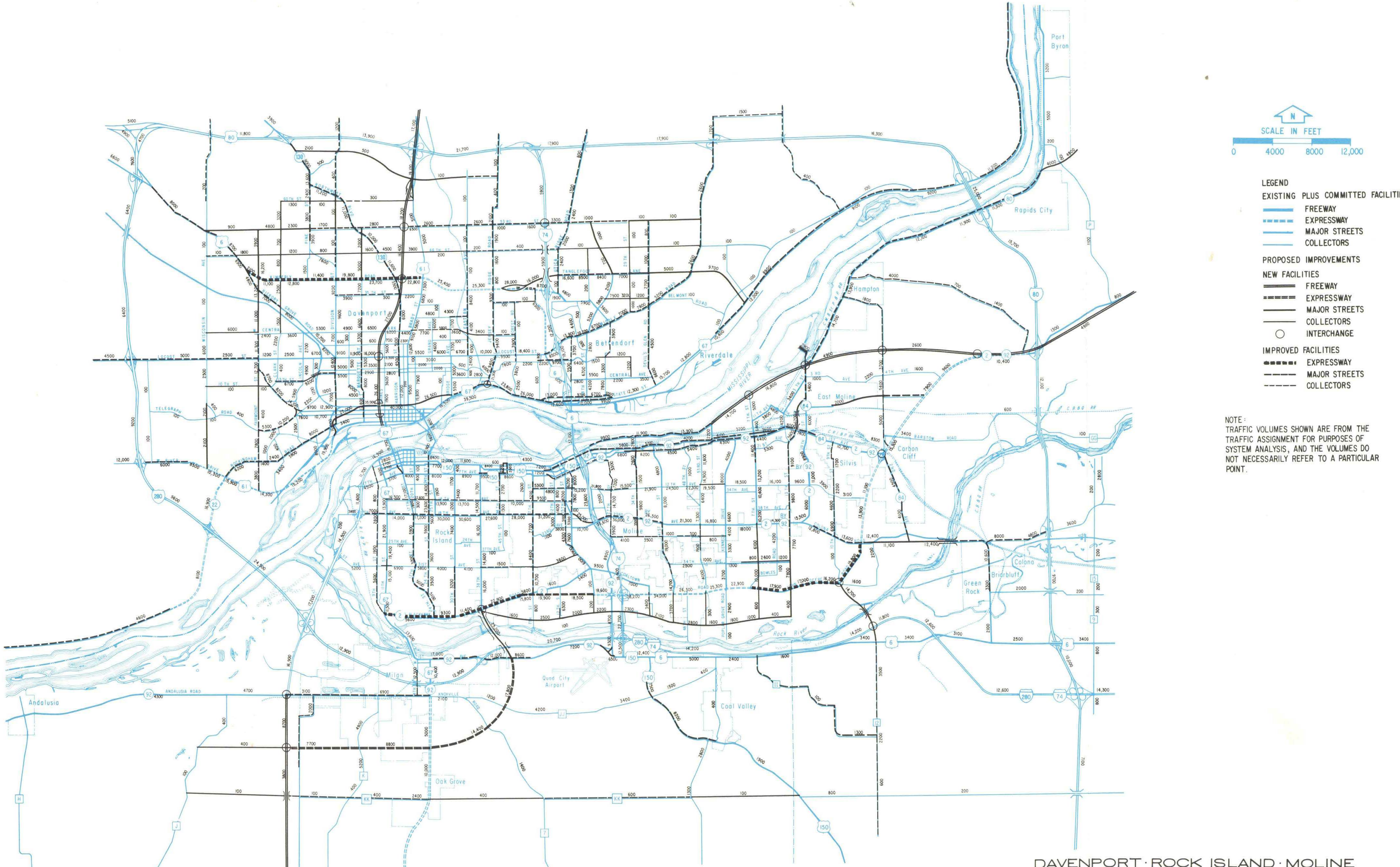
Estimated 1985 daily traffic volumes on segments of the recommended street and highway plan are shown in Figure 78. Traffic was assigned for purposes of system analysis, and the volumes do not necessarily refer to a particular point. Traffic volumes were estimated by assigning 1985 zone-to-zone vehicular trips on minimum time paths. The traffic assignment was unrestrained, i.e., travel time changes which might have rerouted certain trips around points of congestion were not made. Basically, each trip was assigned over the most logical route between origin and destination. While congestion often induces motorists to seek alternative routes, one objective of the planning process is to anticipate such congestion and prevent it by proper design.(1)

The capacity of a street or highway is a measure of its ability to accommodate traffic. The procedures in this study to estimate capacity of different types of streets and highways are fully described in Chapter III.

The degree of operational freedom on street and highway systems may be expressed in terms of the ratio of demand volume to service volume (D/S). When demand volume exceeds service volume (capacity), operation becomes unstable or breaks down entirely. The levels of service chosen as design criteria in this study should produce a street and highway system highly satisfactory to most drivers. In

(1)-Factors to convert average daily traffic to design hour traffic are given in Chapter III, pages 60 to 65.

FIGURE 78



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY

ESTIMATED 1985 AVERAGE DAILY TRAFFIC RECOMMENDED NETWORK

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

urbanized areas some drivers might be delayed longer than one red signal during peak periods. Such delays would be rare, however, and driver inconvenience would be minimal. On rural highways, traffic flow would be stable with speeds governed largely by local conditions.

The capacity analysis of the recommended 1985 street and highway system showed that all potential problem areas present in the existing and committed street system would be relieved by the recommended improvements and additions or by special treatment of intersections and parking restrictions.

1985 PARKING REQUIREMENTS

Parking facilities are an integral part of a total transportation system. An adequate supply of conveniently located parking facilities is essential to maintain the economic well-being of commercial areas. Inadequate parking space may also lead to traffic congestion and accidents.

Travel forecasts made in the course of the comprehensive transportation study were useful in anticipating the type and magnitude of parking problems that will occur in the various business districts. More intensive studies of individual areas will be required, however, to identify specific sites for future parking facilities.

The travel forecasts were translated into projections of 1985 parking space needs in the Davenport, Bettendorf, Rock Island, Moline and East Moline central business districts. The Milan, Silvis and other outlying business districts in Illinois, covered in the inventories of terminal and transfer facilities (Figure 10), were too small for a meaningful projection of future parking needs from the areawide travel forecasts.

Estimates were made of the need for greater parking capacity in each business district, taking into account forecasted demand, changing land use, and the anticipated need for curb parking restrictions to aid moving traffic.

Inventoried parking supply[1] with base year and projected parking demand in each of the five business districts are compared in Table 27. A brief synopsis of the findings of this element of the study as they pertain to each business district follows:

Davenport. Approximately 800 additional parking spaces will be needed in the Davenport central business district by 1985 to maintain the same quality of service as now prevails. Another 200 off-street spaces will probably be required to replace present curb parking facilities which will be eliminated to aid moving traffic. Pressure may also be brought to bear over the next 20 years to convert some of the levee parking areas to use as parks and recreation facilities. Upon implementation of the transportation study proposals for new traffic arteries north and west of the business district, consideration should be given to construction of two new city parking structures, with combined capacity of 600 to 800 cars, convenient to the new highways.

