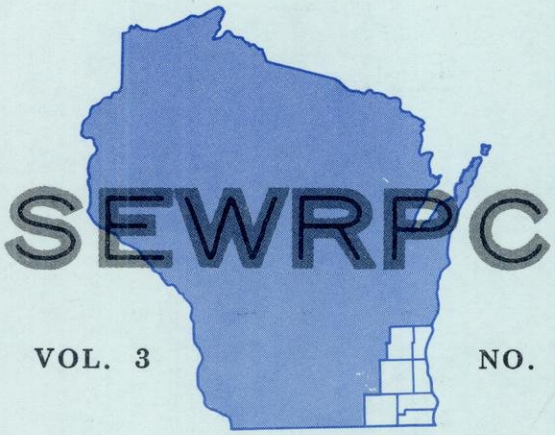
Technical record. vol. 3, no. 6 April 1976

[s.l.]: Southeastern Wisconsin Regional Planning Commission, April 1976

TECHNICAL RECORD



VOL. 3 NO. 6

APRIL 1976

* * * * * IN THIS ISSUE * * * * *

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

COMMISSION MEMBERS

KENOSHA COUNTY
Donald L. Klapper
Donald E. Mayew
Francis J. Pitts,
Vice-Chairman

RACINE COUNTY
George C. Berteau,
Chairman
John Margis, Jr.
Leonard C. Rauen

MILWAUKEE COUNTY
Richard W. Cutler,
Secretary
Evelyn L. Petshek
Emil M. Stanislawski

WALWORTH COUNTY
Anthony F. Balestrieri
Eugene A. Hollister
Harold H. Kolb

OZAUKEE COUNTY
Thomas H. Buestrin
John P. Dries
James F. Egan

WASHINGTON COUNTY
Lawrence W. Hillman
Paul F. Quick
Joseph A. Schmitz,
Treasurer

WAUKESHA COUNTY
Charles J. Davis
Robert F. Hamilton
Lyle L. Link

COMMISSION STAFF

Kurt W. Bauer, P.E. . . . . Executive Director

Harlan E. Clinkenbeard . . . . . Assistant Director

Keith W. Graham, P.E. . . . . Assistant Director

John A. Boylan . . . . . Administrative Officer

John W. Ernst . . . . . Data Processing Manager

Philip C. Evenson . . . . . Chief Community Assistance Planner

Mark P. Green, P.E. . . . . Chief Transportation Planner

Leland H. Kreblin . . . . . Chief Planning Illustrator

William D. McElwee, P.E. . . . . Chief Environmental Planner

Thomas D. Patterson . . . . . Chief of Planning Research

Bruce P. Rubin . . . . . Chief Land Use Planner

THE TECHNICAL RECORD

Volume three Number six

1976

TABLE OF CONTENTS

The preparation of this publication was financed in part through a joint planning grant from the Wisconsin Department of Transportation; the U. S. Department of Transportation, Federal Highway and Urban Mass Transportation Administrations; and the U. S. Department of Housing and Urban Development.

Inside Region $1.00
Outside Region $2.00

FLOODLAND MANAGEMENT: THE ENVIRONMENTAL CORRIDOR CONCEPT

by Stuart G. Walesh, SEWRPC Water Resources Engineer

INTRODUCTION

The principal thrust of floodland management in contemporary engineering and planning practice is to fit urban development into riverine areas in such a manner as to minimize flood damage. This flood damage mitigation objective is accomplished by means of a carefully selected combination of structural and nonstructural measures.

In addition to accomplishing the above flood damage mitigation objective, a comprehensive approach to land and water resource planning in expanding metropolitan areas suggests that floodland management should incorporate another equally important objective: the protection of environmental values—recreational, aesthetic, ecological, and cultural—normally associated with and concentrated in riverine areas not yet occupied by urban land use. That is, riverine areas should be viewed as environmental corridors managed so as to both minimize flood problems and to satisfy a variety of noneconomic, but nevertheless real, human needs.

This paper is directed primarily to engineers and planners in governmental work and in private practice, and the objective is to present the environmental corridor idea with the hope that the entire concept, or certain elements of it, might be more widely applied in floodland management practice. More specifically, this paper defines the environmental corridor concept as it has been advanced by the Southeastern Wisconsin Regional Planning Commission, discusses the unsuitability of riverine areas for urban development, maintains that such areas are not generally needed for urban development, identifies the varied features and compatible and unique uses of riverine areas when viewed as environmental corridors, and finally, discusses the means whereby such corridors may be identified and made available for public use.

In order to maintain a proper perspective, it is of value to note that floodland management ideas and measures have steadily evolved since flooding first became a problem of national concern. During much of the thirty-year period following adoption of the Federal Flood Control Act of 1936, the solution of flood problems and prevention of future flood problems was seen primarily in terms of structural measures. In recent years, as evidenced by the increasing acceptance of recommendations presented in publications such as the 1962 report of the ASCE Task Force on Flood Plain Regulations (6)[1] and the 1966 report of the Federal Task Force on Federal Flood Control Policy (1), the single means structural approach to flood damage mitigation has gradually given way to the multiple means approach employing a combination of various structural and nonstructural measures. This paper, in effect, argues for another step in floodland management: multiple means to achieve the multiple purposes of flood damage mitigation and environmental corridor protection.

PRELIMINARY CONSIDERATIONS

Before proceeding with the subject matter of this paper, it is appropriate to briefly describe the experiential basis for the ideas discussed and information presented herein, to define the environmental corridor concept and to note the noneconomic aspect of the corridor idea.

Experiential Basis of this Paper

The ideas and information presented here are drawn primarily from the land and water resource plan preparation and plan implementation experiences of the Southeastern Wisconsin Regional Planning Commission (SEWRPC). The Commission was created in 1960 as the official planning agency for the rapidly urbanizing seven-county Southeastern Wisconsin Region, an area of 2,700 square miles which, while it encompasses only 5 percent of the Wisconsin's land area, contains 1.8 million people or over 40 percent of the state's population.

The SEWRPC has the responsibility for finding practical solutions to those environmental and developmental problems which transcend the boundaries and fiscal capabilities of individual local units of government and which require a cooperative areawide approach for sound resolution. Examples of completed or current SEWRPC planning efforts that are particularly pertinent to this paper because they incorporate the environmental corridor concept are: the regional land use-transportation study, four comprehensive watershed studies covering about two-thirds of the Region's land area, and the regional sanitary sewerage system study.

---

[1] *Numerals in parentheses refer to corresponding items in Appendix A—References.*

The Environmental Corridor Concept

The SEWRPC credits Charles B. Whitnall and other members of the Milwaukee County (Wisconsin) Park Commission with, in the early 1900s, originating and first implementing the idea which has since been adopted for use by the SEWRPC and which is now referred to as the environmental corridor concept. As originally conceived by Milwaukee County and subsequently extended and modified by SEWRPC and others (15, 29), an environmental corridor is essentially a continuous linear pattern on the landscape consisting of a composite of natural resource and natural resource-related elements which are important to maintaining the overall environmental quality of the Region.

More specifically, SEWRPC criteria require that three or more of the following seven elements of the natural resource base be present to define and identify environmental corridors: floodlands, which include stream channels and lakes plus their undeveloped 100-year recurrence interval floodplains; soils exhibiting limitations for urban development; wetlands; woodlands; wildlife habitat areas; areas of rugged terrain and large relief; and significant geological formations and physiographic features. The Commission also considers the following four natural resource-related elements in defining and identifying environmental corridors: existing outdoor recreation sites; potential outdoor recreation sites; historic sites and structures, and unusual scenic areas and vistas. Environmental corridors in southeastern Wisconsin (see Map 1) encompass 486 square miles, or about 18 percent of the total area of the Planning Region.

The environmental corridor concept as applied by SEWRPC in regional land and water resources planning consists of delineating the corridors and devising various means whereby the majority of the area within these corridors can be reserved in an open and essentially natural state. The primary objective of the corridor concept is to protect the best elements of an urbanizing area's natural resource base, thereby providing those amenities needed to maintain the quality of life for the resident population. These corridor lands recommended for public use are composed of the best of the Region's natural resources and are not "left-over" land.

The environmental corridor concept as expounded herein should be of particular interest to engineers and planners concerned with alternative conceptual approaches to floodland management, since environmental corridors are often aligned with riverine areas and since floodland delineations tend to form the skeleton of such corridors. The environmental corridor concept is primarily intended for application to riverine areas not yet in urban use or committed to urban use by virtue of existing public utilities or transportation facilities. This paper is, therefore, addressed to the prevention of future flooding and land use problems in presently nonurbanized riverine areas and is not addressed to the solution of problems in floodlands already occupied by urban development.

The Noneconomic Dimension

The rationale for maintaining substantial portions of riverine areas as environmental corridors does not include, nor does it need to include, primarily economic arguments. Recreational, aesthetic, ecological, cultural, and other values characteristic of environmental corridors are not, to be sure, readily expressed in economic terms, but such values are, nevertheless, very real. Public officials concerned with land and water resources in general, and long-range planning for floodland areas in particular, should in their analyses and decision making attempt to weigh and integrate these values even though they currently have nonexistent or elusive economic measures. As stated by Aldo Leopold:

> ... a system of conservation based solely on economic self-interest is hopelessly lopsided. It tends to ignore, and thus eventually to eliminate, many elements in the land community that lack commercial value, but that are—as far as we know—essential to its healthy functioning. It assumes, falsely, I think, that the economic parts of the biotic clock will function without the uneconomic parts (13).