Bettendorf. Existing parking facilities in downtown Bettendorf could be operated more efficiently if several of the small lots were combined into fewer but larger facilities. Consideration should also be given to future construction of a parking lot, with a capacity of about 100 cars, accessible from both State and Grant Streets.

Rock Island. Approximately five square blocks of land, or equivalent, would be required to meet anticipated 1985 parking demand in the Rock Island central business district. The city should plan to construct or encourage private entrepreneurs to build downtown multi-level parking garages in the near future. Such facilities should be within easy walking distance of major traffic generators, and they should have convenient connections to major arterial streets. About 1,250 additional parking spaces will be needed, especially in the area between 14th and 20th Streets, and between 5th Avenue and the river.

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(1)-Parking inventories were made in 1967 in the Iowa portion of the area and in 1966 in the Illinois portion.

Table 27

COMPARISON OF INVENTORIED PARKING SUPPLY WITH
BASE YEAR AND PROJECTED DEMAND

Central Business District	Practical Space-Hour Capacity 1966-1967 (1)	Total Space-Hours of Demand (2)		Net Deficiency or Surplus			
				Deficiency Space-Hours		Surplus Space-Hours	
		1961/1964	1985	1961/1964	1985	1961/1964	1985
Davenport	41,960	34,226	39,890	12,097	13,559	19,831	15,629
Bettendorf	9,421	5,475	6,511	-	-	3,946	2,910
Rock Island	33,585	24,378	31,149	1,267	4,766	10,474	7,202
Moline	54,999	31,690	30,971	2,070	1,001	25,379	25,029
East Moline	10,480	6,715	5,999	-	-	3,765	4,481

(1)-From 6:00 a.m. to 6:00 p.m., taking into account that a reasonable percentage of vacant spaces are required for efficient operation. Inventories were made during 1967 in the Iowa business districts and during 1966 in the Illinois business districts.

(2)-Excludes trucks.

Moline. The forecasts indicate that parking demand in downtown Moline will not change significantly between 1964 and 1985. Construction of I-74 through the business district, however, will impose additional traffic on central area streets, resulting in the loss of about 200 present curb parking spaces. It may be possible to replace these spaces in new parking lots beneath the elevated freeway as suggested in Bureau of Public Roads Interim Policy and Procedure Memorandum 21-19, "Joint Development of Highway Corridors and Multiple Use of Roadway Properties."

East Moline. Unless growth of the business area occurs at a greater rate than predicted, it is unlikely that extensive new parking facilities will be required in the East Moline central business district.

PUBLIC TRANSPORTATION FACILITIES

Another important phase of a comprehensive transportation study is the consideration of transportation forms other than private autos and trucks. The effort spent on analysis, however, should be relative to the areawide importance and impact of each mode.

The study area has five central business districts rather than one. Secondary commercial areas, industrial areas, and residential areas are widely distributed over the entire region. Because of this absence of a single dominant focal point, travel is heavily oriented towards the private automobile.

Other forms of transportation, however, play an important role in the study area. Of these, air transport of both passengers and freight has experienced the fastest growth and is expected to continue to increase rapidly. Railroads provide low-cost bulk transportation to the manufacturing industries along the Mississippi River, but trucks are playing an increasingly important role. The two modes--rail and road--are being combined successfully in many instances to offer piggyback service.

Intracity Buses

The experience of local bus lines has generally paralleled that of other public transit systems in the United States. Patronage has declined steadily since about 1946.

There were approximately 9,500 daily person trips by transit in the base years (1961-1964) of the transportation study. These amounted to just over one percent of total daily travel.

Statistics furnished by Davenport City Lines and Rock Island-Moline City Lines indicate that patronage has decreased by nearly 60 percent since 1956. That patronage is still falling is shown by a loss of about 25 percent between 1964 and 1968. Three features of the study area contribute to difficulties in operating a successful public transit system:

1. Rather than one dominant central business district, as in most urbanized areas, there are five central areas and at least three other community business districts.

2. Major industries are spread along 16 miles of riverfront.

3. Residential density is low; there are no compact corridors or centers.

The work program for the study required application of the Erie mode split procedure to the estimated 1985 person trips. This procedure is used to estimate the number of home based work transit trip productions. The modal split analysis indicated that even with an increase in population and extension of present bus lines into the fastest growing areas, the number of transit work trips would still decline by 16 percent between 1964 and 1985.

Considering the features of the study area noted above, either one or a combination of two conditions would have to exist before any substantial portion of auto drivers could be induced to use public transportation:

1. An alternative mode of travel equal or superior to the automobile in terms of speed, safety, comfort, convenience, and out-of-pocket cost would have to become available.

2. Congestion on arterial streets and highways and/or parking fees would have to become so intolerable that auto drivers would seek other means of travel.

There is considerable research now in progress to develop better transit vehicles for medium-sized cities. In view of street and highway improvements committed or planned over the next 15 to 20 years in the Davenport-Rock Island-Moline area, however, it is unlikely that traffic congestion will reach a level which will discourage a significant number of motorists from driving.

Public transportation in the Quad City area should be viewed as a public service. Measures should be taken to continue such service even if subsidies become necessary. The commonly used term, "modal choice," implies, by definition, that the potential traveler has a choice between driving or using public transportation. Transit planning in the Quad City area, however, should be directed toward meeting the needs of those who do not have a choice--the young, the old, the poor, the handicapped, and the second workers in one-car families.

Airlines

The fastest growing mode of public transportation is air transport. Nationally, air traffic has been expanding at a constant rate of about 11 percent per year, and this rate is expected to continue.

The Metropolitan Airport Authority of Rock Island County, in making its forecast of future air traffic at the Quad City Airport, relied extensively on industrywide estimates by aircraft manufacturers and the Federal Aviation Agency. Since the historic growth of air travel at the Quad City Airport closely parallels the national trend, this is a reasonable index if appropriate adjustments are made for local factors. The following table summarizes the Airport Authority's estimates of future air travel.

FORECAST OF AIR TRAVEL
QUAD CITY AIRPORT

	1965 (Actual)	1985 (Estimated)
Total Airline Passengers	245,471	1,460,000
Air Carrier Operations	21,704	37,000
Passengers Per Operation	11.9	40.0
General Aviation Operations	88,649	265,000
Military Operations	1,677	2,000

The forecasts anticipate that major airlines will use larger and larger planes. Simultaneous arrivals and departures of large numbers of passengers will result periodically in heavy traffic concentrations on streets and highways in the vicinity of the Quad City Airport. Bus routes may have to be extended, therefore, to provide service between the airport and local business districts.

It is significant that in terms of aircraft operations, the largest increase is expected in general aviation--private and business planes, pleasure craft, and small freight planes. General aviation facilities, such as the Davenport Municipal Airport, Woods Airport and Quad City Seaplane Base, are expected to take on greater importance in the future.

Railroads

The importance of railroads in passenger transport has been declining, except in large and densely populated metropolitan areas. The future of passenger train service to the study area is indeterminate at this time. The situation might change, however, with pending mergers or changes in emphasis on various modes of transportation.

The future of railroad freight service appears to be assured. In this respect, potential mergers might make the Quad City area an important hub in a nationwide railroad network. Heavy manufacturing industries in the area have always relied on railroads to an important degree for transportation of raw materials and for distribution of finished products to all parts of the country.

Intercity Buses

Upon completion of the National System of Interstate and Defense Highways, intercity travel via bus should be even faster and more convenient than it is at present. Increased competition occasioned by greater car ownership and wider acceptance of air travel, however, will tend to slow the rate of growth of intercity bus travel.

Chapter IX

IMPLEMENTATION PROGRAM

To determine if the recommended transportation plan is within the financial capabilities of the participating agencies, both project costs and potential revenues were estimated. Comparison of estimated costs with forecasted revenues indicated that, based on present funding practices, only one-half of all improvements could be funded by 1985. New sources of construction funds would have to be found if all of the needed improvements were to be implemented.

PROJECT COST ESTIMATES

Estimates of construction cost for street and highway improvements were developed from two separate sets of unit costs. Basic unit costs for Iowa were obtained from the construction cost index information compiled by "Engineering News-Record" magazine. The 1968 unit costs were then adjusted slightly by the Iowa State Highway Commission. In the Illinois portion, the Illinois Division of Highways provided basic 1964 unit costs derived from the statewide needs study, adjusted for local district experience.(1) Ten percent was added in both cases for contingencies and miscellaneous small items to arrive at total construction cost.

Initially, the cost of each project was estimated on a per mile basis using unit costs and typical cross sections shown in Figure 68. Design standards illustrated by these cross sections were adopted in 1965 for planning purposes. They may be modified in final design to meet higher safety standards or other criteria in effect at that time.

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(1)-For purposes of this study it was assumed that inflation of highway construction costs will be balanced by comparable increases in tax revenues.

The cost estimates were later adjusted in locations where particularly rugged terrain or other unusual difficulties would be encountered. Finally, the estimated costs of more advanced projects--those in preliminary and/or final design stages--were made on the basis of the plans. These latter cost estimates represent the most up-to-date figures available.

The total estimated cost of all improvements in the recommended plan amounted to $228,650,000. Implementation of all recommended improvements in the Iowa portion of the study area would require $113,126,000, while $115,524,000 would be needed for construction of the Illinois projects.

FORECAST OF FINANCIAL RESOURCES

Various types of funds are used to finance construction and maintenance of the street and highway system in the Davenport-Rock Island-Moline area. Separate forecasts were made for each portion of the study area.

Financial Resources in Iowa

Revenues available to build and maintain such improvements in Iowa fall into three categories: state primary funds, county road funds, and municipal street funds. Principal sources of revenue for state primary roads are Federal Aid, allocations from the Road Use Tax Fund, and special allocations. Iowa counties receive road funds from an earmarked 38 percent share of the state's Road Use Tax Fund for secondary roads and farm-to-market roads as well as from property taxes. Property taxes are levied annually for roads at the rate of five-eighths mill per dollar of assessed valuation in incorporated areas and eleven and three-quarters mills per dollar in unincorporated areas. The state uses a formula for allocation of county road funds among counties based 40 percent on geographic area and 60 percent on relative needs.

Revenues for municipal street purposes are derived from local property taxes, special assessments and other municipal sources as well as from an earmarked 15 percent share of the state's Road Use Tax Fund.

The Consultant estimated future state primary funds in the Iowa portion of the study area on the basis of the previously published Statewide Needs and Finances Study and the Iowa State Highway Commission's planned expenditures for the 1970-1974 five-year period. It was assumed that Scott County will continue to receive 1.50 percent of total state primary road revenues, of which 80 percent will be available for new construction and right of way acquisition. After allowing for completion of the committed Interstate System, a total of $24,400,000 has been forecast for the 16-year study period from 1970 through 1985 which will be available to build and maintain other primary routes.

The Bi-State Metropolitan Planning Commission, working with the local agencies, forecasted financial resources for Scott County as well as for the cities of Davenport and Bettendorf. A summary of predicted expenditures for right of way and construction by governmental unit is given in Table 28. Since many of the new streets will be built in developing areas, some of the cost can reasonably be expected to be borne by developers and to be raised through special assessments.

Total revenues expected to be available for construction of new streets and highways in the Iowa portion of the urbanized area are:

State Primary Funds	$24,400,000
County Road Funds	9,238,000
Municipal Street Funds	24,903,000
Developers and/or Special Assessments	5,985,000
Total	$64,526,000

Total construction costs, however, estimated at $113,126,000, will greatly exceed the forecasted funds.

Financial Resources in Illinois

In the Illinois portion of the study area, the marked system of state and federal highways is constructed and maintained by the Illinois Division of Highways. The State also builds and maintains portions of the Federal Aid Secondary System which need not be comprised entirely of marked routes.

Table 28

SUMMARY OF FORECASTED EXPENDITURES FOR RIGHTS OF WAY AND CONSTRUCTION BY LOCAL GOVERNMENTAL UNIT
(Iowa Portion 1970-1985)

	Governmental Unit			
Year	Scott County	Davenport	Bettendorf	Total
1970	$ 482,160	$ 785,400	$ 555,000	$ 1,822,560
1971	492,240	806,500	639,500	1,938,240
1972	503,580	830,000	656,600	1,990,180
1973	514,920	853,000	616,700	1,984,620
1974	526,680	881,500	521,000	1,929,180
1975	538,440	910,000	387,600	1,836,040
1976	551,460	939,500	414,900	1,905,860
1977	565,320	968,500	439,300	1,973,120
1978	578,760	998,000	468,700	2,045,460
1979	593,460	1,027,500	507,300	2,128,260
1980	607,320	1,062,500	536,200	2,206,020
1981	623,280	1,097,500	567,500	2,288,280
1982	639,660	1,127,500	616,900	2,384,060
1983	656,040	1,162,500	658,000	2,476,540
1984	672,840	1,198,000	695,700	2,566,540
1985	692,160	1,234,500	739,700	2,666,360
Total	$9,238,320	$15,882,400	$9,020,600 (1)	$34,141,320

(1)-This figure is the final forecast for the City of Bettendorf. Amount shown in Table 32 ($6,329,000) was a preliminary figure used during the process of priority selection.

Source: Scott County Engineer, Davenport Public Works Department and Bettendorf Public Works Department.

The county highway system is built and maintained by Rock Island County[1] with funds from the county's road and bridge funds as well as from motor fuel tax funds. Farm-to-market type township roads are also maintained by the 16 townships.

Each municipality in the study area also builds and maintains some streets and highways. Revenues for street and highway purposes in Rock Island and Moline are derived from road and bridge funds as well as from motor fuel tax funds. Smaller municipalities in the study area make similar improvements with money derived mainly from road and bridge funds.

Over the five-year period from 1959 through 1963, a total of $43,700,000 was spent for streets, highways and related purposes by all agencies in the Illinois portion of the study area. Of this amount, $28,300,000 was spent for acquisition of rights of way and construction--an average of $5,660,000 per year. As shown in Table 29, expenditures for rights of way and construction averaged 64.8 percent of total expenditures during the five-year period but fluctuated from year to year. The balance was spent primarily for maintenance, administration and engineering.