FLOODLANDS NOT SUITED FOR URBAN DEVELOPMENT

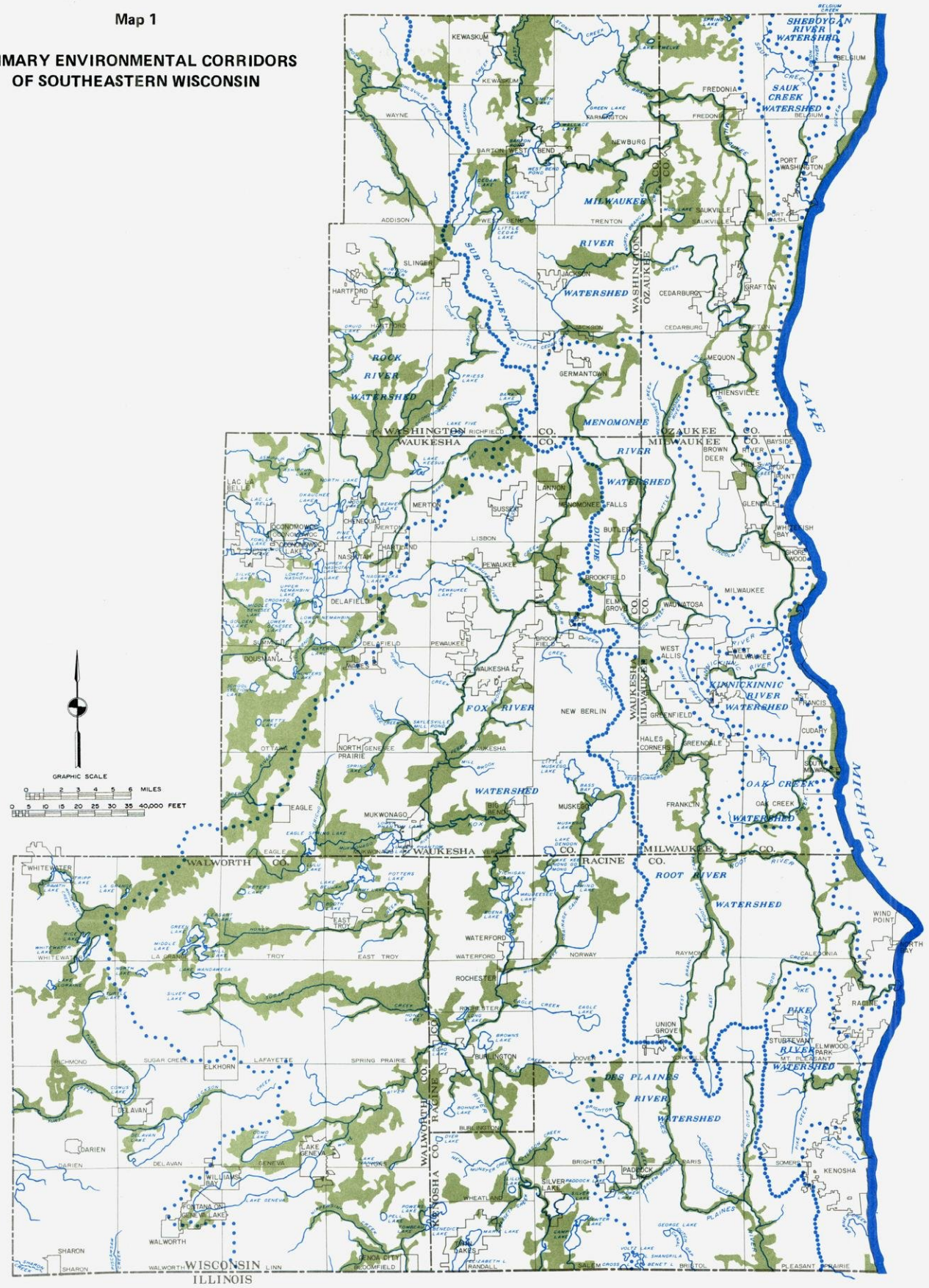
Historical Motivation for Floodland Development

Historically, there were many reasons for settlement in and development of floodlands. Rivers provided both a ready source of water supply and a means of wastewater disposal. Mill wheels extracted energy from the flowing river and used it to grind grain and drive manufacturing processes. A river site for a community facilitated ready access to trade and commerce utilizing water transportation, while the adjacent flat, floodplain lands were suited for agriculture, the products of which were used in that trade and commerce. Some river communities trace their origin to early portage locations or to former strategic military sites (23). The present location of many floodprone, riverine area communities in southeastern Wisconsin may be attributed to some of the aforementioned influences.

While these factors were historically responsible for development of communities in riverine areas they are no longer viable reasons for either additional contiguous urban development in floodlands or for entirely new floodland urbanization not directly linked to existing population centers. In fact, continuously increasing monetary flood losses coupled with soils limitations inherent to floodland areas strongly suggest that the floodlands are, relative to other areas, generally not suited for urban development.

Map 1

PRIMARY ENVIRONMENTAL CORRIDORS OF SOUTHEASTERN WISCONSIN



An environmental corridor is an essentially continuous linear pattern on the landscape consisting of a composite of the best natural resource elements—floodlands, wetlands, woodlands, wildlife habitat, rugged terrain, physiographic features—and natural resource-related elements—existing and potential recreational sites, historic sites, and unusual scenic areas and vistas. Approximately one-fifth of the Southeastern Wisconsin Planning Region lies within the primary environmental corridors, with the corridors being generally aligned with the Region's surface water drainage system. The primary objective of the environmental corridor concept is to protect the best elements of the natural resource base and thereby provide those amenities needed to maintain the quality of life within the Region.

Source: SEWRPC.

Mounting Flood Damages

During the approximately 30-year period following adoption of the Federal Flood Control Act of 1936, U. S. Corps of Engineers and U. S. Soil Conservation Service structural flood control projects resulted in expenditures of over nine billion dollars, with such expenditures attaining an annual rate of one billion dollars in 1966. In spite of this large expenditure, annual flood damages in the United States have increased since 1936, with the current annual damage estimated to be almost two billion dollars (1, 25). It is estimated that, under existing floodland management policy, federal expenditures would have to be maintained at about one billion dollars annually to achieve at least a short-term reversal in mounting annual flood damages (1, 25).

Increasing national flood losses since 1936 are attributable to a variety of causes, the most important of which is damage to new structures unwisely constructed in unprotected or unregulated floodlands (25). Another reason for increasing monetary flood losses is damage to existing, older floodland houses and commercial and industrial property located upstream of new development because of the backwater effect of that development. Aggravation of existing flood problems downstream of new floodland development may be traced to increased downstream discharges and stages resulting from the loss of upstream floodland storage and from the increased hydraulic efficiency associated with the stream channelization that often accompanies floodland development. All of the above factors that have resulted in steadily increasing national flood losses have also been evident in the Southeastern Wisconsin Planning Region.

In summary, the last three to four decade period of mounting flood damages in spite of increasing expenditures for flood control works, coupled with projected large annual expenditures needed to temporarily maintain the status quo, strongly suggest that floodlands are not suited for urban development—at least as that development has occurred in recent history.

Soils Limitations

A detailed soil survey (18) of the Southeastern Wisconsin Planning Region revealed, as would be expected because of the glacial origin of the soils, that the soils were spatially heterogeneous with respect to properties such as drainage potential, permeability, erodibility, bearing capacity, fertility, and cohesion. Interpretative ratings were prepared for over 500 soil types identified in the soil survey with the ratings expressed in terms of limitations of each particular soil type for various urban and rural uses. Each soil type was rated in terms of limitations for urban uses such as septic systems; sanitary sewer construction; residential and light industrial and commercial building construction, and road construction; and rural uses such as agricultural operations, recreational activities, and maintenance of wildlife habitat. These use ratings revealed that riverine area soils generally exhibited limitations for all the aforementioned urban uses while these same soils were well suited for most of the rural and open space uses.

For example, a soil was rated as being poorly suited for septic system operation if it exhibited low permeability, minimal depth to water table, a flood hazard, steep slope, and minimal depth to bedrock or to other impervious material. About 44 percent of the Southeastern Wisconsin Regional Planning Region—including all floodland and floodland fringe areas—exhibit these limitations. The State of Wisconsin, in recognition of floodland soil's limitations for septic system operation, explicitly prohibits installation of soil absorption systems in floodplains (27).

The alternative to septic systems is, of course, a public sanitary sewerage system. The SEWRPC interpretative soil ratings found that floodland soils had limitations for sewer construction because of high shrink-swell potential, minimal depth to water table or bedrock, high flood hazard, and susceptibility to frost action. A comparison of sanitary sewer construction costs under floodland conditions—full sheathing with well points for dewatering—relative to sanitary sewer construction costs under nonfloodland conditions—minimal sheathing and no provision for dewatering—provides a quantitative measure of the unsuitability of floodlands for sewers. For example, a 10-inch diameter sanitary sewer constructed under floodland conditions will cost about six times as much per lineal foot as the same sewer installed under nonfloodland conditions. The relative cost ratio decreases with increasing sewer size, being about three for a 30-inch sewer and approximately two for a 60-inch sewer (20).

Private residences and other buildings constructed in floodland areas commonly experience structural and water problems not directly attributable to flood events. Floodland soils typically have poor bearing characteristics and this factor, coupled with high shrink-swell characteristics, can produce differential foundation movements and resulting damage to walls, floors, and utilities. Because of the high moisture content of floodland soils, houses and other structures with basements may be expected to experience troublesome dampness and also may require almost continuous sump pump operation.

In summary, then, SEWRPC soil survey results indicate a close correlation between riverine areas and soils limitations for most urban land uses. The correlation is probably applicable to floodland areas in general—not just those in southeastern Wisconsin—and in effect supports the contention that floodlands are not, relative to other areas, suited for urban development.

FLOODLANDS NOT NEEDED FOR URBAN DEVELOPMENT

As noted at the beginning of the preceding section which discusses the relative unsuitability of floodlands for urban development, the once valid historical reasons for floodland occupancy are no longer applicable. Floodland urban development is generally no longer needed to meet the physical needs and space requirements of future populations.

Forecast Southeastern Wisconsin Urban Land Needs

Data from the 1970 SEWRPC land use inventory reveals that the 1.8 million people in the 2,700 square mile seven-county Planning Region live and work in urban—as opposed to rural—areas covering about 400 square miles, or 15 percent of the land area of the planning area. The SEWRPC 1990 land use plan calls for accommodating another 750,000 people by converting an additional 200 square miles of rural land in the Planning Region to urban land uses (19).

According to the plan, the necessary incremental development is to occur outside of the floodlands—which comprise 7 to 10 percent of the Region's area—and outside of the environmental corridors—which contain the floodlands and comprise about 18 percent of the Region's area—on land well suited for such development, and is to be encouraged to evolve in relatively compact, concentric rings extending outward from existing urban centers. The land slated for future urbanization is well suited for that purpose as determined by suitable soils, provision of municipal utilities and services at low cost, and ready access to highways and freeways.

There is, therefore, absolutely no need to urbanize floodlands and associated environmental corridors in southeastern Wisconsin even though the Region is, and will continue to be, the most populated portion of the state. Implementation of the SEWRPC land use plan will comfortably accommodate the 1990 population of the Planning Region on about 22 percent of the land area, none of which need be floodlands or environmental corridors.

Forecast National Urban Land Needs

National population and land use data indicate that, just as floodlands are not needed for urban development in southeastern Wisconsin, they are not needed when the United States is considered as a whole. Rather than an expansion of population into rural areas, the nation continues to witness a concentration of people into urban areas. As of 1970, almost 60 percent of the U. S. population of 203 million people resided in 248 urban areas on only about 1 percent of the nation's land area (21). There is, of course, a migration out of older central city areas. The net effect of that movement is a redistribution of population to the fringes of existing metropolitan areas rather than rapid conversion of large amounts of existing rural lands to urban lands.

National population projections for the year 1990 indicate that a total of about 250 million people must be accommodated (22). Because of the long-term trends toward an urban, as opposed to a rural, life style, it is reasonable to assume that most of the incremental population will occur at a density similar to that in present urban fringe areas. Therefore, only a fraction of a percent of the nation's land may be expected to be converted from rural to urban land use by 1990.

Nationally, floodlands are estimated to encompass about 5 to 7 percent of the land area, although unfortunately an inordinate proportion of the nation's urban development is located in those floodlands (1, 5, 25). Since only a relatively small additional amount of the nation's land area will be needed to physically accommodate future urban development and since floodland areas are small relative to unoccupied lands, there appears to be little need to continue the long-standing policy of permitting, and in fact encouraging, the placement of residential, commercial, and industrial development in floodprone areas.