The Illinois Division of Highways projected revenues and expenditures for streets and highways and related purposes in the Illinois portion of the study area covering the period from 1966 through 1985. Table 30 shows revenues and expenditures for the 1970-1974 five-year period. A summary of forecasted expenditures for rights of way and construction by governmental unit for the entire study period (1966-1985) is presented in Table 31.

These forecasts exclude the funding of the Federal Aid Interstate System and the proposed Supplementary Freeway System. Federal Aid Urban Funds are expected to decrease slightly because of slower-than-national-average urban growth in Illinois. Motor fuel tax receipts are projected to grow with increased motor vehicle usage, but gains in other revenues available to the State will probably be offset by increased maintenance, administrative and engineering expenses.

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(1)-County highways in Colona Township are under the jurisdiction of Henry County.

Table 29

PAST EXPENDITURES FOR CONSTRUCTION AND RIGHTS OF WAY
(Illinois Portion - 1959-1963)

Agency	Construction and Right of Way Expenditures 1959	1960	1961	1962	1963
State of Illinois	$1,489,744	$3,539,369	$7,600,762	$5,025,224	$3,872,481
Rock Island County	436,972	513,378	320,044	458,574	936,605
Central Cities (1)	311,816	380,217	789,716	454,408	1,000,636
Other Municipalities (2)	42,674	196,471	364,487	67,552	42,418
Townships (3)	61,667	140,627	101,692	96,928	52,703
Total	$2,342,873	$4,770,062	$9,176,701	$6,102,686	$5,904,843
Total Highway, Street and Related Expenditures	$4,489,620	$7,752,805	$12,722,865	$9,564,017	$9,169,953
Percent of Total Expenditures for Right of Way and Construction Purposes	52.1	61.5	72.1	63.8	64.4

(1)-Rock Island and Moline.
(2)-Includes municipalities within Colona Township, Henry County.
(3)-Includes Colona Township, Henry County.

Source: Illinois Division of Highways

Table 30

FORECASTED REVENUE AND EXPENDITURES FOR FIVE-YEAR CAPITAL IMPROVEMENT PROGRAM (Illinois Portion - 1970-1974)

Revenue

Year	FAP Funds	FAU Funds	Other Funds	FAS Funds	Miscellaneous(1)	Property Tax	Motor Fuel Tax	Wheel Tax	Total Revenue	General Bonds Debt Service Charges(2)	Total Available for Expenditure
1970	$ 346,959	$ 381,362	$ 801,281	$ 95,550	$1,200,346	$1,355,004	$ 2,009,995	$ 203,382	$ 6,393,879	$168,764	$ 6,225,115
1971	345,356	377,472	801,281	95,550	1,200,346	1,355,004	2,058,763	205,661	6,439,433	152,061	6,287,372
1972	343,753	373,613	801,281	95,550	1,200,346	1,355,004	2,112,042	207,940	6,489,529	148,505	6,341,024
1973	342,150	369,759	801,281	95,550	1,200,346	1,355,004	2,163,485	210,218	6,537,793	150,950	6,386,843
1974	340,580	365,948	801,281	95,550	1,200,346	1,355,004	2,212,063	212,497	6,583,269	152,013	6,431,256
Total	$1,718,798	$1,868,154	$4,006,405	$477,750	$6,001,730	$6,775,020	$10,556,348	$1,039,698	$32,443,903	$772,293	$31,671,610

(1)-Revenue which is derived from motor vehicle and operators licenses.

(2)-Motor Fuel Tax, Property tax receipts, and other funds obligated to payment of bonds by local agencies.

Expenditures

Year	Right of Way and Construction	Administration and Engineering	Maintenance	Other	Total
1970	$ 3,063,889	$ 721,201	$ 2,378,893	$ 61,132	$ 6,225,115
1971	3,086,069	727,776	2,411,463	62,064	6,287,372
1972	3,108,333	732,416	2,436,917	63,358	6,341,024
1973	3,127,798	736,546	2,458,216	64,283	6,386,843
1974	3,146,105	740,211	2,479,612	65,328	6,431,256
Total	$15,532,194	$3,658,150	$12,165,101	$316,165	$31,671,610

Source: Illinois Division of Highways

Table 31

SUMMARY OF FORECASTED EXPENDITURES FOR RIGHTS OF WAY AND CONSTRUCTION BY GOVERNMENTAL UNIT
(Illinois Portion - 1966-1985)

	Governmental Unit							
Year	State of Illinois	County[1]	Rock Island	Moline	East Moline	Other Municipalities	Townships	Total
1966	$ 1,070,373	$ 764,055	$ 228,683	$ 339,025	$ 43,416	$ 31,124	$ 89,935	$ 2,566,611
1967	1,088,134	725,225	233,447	344,726	44,199	31,747	88,763	2,556,241
1968	1,330,449	796,442	238,461	350,754	44,016	31,328	91,429	2,882,879
1969	1,327,637	945,696	241,479	356,612	47,133	31,548	91,641	3,041,746
1970	1,322,155	958,140	246,373	362,548	50,212	32,248	92,213	3,063,889
1971	1,316,662	970,230	249,474	368,561	51,202	33,155	96,785	3,086,069
1972	1,311,200	984,224	254,726	374,917	52,247	33,905	97,114	3,108,333
1973	1,305,743	997,805	257,971	381,090	53,265	34,514	97,410	3,127,798
1974	1,300,362	1,008,858	263,228	387,342	53,269	35,262	97,784	3,146,105
1975	1,294,926	1,023,846	268,530	393,669	54,354	36,017	98,122	3,169,464
1976	1,289,546	1,038,392	270,421	400,353	55,495	36,810	98,416	3,189,433
1977	1,284,159	1,050,434	277,769	406,840	56,605	37,461	98,680	3,211,948
1978	1,278,800	1,066,241	279,588	413,404	57,730	37,620	98,904	3,232,287
1979	1,273,481	1,081,564	285,244	420,047	58,866	38,450	99,194	3,256,846
1980	1,268,171	1,094,403	302,215	427,057	59,037	41,777	99,542	3,292,202
1981	1,262,620	1,110,844	331,555	433,859	65,367	42,382	99,743	3,346,370
1982	1,257,112	1,124,775	336,303	440,738	66,380	43,124	99,994	3,368,426
1983	1,251,597	1,140,199	341,097	447,695	67,406	43,875	100,201	3,392,070
1984	1,246,161	1,157,054	346,175	455,032	68,491	44,542	100,356	3,417,811
1985	1,240,902	1,171,474	351,064	462,148	69,543	45,317	100,557	3,441,005
Total	$25,320,190	$20,209,901	$5,603,803	$7,966,417	$1,118,233	$742,206	$1,936,783	$62,897,533
Total 1970-1985	$20,503,597	$16,978,483	$4,661,733	$6,575,300	$ 939,469	$616,459	$1,575,015	$51,850,056

(1)-Includes Colona Township, Henry County

Nearly $63,000,000 are estimated to become available for new street and highway improvements during the 20-year period from 1966 through 1985. Since funds for 1966 through 1969 have already been committed, only the funds summarized below are potentially available for implementation of the recommended plan in the Illinois portion of the study area.