COMPATIBLE AND UNIQUE FLOODLAND USES

This paper has, up to this point, argued that future urban development should not be placed in floodland areas. This contention is supported by the unsuitability, in contemporary society, of floodlands for urban development and the fact that floodlands and associated environmental corridors are simply not needed to accommodate forecast population increases.

While floodlands may not be suited for or needed for urban development, such lands and the environmental corridor of which they are a part are very well suited and, in many cases, uniquely suited for a variety of desirable open space type land uses including recreational activity, aesthetic enjoyment, ecological functions, cultural appreciation, and miscellaneous other uses. In contrast to the incompatibility that generally exists between urban development and floodland characteristics, these necessary open space land uses and corresponding activities generally tend to be very compatible with the characteristics of floodlands.

Recreational Activity

Regional planning as well as comprehensive watershed planning should recognize that there is, and will continue to be, a need for additional active recreational lands readily accessible to metropolitan areas. Floodlands provide an ideal location for needed active recreational lands and supporting facilities because floodlands and the environmental corridors of which

they are a part provide sufficient space; assure the presence of water, a key recreation element; improve the accessibility of the recreation areas to the urban population; and are compatible with recreation uses and supporting facilities (see Figure 1).

Local active park and recreation land requirements are relatively small compared to total land area used for residential, commercial, industrial, and government purposes, and floodland areas are more than ample to contain much of the necessary park and recreation lands. For example, SEWRPC land use objectives and supporting standards recommend a minimum of 10 acres of local—as opposed to regional—active park and recreation land per 1,000 people. By this standard, a minimum of about 10 percent of the land area would be reserved and developed for active recreation land use in a medium-density residential area having a typical density of 10 people per gross residential acre, or 6,400 people per square mile. Most of this active recreation land could be readily located in or near urban area floodlands.

Water is considered a critical element in recreational areas since the combination of land and water tends to enhance the recreational experience. The importance of water in recreational areas is evidenced nationally by the fact that two-thirds of all publicly administered recreation areas contain or provide access to water (25). A recent study (29) in Wisconsin found that the six primary recreational activities in terms of numbers of visits—pleasure driving, swimming, sightseeing, boating, fishing, and picnicking—were directly or at least indirectly related to water. The presence of the important element water is assured by locating recreational areas in or near floodlands.

Accessibility is a key factor in evaluating the effectiveness of active recreation areas in urban areas; that is, recreation lands should be readily accessible to the urban population either through effective transportation or, preferably, by means of geographic proximity (14). The placement and distribution of a given amount of active park and recreation area in urban floodlands will, because of the linear nature of those floodlands, tend to make recreation more readily accessible to the urban population than if the same amount of active park and recreation area is consolidated in a few large parks. It may, however, be necessary to supplement the floodland based recreation areas with some local facilities in order to achieve the desired geographic proximity (4).

Floodlands will, by definition, be subjected to periodic flooding as will the active recreational areas and supporting facilities that have been developed in those floodlands. When one considers all the possible human uses of floodlands, however, it is apparent that the active recreational function is one that is, or can be, very compatible with and essentially unaffected by flooding. For example, floodwater inundation will result in little or no damage to properly designed recreational facilities and areas such as golf courses; picnic areas; playing fields; marinas; and trails for biking, hiking, and horseback riding.

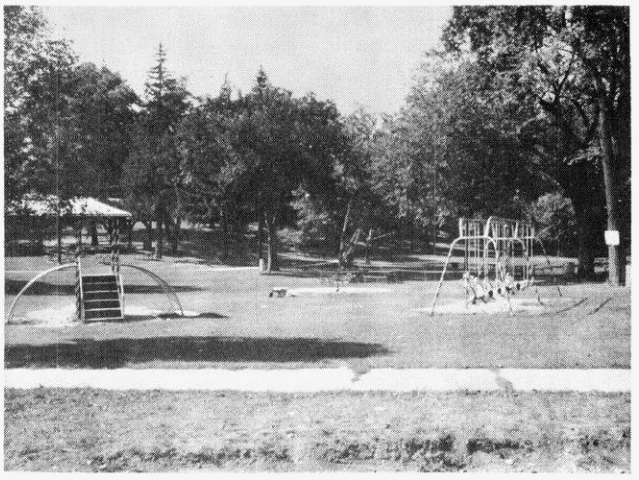
Aesthetic Value

Retention of floodlands in open space uses assures the continued presence of the aesthetic values characteristic of riverine areas and the environmental corridors in which the areas are contained (see Figure 2). Riverine areas tend to be the focal point for regional scenic values. This is partly attributable to the relatively large local topographic relief along the floodland limits which is accentuated by rock outcrops and other geologic features. It is also a function of the variety and gradation of trees and other vegetation native to riverine areas. The flowing water, of course, enhances the overall aesthetic experience. Parkway leisure drives aligned so as to follow the limits of the floodlands provide an effective means to capitalize on the scenic values of floodland areas while, at the same time, avoiding conflict with other more active floodland uses.

The aesthetic experience attendant to floodlands and contiguous environmental corridor lands located within urban areas is enhanced by their potential to serve as effective visual barriers between conflicting urban land uses such as, for example, a commercial area and a residential neighborhood. Furthermore, when environmental

Figure 1

RECREATIONAL VALUES OF AN ENVIRONMENTAL CORRIDOR



Environmental corridors provide a means and location to satisfy the very important recreational needs of an expanding metropolitan area. Since they are generally associated with riverine areas, corridors assure the presence of water—a key recreation element—while the linear nature of corridors enhances accessibility of recreation areas to the urban population. Scattered small portions of the corridors can be developed for intensive use types of recreation, like that shown on the photograph, while large areas can be retained in essentially natural open space for other kinds of recreation. *SEWRPC Photo.*

corridors lie between such a residential neighborhood and one of the numerous urban noise sources—such as a freeway—the trees, shrubs, and other vegetation normally native to those corridors will, based on field studies, provide a significant amount of sound intensity attenuation (3, 12).

For example, a dense vegetal belt as narrow as 100 feet located within an environmental corridor which is, in turn, located between a freeway and residential neighborhood will, by the mechanisms of absorption and diffusion, reduce sound intensity within the residential area to a very satisfactory level of about one-half of the objectionable level that would exist in the absence of the vegetation (see Figure 2).

Undesirable sights and objectionable noise levels can be minimized in urban areas by land use design that incorporates proper juxtaposition of the source of the problem, the area to be protected, and the environmental corridors. Such land use design must, of course, recognize that while there may be many options regarding the ultimate position of sources and of the areas to be protected, the environmental corridor is an essentially fixed, nonrenewable natural resource and must therefore be identified and protected prior to development.

Ecological Function

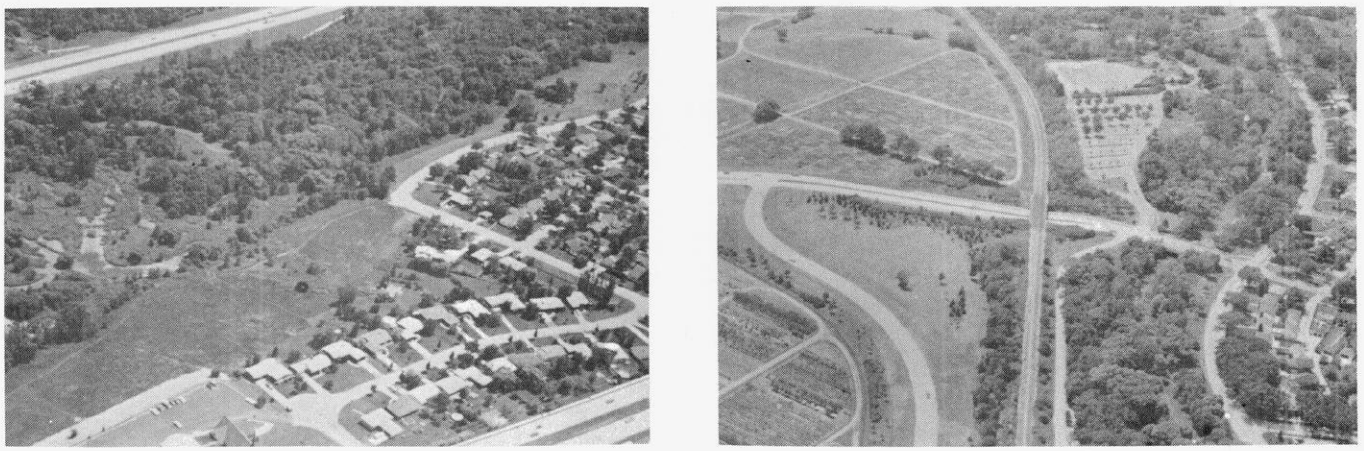
Man is one element in the ecological web and, as such, can affect and may be affected by both the physical environment and other members of the biological community. Floodlands and the environmental corridors containing them are important to the watershed ecosystem, since a disproportionately large share of interaction between the physical environment and the biological community occurs there.

While the human population of a watershed could undoubtedly exist—or perhaps subsist—even if all the natural values of riverine areas were eliminated by various flood-protected forms of urban development, the quality of man's existence is enhanced by reserving much of the riverine areas in open space. Retention of significant, continuous environmental corridor in primarily natural open space conditions will serve various ecological functions directly affecting the quality of life, including: protection of the biologically most productive areas of a watershed, provision of continuous wildlife range, maintenance of water quality enhancement processes, and education and research (see Figure 3).

Floodlands and wetlands, woodlands, and lakes normally found in or contiguous with floodlands are, on a unit area basis, the biologically most productive portions of the watershed. Wetlands, woodlands, and lakes are, for example, the primary habitat for game animals and fish (9) and, as such, must be preserved if recreational hunting and fishing are to continue. Riverine areas are also productive in the sense that they provide diverse and unique flora and fauna (9). Reservation of portions of environmental corridors in natural open space facilitates realization of the educational, scientific, and aesthetic values attendant to that species diversity and uniqueness.

Figure 2

AESTHETIC VALUES OF AN ENVIRONMENTAL CORRIDOR



The presence of environmental corridors can assure protection of the quality of life in expanding urban areas. In addition to being the focal point for scenic values, environmental corridors may serve as visual barriers and acoustic shields between potentially conflicting land uses such as the freeway and residential neighborhood and the railroad and residential neighborhood shown on these photographs.

Photo by Karl W. Emrich.

Continuous corridors of open space riverine lands physically linking urban natural areas with distant larger rural wildlife habitat areas will contribute to the maintenance of wildlife in the urban areas. Reservation of open space "islands" within predominantly urban areas is not sufficient to assure populations of self-sustaining, diverse resident wildlife species. It is, instead, desirable to maintain continuous range between the urban open space areas and the rural wildlife habitat. The physically stable environment provided within a protected environmental corridor will encourage flora and fauna diversity which will, in turn, result in biological stability (26).

Floodlands and associated wetlands and woodlands help to protect water quality in streams and lakes. Research has demonstrated that undisturbed wetlands serve as nutrient and sediment traps, whereas drainage of wetlands not only eliminates these trap functions but also may be expected to precipitate the sudden release of large amounts of accumulated nutrients (11).

The partial vegetal canopy found along natural streams in humid areas intercepts solar radiation, thereby helping to maintain summer water temperatures at low levels conducive to maintenance of a fishery. Removal of brush and trees from the banks of small headwater streams has resulted in very significant changes in temperature characteristics, including increased diurnal fluctuations and overall higher temperatures (2).

In addition to serving a variety of key ecological functions, portions of protected floodlands and contiguous environmental corridor lands may be used to educate the public about those ecological functions and to provide scientists with the opportunity for ecological research. Such education and research activities may be accomplished, for example, by establishing interpretive nature centers, natural area reserves, and restricted use research areas within the corridors.

Cultural Appreciation

Remnants of historic places and events—mills, churches, inns, public buildings, Indian villages, covered bridges—tend to be concentrated in riverine areas because, as discussed earlier, there was considerable motivation for development of floodlands by early settlers. Regional planning and comprehensive watershed planning can help to preserve and even restore many significant historic sites and the cultural record and educational values inherent in such sites by urging compatible, contiguous open space uses. Such compatible, contiguous open space uses are readily provided when the historic sites are included with the floodlands and other elements of the environmental corridor slated for protection (see Figure 4).

Figure 3

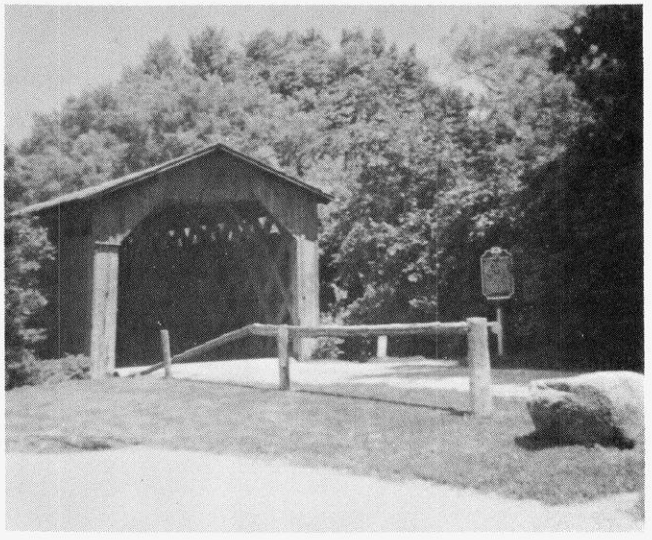
ECOLOGICAL VALUES OF AN ENVIRONMENTAL CORRIDOR

Retention of environmental corridors in basically natural open space conditions serves various ecological functions that have direct bearing on the quality of the environment, including: protection of some of the biologically most productive areas such as that shown on the photograph, provision of continuous wildlife habitat, and maintenance of water quality enhancement processes.

U. S. Department of Agriculture, Soil Conservation Service Photo.

Figure 4

CULTURAL VALUES OF AN ENVIRONMENTAL CORRIDOR



Remnants of historic places and events—such as the covered bridge shown in this photograph—tend to be located in riverine areas because of the important role of water in the life of the early inhabitants and settlers of most areas. Protection of key historic sites can be readily incorporated into an environmental corridor program. For example, Covered Bridge Park in Ozaukee County has been developed around the bridge shown in this photograph.

SEWRPC Photo.

Other Floodland Open Space Uses

There are several other significant nonurban land uses or functions that are suited to and compatible with riverine areas retained in natural open space or developed for active recreation use. Because of wet conditions and rich soils, floodlands are suited for a limited number of specialized agricultural uses such as sod farming and grazing.

Floodland fringe areas and contiguous corridor lands without soil and drainage limitations could provide economical intra- and inter-community utility corridors to be used in common by various public and private utilities to carry sanitary sewers, water mains, gas mains, telephone cables, and electric power lines (7). Problems may arise, however, including incompatibility between general river alignment and desired utility route, pressure for urban development in the floodlands as a result of the ready availability of necessary utilities, and adverse aesthetic effects resulting from construction activity or associated with aboveground elements of the completed utility systems.

IMPLEMENTATION OF THE ENVIRONMENTAL CORRIDOR CONCEPT

The procedure whereby the environmental corridor concept may be integrated into land and water resource planning and plan implementation may be subdivided into two principal parts: delineation of the environmental corridor and selection and implementation of measures to reserve the delineated corridors in essentially natural open space for public use and enjoyment. SEWRPC prepared preliminary corridor delineations under the regional land use plan (19). Those corridors have been supplemented and refined during preparation of SEWRPC comprehensive watershed plans, which also include specific recommendations for maintaining each corridor segment in essentially open space use.

Corridor Delineation

As is apparent from the definition of the environmental corridor presented early in this paper, the corridor is a composite of various elements of the natural resource base plus several natural resource-related elements. Inasmuch as the environmental corridor is a composite of the aforementioned elements, the corridor may be constructed by preparing separate maps delineating the location, extent, and value rating of the individual elements, and then combining them into a single map using an overlay technique (15).

Floodlands provide the basic form of most—although not all—of the environmental corridors within the Southeastern Wisconsin Planning Region. Of the various elements that may be combined to form the environmental corridor, only the floodland element is normally continuous over relatively long lengths, and thus floodlands form a convenient skeleton onto which additional natural resource and natural resource-related elements may be attached. Floodlands of major perennial streams are delineated under the Commission watershed studies in accordance with the State of Wisconsin floodplain management program (28) which requires floodland regulations for all cities, villages, and counties. Hydrologic-hydraulic simulation has been used by SEWRPC to delineate floodlands (24), but other methods are available, including exclusive use of soils data and use of high water elevations from major historic flood events.

Soil survey data and interpretations are another key element in the environmental corridor compositing process. As discussed earlier in this paper, such data and interpretations are available for most of the Southeastern Wisconsin Planning Region. In the SEWRPC planning programs, most of the remaining natural resource-related elements are identified, mapped, and value-rated in cooperation with the Wisconsin Department of Natural Resources.

Corridor Protection

Numerous mechanisms are available whereby environmental corridors can be retained in open space uses (17, 29). Potentially useful corridor protection measures include: public acquisition by purchase, public acquisition by dedication, restrictive easements, and floodland and other land use regulation. Of the total 486 square miles of delineated environmental corridor in the Southeastern Wisconsin Planning Region, approximately 15 percent is protected by public ownership or easement, another 40 percent is at least partially protected by floodland and other land use regulations, while the remaining 45 percent is presently unprotected.

Acquisition By Purchase: The most effective means whereby environmental corridors can be reserved for public use is by outright purchase from private landowners using public funds. The principal advantage of this approach is its definitiveness and legal incontestability, whereas the key disadvantage is, of course, the cost. SEWRPC watershed studies have recommended acquisition as the principal means of securing environmental corridors in urban and urbanizing areas.

An example of the feasibility and effectiveness of purchasing environmental corridors is provided by the park system of Milwaukee County—the most populated of the seven counties in southeastern Wisconsin. The Milwaukee County park system, which is composed of most of the parks in the county including those within the various cities and villages in the county, was developed over an approximately 50-year period and currently encompasses 9 percent of the land area of the county (16). Most of the Milwaukee County parks are in the form of continuous linear bands generally coincident with the floodlands and associated environmental corridors of the various streams flowing within the county. This park system provides a large-scale example of the environmental corridor idea implemented over a long period of time in a major metropolitan area.

Acquisition By Dedication: Another means to reserve floodlands and adjacent environmental corridors is to encourage developers of large tracts of land to dedicate the floodplain and adjacent environmental corridor portions of the tracts to a local government unit or agency for public maintenance and use. Subdivision regulations commonly require developers to provide minimum amounts of recreation and open space areas. Since floodlands are not well suited for residential development because of flooding and soils problems, and since existing floodland regulations may limit the extent of floodland residential areas, a land developer may be receptive to the idea of simply dedicating the floodlands and adjacent environmental corridors to a local government unit or agency. A variation on dedication of private environmental corridor lands to a governmental unit is to give title to, and responsibility for, open space lands in large planned developments to an association controlled by affected property owners.

Easements: In some cases it may be possible for a governmental unit to achieve environmental corridor protection by acquiring an easement, that is, specified rights in land without actually purchasing the land. For example, a governmental unit may acquire a restrictive easement from a land owner that prohibits him from developing the land for residential, commercial, or industrial purposes. When it can be negotiated, an easement has the advantage of permitting both the public and private parties to achieve their land use objectives while, relative to land acquisition, resulting in a smaller expenditure of public funds. Easements should be accompanied by adjustments in tax rates on the private land to reflect the more limited land use options actually available to the owner under the easement agreement.

Protection By Floodland Zoning and Other Land Use Regulations: Floodland regulations take the form of or are incorporated into zoning, subdivision, sanitary, and building ordinances adopted by counties, cities, villages, and towns under police powers—used to restrict an owner in the use of his property when such use is harmful to the public—granted to them by state legislatures. Such regulations are ordinarily intended for the single purpose of flood damage mitigation.

Floodland regulations are commonly based on a two-district floodway-floodplain fringe approach because the two-district concept recognizes the quite different hydraulic function of, as well as the different flood hazard in, the floodway as opposed to the floodplain fringe. The rational nature of the two-district approach enhances the likelihood of public acceptance of floodland regulations; and furthermore, legal precedence indicates that such regulations are more apt to receive the support of the courts (6, 10).

Conventional floodland regulations employing the two-district approach can contribute somewhat to reserving environmental corridors—at least that portion lying within the floodway zone—since fill, structures, and other land uses that would impair floodwater conveyance by adversely increasing stages and velocities or would themselves be subject to flood damage are normally prohibited in the floodway. The overall effectiveness of such floodland regulations in implementing the environmental corridor concept is, however, limited by several factors. The restrictive floodway zone usually encompasses only part of the floodland portion of the environmental corridors and, of course, none of the corridor lands lying outside of the floodlands. A community's adoption of two-district floodway-floodplain fringe regulations may, in fact, actually encourage floodland fill and development outside of the floodway limits, thereby destroying or damaging much of the environmental corridor. Finally, certain urban land uses contrary to environmental corridor protection, such as parking lots and storage areas, may be permitted in the floodway.

There is a possibility of making floodland regulations more effective with respect to environmental corridor protection by expanding the objectives to explicitly include corridor protection as well as flood damage mitigation. For example, some floodland regulations incorporate the floodway zone and a combination floodplain fringe-conservancy zone, with the latter combination zone including the floodplain outside of the floodway plus contiguous land lying outside of the regulatory floodplain.

While there is sufficient case law, and therefore legal precedence, to conclude that the conventional single-purpose two-district floodland regulations are a legitimate application of police power, it may be argued that the courts have not generally upheld the use of police power to protect natural areas from urban development. Such a use of regulation has generally been considered confiscatory, that is, equivalent to taking private property for public benefit without payment of just compensation (10).

Although case law and legal precedent do not support the use of land use regulations to protect environmental corridors, a recent landmark Wisconsin Supreme Court decision (8) suggests that an evolutionary change may be forthcoming. The case involved a decision as to whether or not police power could be used to greatly restrict the owner's use of a wetland area. The court ruled that the conservancy district provisions in question constituted an acceptable exercise of police power since they were intended to protect the quality of nearby surface waters—an objective that is consistent with the state's trust doctrine with respect to surface waters. Furthermore, the court found that the conservancy district provisions were not confiscatory since the owners were permitted uses consistent with the nature of the wetland. The court, in effect, ruled that the public held environmental protection rights in the land and that an owner could be obligated, by means of the vehicle of conservancy zoning, to respect those rights.