State of Illinois Funds	$20,504,000
County Road Funds	16,978,000
Municipal Street Funds	12,793,000
Township Road Funds	1,575,000
Total	$51,850,000

Thus, the available funds forecasted for the Illinois portion of the study area will also fall far short of the estimated cost of all recommended improvements which totals $115,524,000.

RECOMMENDED STAGING PROGRAM

After both project costs and anticipated future revenues had been estimated, priorities for construction of the recommended facilities were established.

In assigning priorities, many factors were considered. Overall, an attempt was made to outline a program for implementing the comprehensive plan systematically, while providing continuous optimum areawide service reasonably balanced between built-up neighborhoods and newly developing areas.

Interaction between various facilities was analyzed to assure that the timing of improvements would produce maximum benefits to motorists. Limited financial resources of participating agencies, however, placed some restraint on what could be done--particularly where joint or closely related facilities were involved.

Projects previously identified as committed received high priorities. In many cases, funds have been earmarked for their implementation. In other cases, preliminary and/or final design was in process. Also high on the list of priorities were existing traffic bottlenecks and dangerous locations on heavily traveled routes which had been in need of upgrading for some time. Major facilities which will require exhaustive preliminary corridor studies show early starts, but their execution was extended over several stages.

Based on the above considerations, all projects were arranged according to priority, and their costs were matched with the forecasted funds by stages, as summarized in Tables 32 and 33. Comparison of estimated costs with projected revenues indicated that many of the recommended facilities would not be financially attainable under present funding practices. The network which would be financially attainable is shown in Figures 79 and 80 by stages. Unfunded projects, as well as Illinois Supplemental Freeways, are also shown in these figures.

Three stages are recommended for implementation of the financially attainable portion of the plan. The remaining unfunded projects could be implemented only if funding practices were changed in the future to make additional funds available.

First Stage. Primary effort in this stage should be directed toward completing committed projects and those already under construction; making improvements related to the Interstate System, which is scheduled for completion by 1975; and remedying the most serious deficiencies.

Projects in the Iowa portion are:

Conversion of State Street and Grand Street into a one-way couplet through Bettendorf.

Initiation of the East River Drive improvement.

Start of the Davenport Central Business District Bypass.

Improvement of connections to Interstate 74 at Middle Road and Kimberly Road; to Interstate 280 at West River Drive; and to Interstate 80 at Middle Road.

Upgrading of major north-south streets in built-up areas such as Harrison Street, Marquette Street, Division Street, Eastern Avenue and Jersey Ridge Road in Davenport as well as 18th Street and 23rd-25th Streets in Bettendorf.

Table 32

FORECASTED FUNDS AND ESTIMATED COSTS
FOR STREET AND HIGHWAY IMPROVEMENTS BY STAGE
(Iowa Portion)

	Stage I (1970-74)		Stage II (1975-79)		Stage III (1980-85)		Total		Unfunded
	Funds	Costs	Funds	Costs	Funds	Costs	Funds	Costs	Costs(1)
					(000 Omitted)				
Iowa Highway Commission(2)	$ 8,400	$ 8,757	$ 9,500	$ 9,493	$ 6,500	$ 6,537	$24,400	$24,787	$31,400
Scott County	2,520	2,501	2,827	2,990	3,891	3,737	9,238	9,228	1,000
Davenport	4,156	4,173	4,843	4,877	6,882	6,929	15,881	15,979	11,300
Bettendorf(3)	2,097	2,076	1,556	1,391	2,676	1,180	6,329	4,647	300
Total	$17,173	$17,507	$18,726	$18,751	$19,949	$18,383	$55,848	$54,641	$44,000
By Developers or Special Assessment									
Davenport	-	-	$ 1,380	$ 1,380	$ 1,005	$ 1,005	$ 2,385	$ 2,385	$ 8,500
Bettendorf	867	867	1,733	1,733	1,000	1,000	3,600	3,600	-
Total	$ 867	$ 867	$ 3,113	$ 3,113	$ 2,005	$ 2,005	$ 5,985	$ 5,985	$ 8,500
Grand Total	$18,040	$18,374	$21,839	$21,864	$21,954	$20,388	$61,833	$60,626	$52,500

(1) Estimated costs for additional improvements needed to complete proposed highway and street network.

(2) Iowa Highway Commission funds for 1970 through 1985 ($24,400,000) were distributed more heavily in StagesI and II. This fulfills near-term needs and anticipates lead time required for corridor studies and preliminary engineering on major improvements.

(3) Stage I funds assume sale of bonds deemed necessary to finance a backlog of needed transportation improvements.

Table 33

FORECASTED FUNDS AND ESTIMATED COSTS
FOR STREET AND HIGHWAY IMPROVEMENTS BY STAGE
(Illinois Portion)

	Stage I (1970-74)		Stage II (1975-79)		Stage III (1980-85)		Total		Unfunded
	Funds	Costs	Funds	Costs	Funds	Costs	Funds	Costs	Costs(1)
					(000 Omitted)				
Illinois Division of Highways	$ 6,556	$ 6,560	$ 6,421	$ 6,308	$ 7,527	$ 7,781	$20,504	$20,649	$ 8,700
Rock Island County	4,919	5,075	5,260	5,090	6,799	6,719	16,978	16,884	2,400
Rock Island(2)	3,975	4,075	1,382	1,415	2,008	1,886	7,365	7,376	1,400
Moline	1,874	1,980	2,034	1,985	2,667	2,646	6,575	6,611	8,400
East Moline	260	380	283	220	396	246	939	846	-
Henry County(3)	-	-	460	460	1,110	1,110	1,570	1,570	-
Milan(3)	355	355	-	-	-	-	355	355	-
Quad City Airport Authority(3)	85	85	-	-	-	-	85	85	-
Silvis(3)	75	75	-	-	93	93	168	168	-
South Moline Township(3)	50	50	-	-	-	-	50	50	-
Toll or other(4)	-	-	-	-	-	-	-	-	40,030
Total	$18,149	$18,635	$15,840	$15,478	$20,600	$20,481	$54,589	$54,594	$60,930