SUMMARY

The primary objective of floodland management in contemporary engineering and planning practice is to accomplish the single-purpose objective of tailoring urban development to riverine areas in such a manner as to mitigate flood damages. This paper maintains that, in the context of land and water resource planning, floodland management should incorporate a second, equally important objective: protection of environmental corridors and their intrinsic recreational, aesthetic, ecological, and cultural values.

An environmental corridor is a continuous, linear landscape pattern composed of various natural resource elements—one of the most important of which is the river channel and its floodplains—and several natural resource-related elements. The environmental corridor concept as applied by the SEWRPC in its regional land and water resources planning programs consists of identifying the corridors—using delineated floodplains for the basic form—and recommending various means whereby much of the corridor lands can be retained in essentially natural open space for public use and enjoyment.

The environmental corridor concept is partly founded on the unsuitability of riverine areas for urban development as demonstrated by mounting national flood damages attributable to floodland development and by the correlation between riverine area soils and limitations for urban development. Furthermore, floodland urbanization is simply not needed to meet the physical needs or forecast living and working space requirements of society. Future populations can be readily accommodated at acceptable densities without occupying floodlands and adjacent environmental corridor lands.

Floodlands and associated environmental corridors are, however, compatible with and, in some cases, uniquely suited for needed open spaces. These environmental corridor uses include recreational activity, aesthetic enjoyment, ecological functions, cultural appreciation, and other open space land uses, all of which contribute to the quality of life in a metropolitan area.

After delineating the environmental corridors, several measures are available to reserve the corridors in open space for public use. Protection measures include land acquisition by purchase, acquisition by dedication, easements, and floodland and other land use regulations.

ACKNOWLEDGEMENT

The author wishes to acknowledge the helpful suggestions provided during preparation of this article by Mr. Cyril Kabat, Director, Bureau of Research, Division of Resource Management, Wisconsin Department of Natural Resources.

Appendix A

REFERENCES

1. "A Unified National Program for Managing Flood Losses," Report by the Task Force on Federal Flood Control Policy to the Committee on Public Works, U. S. House of Representatives, House Document No. 465, 89th Congress, Second Session, August 1966.

2. Brown, G. W. and Krygier, J. T., "Effects of Clear-Cutting on Stream Temperature," Water Resources Research, Volume 6, No. 4, August 1970.

3. Cook, D. I. and Van Haverbeke, D. F., "Trees, Shrubs and Landforms for Noise Control," Journal of Soil and Water Conservation, November-December 1972.

4. David, E. J. L., "Floodplain Lands for Parks and Recreation: A Case Study of Milwaukee," Journal of Land Economics, Volume 49, No. 2, May 1973.

5. Goddard, J. E., "An Evaluation of Urban Flood Plains," Technical Memorandum No. 19, ASCE Urban Water Resources Research Program, December 1973.

6. "Guide for Development of Floodplain Regulations," Progress Report of the Task Force on Floodplain Regulations, Committee on Flood Control, Hydraulics Division of ASCE, Journal of the Hydraulics Division, ASCE, Volume 88, No. HY5, Proc. Paper 3264, September 1962.

7. Hill, J. C., "Shared Transmission Corridors Aid Grid Growth," Electric Light and Power, March 1972.

8. Just vs. Marinette County, 56 Wisconsin 2d 7 (1972).

9. Kabat, C., "The Role of Ecology in Comprehensive Watershed Planning in Southeastern Wisconsin," Proceedings of the Water Resources Planning Conference on Effective Consideration of Ecological Factors in Water and Related Land Resources Planning and Management, Boston, November 1969.

10. Kusler, J. A., and Lee, T. M., "Regulations for Floodplains," edited by R. Spicer, A Planning Advisory Service Memo of the American Society of Planning Officials, Chicago, 1972.

11. Lee, G. F., Bentley, E. and Amundson, R., "Effect of Marshes on Water Quality," Presented to the International Ecological Association, Leningrad, Russia, 1971.

12. Leonard, R. E., "Effects of Trees and Forest in Noise Abatement," Trees and Forests in an Urbanizing Environment, Cooperative Extension Service of the University of Massachusetts, Amherst, March 1971.

13. Leopold, A., A Sand County Almanac, Revised Edition, Sierra Club-Ballantine Books, Inc., 1972.

14. Mann, L. D., "Open Space Accessibility for Recreation," Journal of the Urban Planning and Development Division, ASCE, Volume 97, No. UP2, Proc. Paper 8607, December 1971.

15. McHarg, I. L., Design with Nature, Natural History Press, Garden City, New York, 1969.

16. Milwaukee County Park Commission, Guide for Growth, Milwaukee, Wisconsin, 1972.

17. O'Donnell, D. J., Kabat, C. and others, "Fox River Watershed Natural Resource Protection and Recreation Plan Elements," Appendix: Recommended Methods of Preservation and Acquisition of Potential Parks, Recreation and Related Open Space Areas in the Fox River Watershed; Wisconsin Department of Natural Resources and Southeastern Wisconsin Regional Planning Commission, 1973.

18. Southeastern Wisconsin Regional Planning Commission, Planning Guide No. 6, Soils Development Guide, August 1969.

19. Southeastern Wisconsin Regional Planning Commission, Planning Report No. 7, The Land Use-Transportation Study, Volume 1, Inventory Findings—1963, May 1965; Volume 2, Forecasts and Alternative Plans—1990, June 1966; Volume 3, Recommended Regional Land Use-Transportation Plan—1990, November 1966.

20. Southeastern Wisconsin Regional Planning Commission, Planning Report No. 16, A Regional Sanitary Sewerage System Plan for Southeastern Wisconsin, February 1974.

21. U. S. Bureau of the Census, "Population and Land Area of Urbanized Areas: 1970 and 1960," U. S. Government Printing Office, Washington, D. C., February 1972.

22. U. S. Bureau of the Census, "Projections of the Population of the United States by Age and Sex: 1972-2020," U. S. Government Printing Office, Washington, D. C., December 1972.

23. Vollmer, A. H., "Urban Planning and Development of River Cities," Journal of the Urban Planning and Development Division, ASCE, Volume 96, No. UP1, Proc. Paper 7144, March 1970.

24. Walesh, S. G., "Simulation in Watershed Planning," Journal of the Hydraulics Division, ASCE, Volume 99, No. HY9, Proc. Paper 10020, September 1973.

25. Water Resources Council, The Nation's Water Resources, Washington, D. C., 1968.

26. Watt, K. E. F., Principles of Environmental Science, Chapter 2, "Principles of Environmental Science," McGraw-Hill Book Co., New York, 1973.

27. Wisconsin Administrative Code, Chapter H62, November 1972.

28. Wisconsin Administrative Code, Chapter NR 116, May 1971.

29. Wisconsin Department of Resource Development, Recreation in Wisconsin, November 1962.

CHARACTERISTICS OF TRAVEL IN THE MILWAUKEE CENTRAL BUSINESS DISTRICT, 1963 AND 1972

by Sheldon W. Sullivan, SEWRPC Chief of Data Collection, and Jean Lusk, SEWRPC Research Analyst

INTRODUCTION

The highly developed Central Business District (CBD) of the City of Milwaukee has long been regarded as the hub of the seven-county Region of Southeastern Wisconsin, and, as such, considerable interest exists with respect to its growth and change.[1] It is within this intensively used land area of approximately 1.25 square miles that each weekday occur a myriad of commercial, financial, governmental, educational, recreational, and other activities which together produce the largest concentration of person and vehicle trip destinations within the Region. No other area of comparable size within the Region produces a concentration of person and vehicle trip destinations even one-half as large. Due to the importance of and the degree of activity within the Milwaukee CBD it is believed useful to examine in this article the trends over time in the travel habits and patterns affecting this area.

Format of Presentation

The data upon which this article is based were obtained through comprehensive home interview studies conducted by the Southeastern Wisconsin Regional Planning Commission in 1963 and 1972 and represent linked trip data, that is, trips in which the true origins and destinations are retained in the file but in which one or more intermediate stops to pick up or discharge a passenger, for example, are deleted.[2] Presented in this article are data which pertain to internal person trips only—i.e., trips which both begin and end within the seven-county Region of southeastern Wisconsin. The data do not incorporate external person trips—i.e., trips which begin or end at a point outside the seven-county Region, which amounted to less than 2 percent of total person trips made to the CBD in both 1963 and 1972.

This article consists of two principle sections. The first section delineates the characteristics of tripmaking in the Milwaukee CBD in 1963 and 1972. The second section compares significant trends emerging in the CBD from 1963 to 1972 with the equivalent trends developing within the Region during the period.

CHARACTERISTICS OF TRIPMAKING IN THE MILWAUKEE CBD: 1963 and 1972

The home interview travel surveys conducted in the Region in 1963 and 1972 furnish a comprehensive representation of travel habits and patterns affecting the Milwaukee CBD. This section of this article presents these inventory findings as they relate to the following travel characteristics: 1) the modes of travel; 2) the trip purposes; 3) land use at destination; 4) the location of travel; 5) the time patterns of travel; and 6) the aspects affecting the completion of the trip, for example, parking type and cost.

Total Internal Person Trips in the CBD

As shown in Table 1, the 1963 and 1972 SEWRPC travel inventories for this Region indicate that a modest decline occurred in total weekday internal person travel to, from, and within the Milwaukee CBD. Such travel declined from approximately 262,200 trips in 1963 to approximately 250,700 trips in 1972, or about 4 percent. Of these trips, the number made to and from the CBD each amounted to approximately 124,000 in 1963 and 119,000 in 1972, in each direction, and the number made entirely within the CBD amounted to approximately 14,000 in 1963 and 12,000 in 1972.

For the purposes of this article further discussion of travel in the Milwaukee CBD will concern only trips with destinations within the CBD—i.e., the total of those trips made to and made within the CBD. As shown in Table 2 the percentage distribution of trips destined for the Milwaukee CBD by mode is virtually the same as the distribution by mode of total trips entering, leaving, and within the CBD.