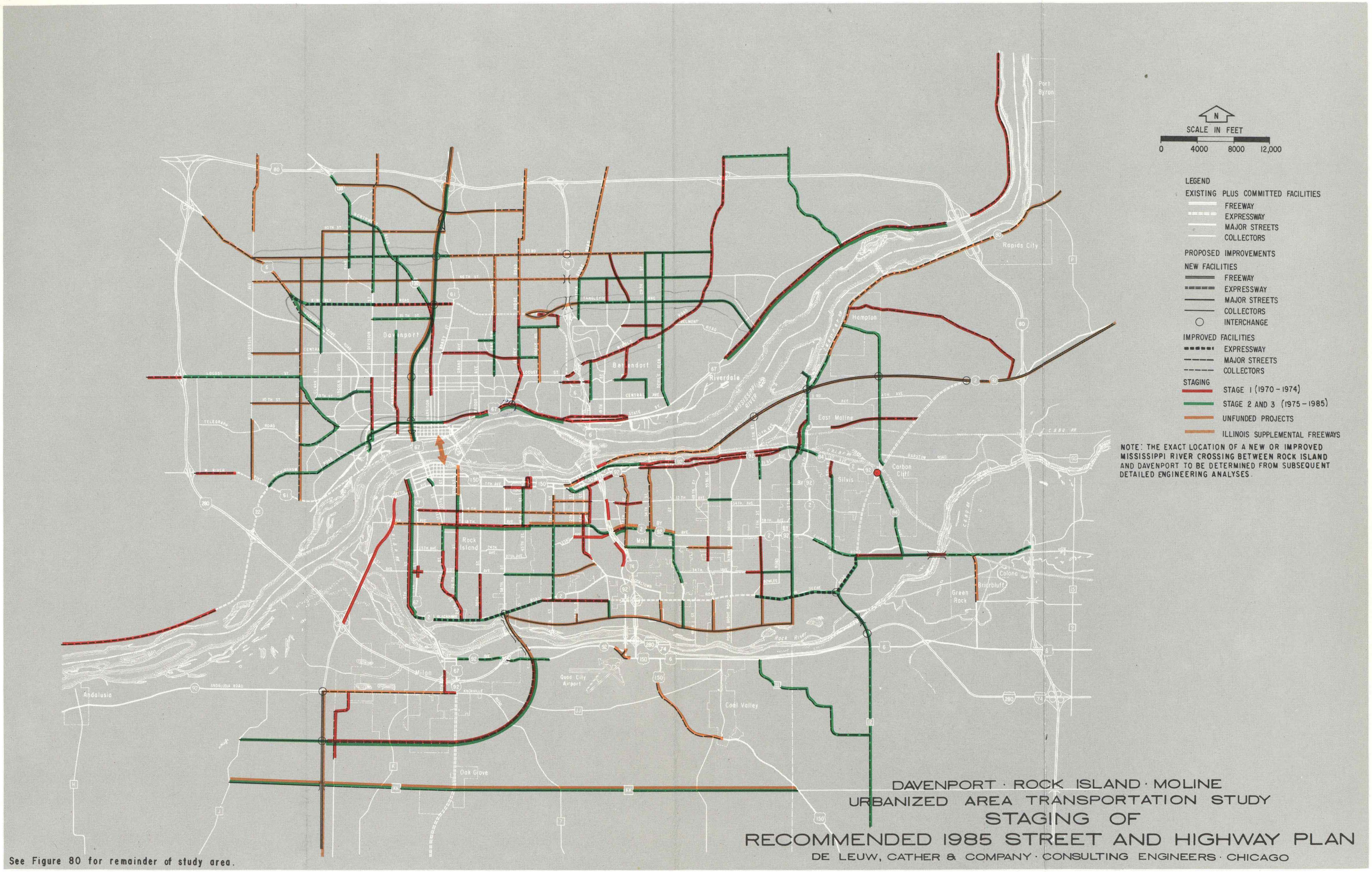
(1) Estimated costs for additional improvements needed to complete proposed highway and street network including minor differences in total costs for first three stages.

(2) Stage I Funds prorated from City of Rock Island's Six Year Capital Improvement Program 1969-1975, July 1,1969.

(3) Funds were assumed available from Henry County, Milan and Silvis to cover the costs of improvements attributable to them.

(4) $6,530,000 estimated cost of West Rock River Crossing; $15,000,000 estimated order-of-magnitude cost for the Riverside Expressway between River Drive at Moline ECL to Ill. 2-92 east of East Moline; and $18,500,000 is the estimated cost for a Mississippi crossing in the vicinity of Arsenal Island Bridge.

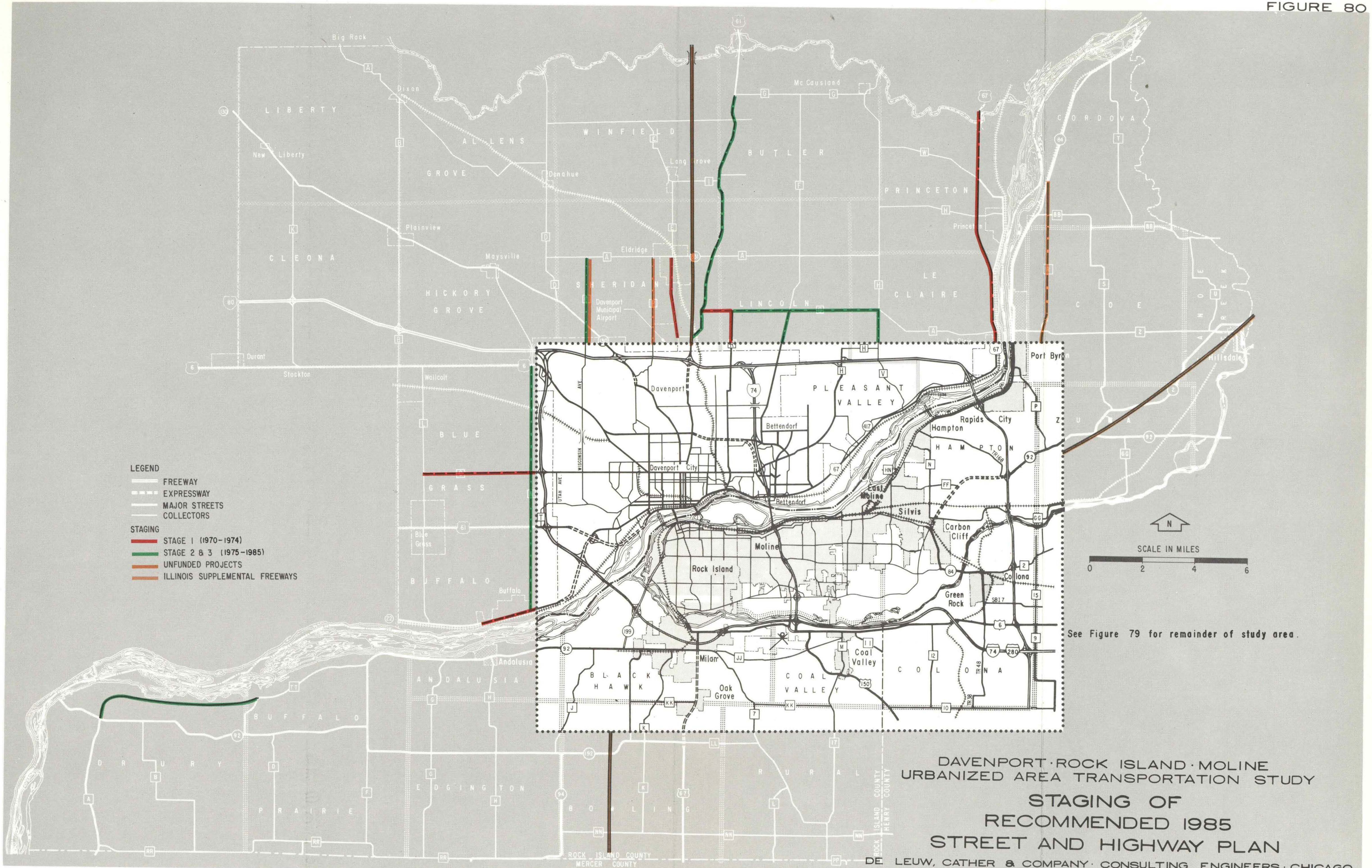
FIGURE 79



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY
STAGING OF
RECOMMENDED 1985 STREET AND HIGHWAY PLAN
DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

See Figure 80 for remainder of study area.

FIGURE 80



DAVENPORT · ROCK ISLAND · MOLINE
URBANIZED AREA TRANSPORTATION STUDY
STAGING OF
RECOMMENDED 1985
STREET AND HIGHWAY PLAN
DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO
LEGEND
FREEWAY
EXPRESSWAY
MAJOR STREETS
COLLECTORS
STAGING
STAGE I (1970-1974)
STAGE 2 & 3 (1975-1985)
UNFUNDED PROJECTS
ILLINOIS SUPPLEMENTAL FREEWAYS
SCALE IN MILES
0
2
4
6
N
See Figure 79 for remainder of study area.
Davenport
Davenport City
Bettendorf
Rock Island
Moline
East Moline
Silvis
Carbon Cliff
Hampton
Rapids City
Port Byron
Colona
Green Rock
Milan
Coal Valley
Oak Grove
Andalusia
Buffalo
Blue Grass
Walcott
Durant
Stockton
Eldridge
Long Grove
Donahue
Maysville
Plainview
New Liberty
Dixon
Big Rock
Mc Causland
Princeton
Hillsdale
Davenport Municipal Airport
LIBERTY
ALLENS GROVE
WINFIELD
BUTLER
PRINCETON
CORDOVA
CLEONA
HICKORY GROVE
SHERIDAN
LINCOLN
LE CLAIRE
PLEASANT VALLEY
BLUE GRASS
BUFFALO
HAMPTON
BLACK HAWK
COAL VALLEY
COLONA
ANDALUSIA
DRURY
EDGINGTON
RURAL
PRAIRIE
BOWLING
ROCK ISLAND COUNTY
MERCER COUNTY
HENRY COUNTY
UTAH AVE
WISCONSIN AVE

Improvement of east-west facilities such as extension of Kimberly Road westerly to Division Street and East Central Park Avenue.

Reconstruction and widening of U.S. 67 and State Route 22.

Reconstruction of numerous county roads on the periphery of the urbanized area.

Projects in the Illinois portion are:

Completion of the Illinois 2-92 and Illinois 84 interchange in Silvis.

Improvements in downtown Moline related to Interstate 74 as well as construction of frontage roads along this facility.

John Deere Expressway from 16th Street, Moline, to Blackhawk Road, Rock Island.

One-way couplet extending 5th-6th Avenues in Moline along 16th-17th Avenues in East Moline.

45th-46th Streets connection between 3rd Avenue, Moline, and 6th-7th Avenues, Rock Island.

Colona Road improvements, commencing with construction of a new bridge over the Rock River.

Start of Illinois 84 improvements which will provide a railroad grade separation in East Moline.

First phase of 92nd Avenue Expressway south of Milan.

Start of Milan Southeast Beltway.

Andalusia Road widening in Milan.

Beginning of improvements along 18th Avenue, Rock Island, and 19th-23rd Avenues, Moline.

13th-14th Avenues connection in Rock Island.

15th-16th Streets north-south, one-way couplet in Moline.

Industrial Road along 8th-10th Avenues in East Moline.

Improvement of major north-south streets such as 9th Street, 17th-24th Streets, 24th Street, and 30th Street in Rock Island; 53rd Street and 70th Street, Moline; 7th Street, East Moline; 4th Street, Milan; and 9th-10th Streets, Silvis.

Second Stage. A number of major facilities initiated during the first stage should be brought to completion, while all remaining large projects should be started during the second stage (1975-1979). Along with improvements in built-up areas, more emphasis should be given to newly developing areas in this phase.

Projects in the Iowa portion are:

Beginning of the Gaines Street Freeway.

Extension of the Kimberly Road expressway to Hickory Grove Road.

Completion of East River Drive reconstruction and continued development of the Davenport Central Business District Bypass.

Improvement of West Locust Street to Interstate 280.

Construction of 53rd Street, Division Street, and Pine Street in the newly developing part of Davenport.

Improvement of Utica Ridge Road, Devil's Glen Road, and Tanglefoot Lane in Bettendorf.

Completion of U.S. 67.

Projects in the Illinois portion are:

Completion of most of the improvements on Colona Road and Illinois 84 in East Moline.

Extension of the John Deere Expressway to 11th Street in Rock Island and start of the remaining section between Bowles Road and Colona Road.

Completion of the first stage of the Milan Southeast Beltway.

Beginning of the East Rock River Crossing.

Continuation of work on 18th Avenue, Rock Island, and on the 19th-23rd Avenues, Moline, corridor improvement.

Improvement of 4th Avenue in downtown Moline.

Construction of 13th Street, East Moline, and 80th Street, Moline; 34th Avenue, 41st Street, and 16th Street south of John Deere Expressway, Moline, in newly developing areas.

Completion of the 12th Avenue, Moline-30th Avenue, East Moline, facility.

Third Stage. Most of the major improvements started in previous stages should be completed in the six-year (1980-1985) third stage. In addition, major streets should be extended into developing areas and deficiencies rectified in older neighborhoods.

Projects in the Iowa portion are:

Completion of construction of the Davenport Central Business District Bypass.

Extension of the Northwest Boulevard improvement to Interstate 80.

Continuation of construction of the Gaines Street Freeway.

Improvement of major streets such as Rockingham Road, Hickory Grove Road, 14th-15th Streets connection, Waverly Road, Fairmount Street, and Telegraph Road in the west end of Davenport.

Extension of improvements of Utica Ridge Road, Tanglefoot Lane, and Devil's Glen Road.

Projects in the Illinois portion are:

Completion of the John Deere Expressway.

Extension of the Illinois 84 improvement north to the East Moline city limits.

Completion of the East Rock River Crossing.

Completion of the 18th Avenue, Rock Island, and the 19th-23rd Avenues, Moline, corridor west of Interstate 74; and beginning of redevelopment of the 23rd Avenue corridor east of Interstate 74.

Completion of all work on the 92nd Avenue Expressway, Milan Southeast Beltway, and Colona Road.

Unfunded Projects. Projects in this category would all be desirable elements of the comprehensive plan. None would be financially attainable, however, under the current funding program. If substantial additional sums become available, these projects should be implemented as part of the 1985 street and highway plan.

Projects in the Iowa portion are:

Completion of the Gaines Street Freeway.

Extension of the Kimberly Road expressway to Interstate 80.

Construction of Iowa Supplemental Freeway 561.

Fairmount Street extension south of West River Drive.

Other recommended major streets in outlying areas of Davenport as growth takes place.

Tanglefoot Lane connection to Kimberly Road.

Projects in the Illinois portion are:

Improvement of Illinois 84 northeast of East Moline.

Andalusia Road reconstruction west of Milan.

Completion of 23rd Avenue, Moline, east of Interstate 74.

Improvement of 14th Avenue, Rock Island, and 16th Avenue, Moline.

Construction of 52nd Avenue south of the John Deere Expressway.