---

[1] *For a brief history on development of the Milwaukee CBD, see "A Backward Glance: Downtown Yesterdays," by Gerald P. Caffrey, in SEWRPC Technical Record, Vol. 3, No. 2.*

[2] *In a previous SEWRPC Technical Record Article, Vol. 3, No. 2, reporting the findings of the 1963 characteristics of travel in the Milwaukee CBD, the data were based on unlinked trip data, i.e., trips in which each segment of the trip from origin to destination is retained in the file. While both linked and unlinked data are employed in transportation planning analysis, it is believed that for the purpose of this article, linked trip data, although having the effect of somewhat reducing the actual number of trips and vehicle miles of travel, presents nonetheless a clearer understanding and a more accurate representation of the travel habits and patterns existing within the Region and within the CBD.*

Table 1

INTERNAL PERSON TRIPS ENTERING, LEAVING, AND WITHIN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY MODE OF TRAVEL: 1963 and 1972

Direction of Travel	Year	Mode of Travel									
		Auto Driver		Auto Passenger		Mass Transit		Other[a]		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Entering the CBD	1963	58,840	47.3	20,230	16.3	44,590	35.9	650	0.5	124,310	100.0
	1972	67,500	56.6	24,790	20.8	26,350	22.1	580	0.5	119,220	100.0
Leaving the CBD	1963	59,030	47.6	19,610	15.8	44,610	35.9	850	0.7	124,100	100.0
	1972	68,030	56.9	25,350	21.2	25,410	21.3	670	0.6	119,460	100.0
Within the CBD	1963	6,220	45.1	1,390	10.1	5,960	43.2	220	1.6	13,790	100.0
	1972	6,820	56.6	2,470	20.5	2,660	22.1	90	0.8	12,040	100.0
Total	1963	124,090	47.3	41,230	15.7	95,160	36.3	1,720	0.7	262,200	100.0
	1972	142,350	56.8	52,610	21.0	54,420	21.7	1,340	0.5	250,720	100.0

[a] *Includes passenger travel by school bus, taxi, and truck in both 1963 and 1972 and trips by motorcycle in 1972.*

Source: SEWRPC.

Table 2

MODES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY TRIP PURPOSE: 1963 and 1972

Trip Purpose	Year	Mode of Travel									
		Auto Driver		Auto Passenger		Mass Transit		Other		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Work	1963	35,990	51.3	7,550	10.7	26,510	37.8	160	0.2	70,210	100.0
	1972	40,020	61.2	10,760	16.4	14,530	22.2	150	0.2	65,460	100.0
Personal Business	1963	13,760	54.5	4,830	19.1	6,400	25.3	280	1.1	25,270	100.0
	1972	18,040	62.2	7,620	26.3	3,190	11.0	140	0.5	28,990	100.0
School	1963	1,730	34.7	500	10.0	2,570	51.5	190	3.8	4,990	100.0
	1972	3,610	46.1	800	10.2	3,320	42.4	100	1.3	7,830	100.0
Social Recreation	1963	7,000	48.0	4,440	30.4	2,980	20.4	170	1.2	14,590	100.0
	1972	6,540	53.1	4,550	37.0	950	7.7	270	2.2	12,310	100.0
Shopping	1963	4,860	29.4	2,930	17.7	8,730	52.9	--	--	16,520	100.0
	1972	3,730	30.1	2,520	20.3	6,140	49.6	--	--	12,390	100.0
Home	1963	1,720	26.4	1,370	21.0	3,360	51.5	70	1.1	6,520	100.0
	1972	2,380	55.6	1,010	23.6	880	20.6	10	0.2	4,280	100.0
Total	1963	65,060	47.1	21,620	15.7	50,550	36.6	870	0.6	138,100	100.0
	1972	74,320	56.6	27,260	20.8	29,010	22.1	670	0.5	131,260	100.0

Source: SEWRPC.

Mode of Travel

One of the most significant changes occurring in the travel to the CBD over the approximately 10-year period was the very sharp decrease in mass transit travel from 50,500 trips per average weekday in 1963 to 29,000 in 1972, a decline of 43 percent. This rate of decline approximates the rate of decline experienced over the period in total mass transit travel within the Region. Auto driver travel increased from 65,100 trips in 1963 to 74,300 trips in 1972, an increase of 14 percent; and auto passenger travel increased from 21,600 trips in 1963 to 27,300 trips in 1972, an increase of 26 percent. Person travel by all other modes combined, including taxi passenger, truck passenger, motorcycle, and school bus declined from about 900 trips in 1963 to about 700 trips in 1972, or by 23 percent. These changes in person travel by mode resulted in increases between 1963 and 1972 in the proportion of auto driver trips to total CBD trips from 47 percent to 57 percent, and in the proportion of auto passenger trips from 16 percent to 21 percent, while the proportion of total mass transit trips decreased from 37 percent to 22 percent. Total person trips made by other modes decreased from 0.6 percent to 0.5 percent in the period (see Table 2).

Mode of Travel by Trip Purpose: Table 2 also indicates that the volume of auto driver trips increased over the period for work, personal business, school and home but decreased for shopping and social-recreation. The volume of auto passenger trips increased in each category except shopping, and the volume of mass transit passenger trips decreased in each category except school. The most significant change in volumes during the period within a single category was the abrupt decline in mass transit trips to work, which decreased from about 26,500 in 1963 to 14,500 in 1972, or by 45 percent. Further emphasizing the decline in mass transit travel are the percentage distributions of mode of travel within trip purpose. The proportions of auto driver and auto passenger travel increased from 1963 to 1972 within each trip purpose while the proportion of transit trips declined within every trip purpose.

Choice and Captive Mass Transit Trips by Trip Purpose: Only a small percentage of mass transit passengers traveling to the CBD on an average weekday could have chosen to make the trip as an auto driver, all other riders being "captive" in that they either were not licensed drivers, did not own an auto, or did not otherwise have an auto available at the time of the transit trip. In 1963, of a total of 50,500 transit trips made to the CBD on an average weekday, only 7,100, or 14 percent, were "choice" trips. By 1972 there were less than 2,500 such trips, or only 8 percent of the 29,000 mass transit trips made on the average weekday. As shown in Table 3, mass transit passengers who had the choice of driving an auto to the CBD were numerous only in trips to work, such trips amounting to about 5,800 in 1963 and 1,500 in 1972. Should these downward trends in choice ridership continue, it is conceivable that mass transit ridership to this CBD, as well as elsewhere within the Region, will consist almost entirely of captive passengers.

Mode of Travel by Age Group: Substantial increases from 1963 to 1972 were found in person trips made on an average weekday to the CBD within each of the two age groups from 15 through 24 years of age and from 25 through 34 years of age, the former increasing from 25,200 trips to 30,500 trips, or 21 percent, and the latter from 25,100 trips to 30,100, or 20 percent. Substantial decreases, on the other hand, were noted in each of the two age groups from 35 through 44 years of age and from 65 years of age and older, the former decreasing from 28,200 trips to about 18,500, or 34 percent, and the latter from about 13,500 trips to about 9,700, or 28 percent. Smaller decreases in trip volumes were noted in each of the two age groups of 5 through 14 years of age and 55 through 64 years of age. The highest use of mass transit service in each year was found in the two youngest and two oldest age groups while the highest use of the automobile was found in each of the three age group categories falling within the ages of 15 through 54 years of age (see Table 4).

Table 3

CHOICE AND CAPTIVE MASS TRANSIT TRIPS TO THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY TRIP PURPOSE: 1963 and 1972

Ridership Status	Year	Purposes of Transit Trips													
		Work		Personal Business		School		Social-Recreation		Shopping		Home		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Choice	1963	5,830	22.0	380	5.9	130	5.1	180	6.0	350	4.0	240	7.1	7,110	14.1
	1972	1,500	10.3	280	8.8	180	5.4	60	6.3	230	3.7	200	22.7	2,450	8.4
Captive	1963	20,680	78.0	6,020	94.1	2,440	94.9	2,800	94.0	8,380	96.0	3,120	92.9	43,440	85.9
	1972	13,030	89.7	2,910	91.2	3,140	94.6	890	93.7	5,910	96.3	680	77.3	26,560	91.6
Total	1963	26,510	100.0	6,400	100.0	2,570	100.0	2,980	100.0	8,730	100.0	3,360	100.0	50,550	100.0
	1972	14,530	100.0	3,190	100.0	3,320	100.0	950	100.0	6,140	100.0	880	100.0	29,010	100.0

Source: SEWRPC.

Mode of Travel by Licensed Driver Status and Sex: The majority of trips to the Milwaukee CBD on an average weekday was made by males, such trips accounting for about 53 percent of the person trips in both 1963 and 1972. In both years, the large majority of auto driver trips was made by males while the large majority of both auto passenger and mass transit passenger trips was made by females.

Approximately 9 of 10 males making trips to the CBD were licensed to drive in both 1963 and 1972, as compared to about 5 of 10 females in 1963 and 6 of 10 females in 1972. The majorities of male auto passengers and male mass transit passengers were licensed to drive but the majorities of female auto passengers and female mass transit passengers were not. It is significant to note that in both 1963 and 1972 almost one-half of total mass transit trips to this CBD were made by females who were not licensed to drive (see Table 5).

Mode of Travel by Number of Autos Available Per Household: The effect of increased automobile availability upon trip-making to the Milwaukee CBD on the average weekday is clearly demonstrated in Table 6 which indicates that, as the number of autos available to a household increased, the tendency to drive to the CBD increased and the tendency to travel by mass transit decreased. While no more than 5 percent of trips were made to the CBD by persons from 0-auto households as auto drivers, as much as 83 percent of trips to the CBD were made by automobile by persons from 3-or-more auto households; and conversely, while as much as 87 percent of trips to the CBD by persons from 0-auto households were made as mass transit passengers, no more than 8 percent of trips to the CBD by persons from 3-or-more auto households were made by transit. In contrast, the effect of increased automobile availability upon auto passenger travel was found to be minimal.

Mode of Travel by Income Group: Data relating to annual household income were obtained in 1963 from persons making a total of 118,020 trips to the CBD, or 85 percent of total trips with destinations in the CBD, and in 1972, from persons making a total of 91,410 trips to the CBD, or 70 percent of total trips with destinations in the CBD. These data indicate that in both years, nearly one-half of total travel to the CBD was generated by persons from households with an annual

Table 4

MODES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY AGE GROUP: 1963 and 1972

Age Groups (in Years)	Year	Mode of Travel									
		Auto Driver		Auto Passenger		Mass Transit		Other		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
5-14	1963	--	--	2,060	51.9	1,710	43.1	200	5.0	3,970	100.0
	1972	--	--	1,650	64.5	800	31.2	110	4.3	2,560	100.0
15-24	1963	8,150	32.3	5,390	21.4	11,520	45.7	150	0.6	25,210	100.0
	1972	12,430	40.8	9,380	30.8	8,340	27.4	310	1.0	30,460	100.0
25-34	1963	15,710	62.7	3,460	13.8	5,790	23.1	100	0.4	25,060	100.0
	1972	21,240	70.5	5,150	17.1	3,600	12.0	130	0.4	30,120	100.0
35-44	1963	17,460	61.9	3,340	11.9	7,280	25.8	120	0.4	28,200	100.0
	1972	13,350	72.1	2,320	12.5	2,830	15.3	20	0.1	18,520	100.0
45-54	1963	11,980	49.7	3,470	14.4	8,630	35.8	10	0.1	24,090	100.0
	1972	15,480	67.3	3,710	16.1	3,790	16.5	30	0.1	23,010	100.0
55-64	1963	7,270	40.1	2,120	11.7	8,640	47.7	90	0.5	18,120	100.0
	1972	8,430	49.8	2,990	17.7	5,490	32.5	--	--	16,910	100.0
65 and Over	1963	4,490	33.4	1,780	13.2	6,980	51.9	200	1.5	13,450	100.0
	1972	3,390	35.0	2,060	21.3	4,160	43.0	70	0.7	9,680	100.0
Total	1963	65,060	47.1	21,620	15.7	50,550	36.6	870	0.6	138,100	100.0
	1972	74,320	56.6	27,260	20.8	29,010	22.1	670	0.5	131,260	100.0

Source: SEWRPC.