Construction of West Rock River bridge connecting Milan Southeast Beltway and the John Deere Expressway.

Riverfront Expressway through East Moline.

Additional Mississippi River bridge.

Detailed information on all recommended improvements along with their costs, as well as a complete inventory of the principal street and highway system, can be found in the Technical Supplement to Comprehensive Plan Report. The Technical Supplement also contains sketch plans of all first stage improvements within the urbanized area.

A separate capacity analysis was made of the Financially Attainable Network in the Illinois portion of the study area to assure that the system would be able to function through 1985. A test was made at the minimum level of service D (load factor 0.70), or the point where traffic flow approaches breakdown.

Analyses indicated that the most urgently needed improvements of the unfunded projects will be:

1. Completion of 19th-23rd Avenues improvement in Moline.

2. Extension of Illinois 84 widening from East Moline to north of Hampton.

Addition of these two improvements to the financially attainable system may be considered to constitute the minimum plan which would assure against traffic breakdown through 1985 in the Illinois portion of the study area.

The Recommended 1985 Street and Highway Plan is the overall goal for implementation, while the Financially Attainable Program constitutes the stage construction steps in the attainment of the Recommended Plan.

Chapter X

CONTINUING TRANSPORTATION PLANNING PROCESS

Much time, effort and money have been expended in data collection, analysis, coordination, and plan preparation in the initial transportation study. If this investment in plan formulation is to pay maximum dividends to the area, the plans, data, techniques, and processes developed must be fully used. The continuing planning process is designed to meet this objective. More specifically, the continuing planning process is designed to:

1. Assist in Plan Implementation. Afford governmental agencies in the Bi-State area assistance in preparing Federal grant applications, zoning ordinances, subdivision regulations, capital improvement programs, and other plan implementation measures.

2. Provide Service. Furnish information to the community on plans and programs, the planning process, and planning activity to increase understanding of and participation in the planning process.

3. Perform Surveillance. Monitor growth and change of the area as a basis for checking whether progress is being made toward achievement of plans and programs.

4. Conduct Reappraisal. Periodically review and update planning objectives and programs so that plans will reflect current thinking.

5. Refine and Interpret. Detail portions of existing plans to expand their comprehensiveness and give interested agencies and individuals a better understanding of how area plans might be implemented.

ORGANIZATION

The basic organizational structure established to administer the initial study (Chapter I) should be retained to direct the continuing phase of the transportation planning process. Under this arrangement the Bi-State Metropolitan Planning Commission would have primary responsibility for coordinating and compiling the transportation planning work accomplished by the various governmental agencies and their consultants.

SCOPE OF WORK

An operations plan has been developed covering five elements corresponding to the five objectives of the continuing transportation planning process, stated above. The following is a brief description of the types of activities included under each element. It should be noted, however, that the distinction between elements is sometimes arbitrary, resulting in several tasks being classified under more than one heading.

Plan Implementation would include annual review and updating of the five-year transportation improvement program; recommending initiation of corridor studies, route location studies, and advance reservation of rights of way for planned improvements; assistance in developing measures to help implement the plan such as zoning and subdivision ordinances, capital improvement programs, and Federal and state grant applications; and provision of land use and transportation planning and traffic engineering services when they would assist in implementing the plan.

Service would include publication of planning information through quarterly and annual reports; preparation of newsletters and slide presentations; interpretation of plans to public agencies and the general public; supplying of data and maps to interested agencies and individuals; and assistance to local planners and others in the use of planning information. The service function of the operations plan would be applicable to all metropolitan planning efforts while the service function for transportation could be performed in conjunction with general areawide planning operations.

Surveillance would include annual and less frequent (two- to five-year) data collection and tabulation as well as comparison of evolving conditions with forecasts. The tabulations and evaluations should be used in periodic reappraisals of the transportation plan. Annual surveillance should include tabulation and evaluation of changes in number of dwelling units, population, major land use, community facilities, major employment, and the total transportation system. It will also be important to remain sensitive to public attitudes. Base maps should be kept current and a record should be maintained of laws and ordinances in force. Surveillance done less frequently should include tabulation and comparison of traffic volumes, land use, school enrollment, employment by place of work and place of residence, accident rates, capacity-usage comparisons, fiscal inventories, and aerial photography.

Reappraisal would include annual review of the plan and plan implementation efforts; plan revisions as necessary; updating at least every five years to insure a workable plan looking ahead at least 20 years; assistance in evaluating alternative development plans proposed by other agencies from time to time. The five-year updating should include reappraisal of goals and objectives; review and adjustment of population, economic, land use, fiscal, and other forecasts; analyses of laws and ordinances; and reevaluation of the land use plan.

Refinement would include expansion of plan elements that were given cursory attention in the initial planning effort; development of procedures to improve the quality of data on which the plan was based and the procedures by which the initial plan was developed. Plan elements deemed to require more detailed attention in the future include financial analyses for the Illinois portion of the area, transit, railroads, terminal and transfer facilities (including parking), and the feasibility of creating a port authority in the area. Procedures which should be developed for improving the quality of planning data and techniques include conversion of IBM 7090 computer tapes to IBM 360 tapes, development of an increasingly sophisticated regional information system for more rapid and efficient retrieval of planning data, updating the area's address coding guide, assignment of grid coordinates to geographic features for computer mapping, simplification of the area's existing land use model, and development of a means of evaluating the effectiveness of metropolitan planning efforts.

FURTHER STUDIES

In view of the broad range of items covered by this study, it was inevitable that some subjects of particular significance to the area could not be given the detailed consideration they deserved. It is recommended that in-depth studies of the following subjects, among others, be undertaken during the next five years:

Railroads

Because of their historic significance in the area, railroad tracks and yards occupy strategic locations which, in several instances, conflicted with otherwise desirable highway and urban development plans. Characteristics of railroad operations have changed since the original facilities were built, but there have been very few major modifications of railroad facilities in the Quad City area. Aside from the problem of railroad-highway crossings, conflicts between highways and railroad facilities were encountered in alternative studies of a bypass around the Davenport central business district, a riverfront expressway in Illinois, and eventual re-building of the Government Bridge. A comprehensive railroad study should focus on:

1. Potential consolidation of facilities and operations;
2. Relocation of yards and tracks;
3. Abandonment of little-used facilities; and
4. Feasibility of constructing a new or improved high level railroad bridge across the Mississippi River.

The study should investigate means of financing needed railroad improvements as well as their overall economic impact.

Public Transit

Although the study indicated that person trips by transit are a small component of total daily travel, some form of public transportation should continue to be operated for persons who cannot drive or do not always have a car available. Innovations in transit technology should be carefully analyzed to see if any are applicable to the Quad City problems. The financial aspects of providing public transportation should also be thoroughly studied by the appropriate authorities to estimate the amount of subsidy required, if any, to maintain adequate transit service.

Transportation Authority

A suggestion was made during the study that creation of a Transportation Authority with taxing, licensing and/or borrowing powers might be the best vehicle for solving some of the area's more complex transportation problems. This idea relates directly to the railroad and public transit facilities, mentioned above, as well as to airports, bridges and barge terminals. The legal and financial feasibility of embarking on such a program should be thoroughly considered.