Table 5

MODES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY THE LICENSED DRIVER STATUS AND SEX OF THE TRIPMAKERS: 1963 and 1972

Licensed Driver Status and Sex	Year	Mode of Travel									
		Auto Driver		Auto Passenger		Mass Transit		Other		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Male Driver	1963	52,260	80.3	4,250	19.7	8,620	17.1	250	28.7	65,380	47.3
	1972	55,440	74.6	5,480	20.1	3,770	13.0	210	31.3	64,900	49.4
Male Nondriver	1963	--	--	1,540	7.1	7,090	14.0	190	21.9	8,820	6.4
	1972	--	--	1,590	5.8	3,180	11.0	180	26.9	4,950	3.8
Total Male	1963	52,260	80.3	5,790	26.8	15,710	31.1	440	50.6	74,200	53.7
	1972	55,440	74.6	7,070	25.9	6,950	24.0	390	58.2	69,850	53.2
Female Driver	1963	12,800	19.7	7,090	32.8	10,550	20.9	90	10.3	30,530	22.1
	1972	18,880	25.4	11,920	43.7	7,980	27.5	140	20.9	38,920	29.7
Female Nondriver	1963	--	--	8,740	40.4	24,290	48.0	340	39.1	33,370	24.2
	1972	--	--	8,270	30.4	14,080	48.5	140	20.9	22,490	17.1
Total Female	1963	12,800	19.7	15,830	73.2	34,840	68.9	430	49.4	63,900	46.3
	1972	18,880	25.4	20,190	74.1	22,060	76.0	280	41.8	61,410	46.8
Total	1963	65,060	100.0	21,620	100.0	50,550	100.0	870	100.0	138,100	100.0
	1972	74,320	100.0	27,260	100.0	29,010	100.0	670	100.0	131,260	100.0

Source: SEWRPC.

Table 6

MODES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY THE NUMBER OF AUTOMOBILES AVAILABLE PER HOUSEHOLD: 1963 and 1972

Autos Available Per Household	Year	Mode of Travel									
		Auto Driver		Auto Passenger		Mass Transit		Other		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
0	1963	240	0.9	2,960	11.7	21,890	86.2	300	1.2	25,390	100.0
	1972	860	4.9	3,730	21.1	12,910	73.1	150	0.9	17,650	100.0
1	1963	37,930	49.6	13,800	18.0	24,210	31.7	500	0.7	76,440	100.0
	1972	34,360	56.2	14,550	23.8	11,830	19.4	390	0.6	61,130	100.0
2	1963	22,450	72.7	4,300	13.9	4,080	13.2	70	0.2	30,900	100.0
	1972	30,480	74.8	6,830	16.7	3,330	8.2	130	0.3	40,770	100.0
3 or More	1963	4,440	82.7	560	10.4	370	6.9	--	--	5,370	100.0
	1972	8,620	73.6	2,150	18.4	940	8.0	--	--	11,710	100.0
Total	1963	65,060	47.1	21,620	15.7	50,550	36.6	870	0.6	138,100	100.0
	1972	74,320	56.6	27,260	20.8	29,010	22.1	670	0.5	131,260	100.0

Source: SEWRPC.

income, expressed in 1972 constant dollars, between $8,000 and $15,999. However, substantial differences, reflecting the growing affluence of the past decade, were observed between 1963 and 1972 in the lower and higher income categories. In 1963, 36 percent of the trips to the CBD were made by persons from households with an annual income of $7,999 or less, and 14 percent of the trips were made by persons from households with an annual income in excess of $16,000. In contrast, in 1972, approximately 18 percent of the trips to the CBD were made by persons from households with an annual income of $7,999 or less and 34 percent were made by persons from households with an annual income in excess of $16,000. Upon correlating income with the mode of travel, it was found that as income increased the percentage of trips made as an auto driver to the CBD also increased, the percentage of trips made by mass transit generally declined, and the percentage of trips made as auto passengers remained unaffected (see Table 7).

Mode of Travel by Occupational Group: Great diversity was found in the occupations of persons making trips to the Milwaukee CBD on an average weekday, no single category, for example, accounting for as much as one-fourth of total trips. Clerical and kindred workers (not including sales workers) represented the single largest category, accounting for 21 percent of the total in 1963 and 19 percent in 1972. In other major categories in 1963 and 1972, professional, technical and kindred workers, accounted for 13 percent and 16 percent, respectively; housewives and unpaid home workers, 13 percent and 11 percent; students, 9 percent and 12 percent; managers, officials and proprietors, 9 percent and 12 percent; sales workers, 7 percent in both years; craftsmen, foremen, and kindred workers, 7 percent and 5 percent; operatives and kindred workers, 7 percent and 4 percent; service workers, 6 percent in both years; and retired or incapacitated persons, 5 percent in both years. The minor categories, including laborers and farm workers, private household workers, and the unemployed, each accounted for about 1 percent or less of total trips.

The highest utilization of mass transit by major occupational category in trips to the CBD in 1963 and 1972 respectively was found to be: retired and incapacitated persons, 55 percent and 48 percent; service workers, 52 percent and 33 percent; clerical workers, 50 percent and 32 percent; students, 44 percent and 32 percent; and housewives and other unpaid home workers, 44 percent and 26 percent. The highest utilization of the automobile (both driver and passenger) by major occu-

Table 7

MODES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY HOUSEHOLD ANNUAL INCOME: 1963 and 1972

Household Annual Income (1972 Constant $)	Year	Mode of Travel									
		Auto Driver		Auto Passenger		Mass Transit		Other		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
0 to 3,999	1963	3,030	24.3	1,660	13.3	7,640	61.3	140	1.1	12,470	100.0
	1972	1,310	26.0	1,090	21.7	2,630	52.3	--	--	5,030	100.0
4,000 to 7,999	1963	11,080	36.6	4,450	14.7	14,570	48.2	140	0.5	30,240	100.0
	1972	4,860	41.8	2,250	19.3	4,400	37.8	130	1.1	11,640	100.0
8,000 to 11,999	1963	17,430	46.0	7,000	18.5	13,300	35.1	140	0.4	37,870	100.0
	1972	12,640	56.2	5,400	24.0	4,260	18.9	190	0.9	22,490	100.0
12,000 to 15,999	1963	12,100	56.8	3,440	16.2	5,730	26.9	30	0.1	21,300	100.0
	1972	12,820	60.9	4,730	22.5	3,340	15.9	150	0.7	21,040	100.0
16,000 to 21,999	1963	6,590	63.7	1,600	15.4	2,080	20.1	80	0.8	10,350	100.0
	1972	9,350	63.9	3,770	25.8	1,480	10.1	30	0.2	14,630	100.0
22,000 or more	1963	4,770	82.4	600	10.3	340	5.9	80	1.4	5,790	100.0
	1972	11,640	70.2	3,360	20.2	1,570	9.5	10	0.1	16,580	100.0
Total[a]	1963	55,000	46.6	18,750	15.9	43,660	37.0	610	0.5	118,020	100.0
	1972	52,620	57.6	20,600	22.5	17,680	19.3	510	0.6	91,410	100.0

[a] *Total excludes 20,080 trips in 1963 and 39,850 trips in 1972 for which the household income was not reported.*

Source: SEWRPC.

pational category in trips destined for the CBD in 1963 and 1972, respectively, was: managers, officials and proprietors, 86 percent and 94 percent; professional, technical, and kindred workers, 80 percent and 92 percent; sales workers, 80 percent and 82 percent; and craftsmen, foremen and kindred workers, 79 percent and 94 percent. Since these four major occupational groups, which together accounted for a very substantial portion of total travel in the CBD, tend toward an almost exclusive reliance on auto travel, efforts to achieve a better balance between mass transit and auto travel must be directed toward making mass transit travel more competitive, and thus more attractive, to persons in these, as well as other occupational groups (see Table 8).

Table 8

MODES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY OCCUPATION: 1963 and 1972

Occupation	Year	Mode of Travel									
		Auto Driver		Auto Passenger		Mass Transit		Other		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Professional, Technical, and Kindred	1963	12,470	68.1	2,080	11.4	3,560	19.4	210	1.1	18,320	100.0
	1972	15,680	74.9	3,480	16.6	1,700	8.1	70	0.4	20,930	100.0
Managers, Officials, and Proprietors	1963	9,240	75.9	1,220	10.0	1,650	13.5	70	0.6	12,180	100.0
	1972	12,930	85.4	1,350	8.9	840	5.6	20	0.1	15,140	100.0
Clerical and Kindred	1963	9,270	32.4	5,060	17.7	14,240	49.7	70	0.2	28,640	100.0
	1972	10,730	44.3	5,730	23.6	7,660	31.6	130	0.5	24,250	100.0
Sales Workers	1963	7,360	74.1	620	6.2	1,960	19.7	--	--	9,940	100.0
	1972	6,200	71.8	860	10.0	1,560	18.1	10	0.1	8,630	100.0
Craftsmen, Foremen, and Kindred	1963	7,010	69.5	990	9.8	2,090	20.7	--	--	10,090	100.0
	1972	5,050	86.2	450	7.7	360	6.1	--	--	5,860	100.0
Operatives and Kindred	1963	4,440	48.3	670	7.3	4,090	44.4	--	--	9,200	100.0
	1972	4,070	70.3	670	11.6	1,010	17.4	40	0.7	5,790	100.0
Private Household	1963	130	46.4	40	14.3	110	39.3	--	--	280	100.0
	1972	50	27.8	10	5.5	120	66.7	--	--	180	100.0
Service Workers	1963	3,200	37.3	940	11.0	4,440	51.7	--	--	8,580	100.0
	1972	4,830	49.0	1,800	18.3	3,210	32.5	20	0.2	9,860	100.0
Laborers and Farm Workers	1963	770	58.3	120	9.1	430	32.6	--	--	1,320	100.0
	1972	1,110	55.5	680	34.0	210	10.5	--	--	2,000	100.0
Housewives and Other Unpaid Home Workers	1963	4,980	27.5	5,000	27.6	7,960	44.0	170	0.9	18,110	100.0
	1972	4,610	33.0	5,700	40.8	3,570	25.6	80	0.6	13,960	100.0
Students	1963	3,090	24.8	3,670	29.5	5,420	43.5	280	2.2	12,460	100.0
	1972	5,320	34.7	4,830	31.5	4,930	32.2	250	1.6	15,330	100.0
Retired and Incapacitated Persons	1963	2,480	34.9	680	9.5	3,880	54.6	70	1.0	7,110	100.0
	1972	2,740	38.4	940	13.2	3,450	48.4	--	--	7,130	100.0
Unemployed	1963	620	33.2	530	28.3	720	38.5	--	--	1,870	100.0
	1972	1,000	45.5	760	34.5	390	17.7	50	2.3	2,200	100.0
Total	1963	65,060	47.1	21,620	15.7	50,550	36.6	870	0.6	138,100	100.0
	1972	74,320	56.6	27,260	20.8	29,010	22.1	670	0.5	131,260	100.0

Source: SEWRPC.

Purposes of Trips with Destinations in the Milwaukee CBD

Contributing to the overall decline in tripmaking to the Milwaukee CBD on the average weekday from 138,100 person trips in 1963 to 131,300 person trips in 1972 were decreases of 4,700 work trips, 4,100 shopping trips, 2,300 social-recreational trips, and 2,200 trips to home. Partially offsetting these decreases were increases of 3,700 personal business trips and 2,800 school trips. Despite these increases and decreases, the 1963 and 1972 percentage distributions of person trips by trip purpose as shown in Table 9 remained quite similar, varying by 4 percent or less in any category and, for work trips, 1 percent.

The importance of the Milwaukee CBD as a center of employment is indicated by the tens of thousands of work trips destined for this area, 70,200 in 1963 and 65,500 in 1972. Such trips accounted in both years for about one-half of the person trips destined for the CBD and for about 11 percent of the total work trips made within the Region in 1963 and 9 percent in 1972. Next in importance were trips to transact personal business which amounted to 25,300, or 18 percent, in 1963 and to 29,000, or 22 percent, in 1972. Of the remaining trips made to the Milwaukee CBD on an average weekday in 1963 and 1972, respectively, shopping trips amounted to 16,500, or 12 percent, and 12,400, or 9 percent; social-recreational trips amounted to 14,600, or 11 percent, and 12,300, or 9 percent; school trips amounted to 5,000, or 4 percent, and 7,800, or 6 percent; and trips to home amounted to 6,500, or 5 percent, and 4,300, or 3 percent.

Trip Purpose by Mode of Travel: Examination of the percentage distributions of trip purposes by mode of travel as shown in Table 9 indicated similar patterns in both 1963 and 1972, with only three categories showing differences in excess of 4 percent: the proportion of auto passenger trips made to attend work increased from 35 percent in 1963 to 40 percent in 1972; the proportion of auto passenger trips made to conduct personal business increased from 22 percent in 1963 to 28 percent in 1972; and the proportion of mass transit trips made to attend school increased from 5 percent in 1963 to 11 percent of total transit trips in 1972.

In both 1963 and 1972, trips to work in the CBD comprised over 50 percent of both auto driver and mass transit travel and slightly less than 40 percent of auto passenger travel. Second in importance were auto driver and auto passenger trips made to transact personal business, and mass transit trips made for shopping.

Time Expended Within the CBD Between Trips by Trip Purpose: As shown in Table 10 very little change occurred from 1963 to 1972 in the percentage distribution of trips to the Milwaukee CBD by the period of time expended within the CBD, both in total and within each trip purpose category. Approximately one-fourth of the persons making CBD trips on an average weekday in both 1963 and 1972 spent less than one hour prior to making another trip, either within the CBD or in order to leave the CBD; 29 percent in both years spent at least one hour but less than four hours; about 13 percent

Table 9

MODES OF INTERNAL PERSON TRIPS IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY TRIP PURPOSE: 1963 and 1972

Mode of Travel	Year	Trip Purpose													
		Work		Personal Business		School		Social Recreation		Shopping		Home		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Auto Driver	1963	35,990	55.3	13,760	21.1	1,730	2.7	7,000	10.8	4,860	7.5	1,720	2.6	65,060	100.0
	1972	40,020	53.8	18,040	24.3	3,610	4.9	6,540	8.8	3,730	5.0	2,380	3.2	74,320	100.0
Auto Passenger	1963	7,550	34.9	4,830	22.3	500	2.3	4,440	20.6	2,930	13.6	1,370	6.3	21,620	100.0
	1972	10,760	39.5	7,620	27.9	800	3.0	4,550	16.7	2,520	9.2	1,010	3.7	27,260	100.0
Mass Transit	1963	26,510	52.4	6,400	12.7	2,570	5.1	2,980	5.9	8,730	17.3	3,360	6.6	50,550	100.0
	1972	14,530	50.1	3,190	11.0	3,320	11.4	950	3.3	6,140	21.2	880	3.0	29,010	100.0
Other	1963	160	18.4	280	32.2	190	21.8	170	19.5	--	--	70	8.1	870	100.0
	1972	150	22.4	140	20.9	100	14.9	270	40.3	--	--	10	1.5	670	100.0
All Modes	1963	70,210	50.8	25,270	18.3	4,990	3.6	14,590	10.6	16,520	12.0	6,520	4.7	138,100	100.0
	1972	65,460	49.9	28,990	22.1	7,830	5.9	12,310	9.4	12,390	9.4	4,280	3.3	131,260	100.0

Source: SEWRPC.

in 1963 and 15 percent in 1972 spent at least four hours but less than eight hours; and approximately 34 percent in 1963 and 31 percent in 1972 spent eight hours or longer. As would be expected, persons attending work or school generally were engaged for longer periods of time than those persons who made trips for other purposes. Persons making trips for the purpose of conducting personal business tended to expend the shortest period of time between trips, 59 percent in 1963 and 66 percent in 1972 being engaged for less than one hour. Of persons making shopping trips, 88 percent in 1963 and 89 percent in 1972 spent less than four hours prior to making another trip, and slightly more than one-third in both years took less than one hour. Of persons making social-recreational trips, 88 percent in 1963 and 85 percent in 1972, were occupied for less than four hours prior to making another trip, and 40 percent in both years were engaged for at least two hours but less than four hours.

Trip Purpose by Age Group: Trips to work accounted for the majority of trips made to the Milwaukee CBD on an average weekday in 1963 and 1972 within each of the four age groups from 25 through 64 years of age, and for the plurality of trips made by those 15 through 24 years of age. In both 1963 and 1972 trips for personal business, shopping, and social-recreation comprised the majority of trips in the youngest age category while trips for personal business, shopping, and work constituted a large part of the trips of the oldest age category.

Notable changes during the period included: sharp declines in the volumes of work trips by persons 35 through 44 years of age, and by persons 65 and older—accounting for a large portion of the decline in total trips made by persons in these age groups; large increases in the volumes of personal business trips by persons in the 15 through 24 years, and 25 through 34 years age groups; a large decrease in the volumes of social-recreational and shopping trips by persons 35 through 44 years of age; and a substantial increase in the volume of school trips by persons in the 15 through 24 years age group (see Table 11).

Trip Purpose by Licensed Driver Status and Sex: In both 1963 and 1972 the majorities of trips to the Milwaukee CBD on an average weekday for the purposes of work, personal business, and social-recreation were made by males, while the majority of trips for shopping was made by females. Males outnumbered females in trips to school in 1963 but not in 1972, while females outnumbered males in trips to home in 1963, but not in 1972.

Males who were licensed to drive outnumbered unlicensed males by a large majority within each trip purpose category, both in 1963 and 1972, while females who were licensed to drive outnumbered unlicensed females by smaller majorities in trips for work, personal business, and social-recreation and females who were not licensed to drive outnumbered licensed females in trips to shopping and to home in both 1963 and 1972 and in trips to school in 1963 but not in 1972. Considering both sexes, licensed drivers formed the majority within each trip purpose category in both years except that of shopping in 1963 (see Table 12).

Table 10

PERCENTAGE DISTRIBUTION OF TIME EXPENDED BETWEEN TRIPS ON AN AVERAGE WEEKDAY BY THE PURPOSE OF TRIPS, OTHER THAN TO HOME, WITH DESTINATIONS IN THE MILWAUKEE CBD: 1963 and 1972

Time Expended Between Trips (In Hours)	Year	Trip Purpose					
		Work	Personal Business	School	Social-Recreation	Shopping	Total
Less than 1	1963	10.7	59.2	2.9	23.6	36.3	24.4
	1972	10.1	65.7	1.4	18.0	33.9	25.2
1.0-1.9	1963	5.2	19.3	6.3	24.8	28.3	13.1
	1972	6.1	17.1	12.7	25.6	26.4	12.9
2.0-3.9	1963	7.5	15.1	31.0	39.5	23.0	15.5
	1972	8.5	11.3	29.1	40.9	28.9	15.6
4.0-7.9	1963	15.3	5.0	43.3	10.7	11.1	13.3
	1972	16.7	4.6	49.1	15.5	10.2	15.2
8.0 and Over	1963	61.3	1.4	16.5	1.4	1.3	33.7
	1972	58.6	1.3	7.7	--	0.6	31.1
Total	1963	100.0	100.0	100.0	100.0	100.0	100.0
	1972	100.0	100.0	100.0	100.0	100.0	100.0

Source: SEWRPC.

Table 11

PURPOSES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY AGE GROUP: 1963 and 1972

Age Groups (In Years)	Year	Trip Purpose													
		Work		Personal Business		School		Social-Recreation		Shopping		Home		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
5-14	1963	60	1.5	1,340	33.8	350	8.8	1,350	34.0	670	16.9	200	5.0	3,970	100.0
	1972	120	4.7	1,250	48.8	200	7.8	350	13.7	640	25.0	--	--	2,560	100.0
15-24	1963	11,020	43.7	3,700	14.7	3,450	13.7	2,860	11.3	2,730	10.8	1,450	5.8	25,210	100.0
	1972	11,530	37.9	7,230	23.7	5,150	16.9	3,180	10.4	2,440	8.0	930	3.1	30,460	100.0
25-34	1963	15,030	60.0	3,730	14.9	650	2.6	2,660	10.6	1,810	7.2	1,180	4.7	25,060	100.0
	1972	17,490	58.1	6,510	21.6	1,070	3.5	2,860	9.5	1,450	4.8	740	2.5	30,120	100.0
35-44	1963	17,080	60.5	4,880	17.3	220	0.8	2,930	10.4	2,730	9.7	360	1.3	28,200	100.0
	1972	11,700	63.2	3,310	17.9	510	2.7	1,210	6.5	1,390	7.5	400	2.2	18,520	100.0
45-54	1963	14,240	59.1	3,880	16.1	180	0.7	1,890	7.9	2,910	12.1	990	4.1	24,090	100.0
	1972	14,000	60.8	3,800	16.5	540	2.4	2,330	10.1	1,840	8.0	500	2.2	23,010	100.0
55-64	1963	9,400	51.9	3,930	21.7	30	0.1	1,320	7.3	2,680	14.8	760	4.2	18,120	100.0
	1972	9,270	54.8	3,420	20.2	360	2.2	1,070	6.3	2,060	12.2	730	4.3	16,910	100.0
65 and Over	1963	3,380	25.1	3,810	28.3	110	0.8	1,580	11.8	2,990	22.2	1,580	11.8	13,450	100.0
	1972	1,350	14.0	3,470	35.9	--	--	1,310	13.5	2,570	26.5	980	10.1	9,680	100.0
Total	1963	70,210	50.8	25,270	18.3	4,990	3.6	14,590	10.6	16,520	12.0	6,520	4.7	138,100	100.0
	1972	65,460	49.9	28,990	22.1	7,830	6.0	12,310	9.4	12,390	9.4	4,280	3.2	131,260	100.0

Source: SEWRPC.

Table 12

PURPOSES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY THE LICENSED DRIVER STATUS AND SEX OF THE TRIPMAKERS: 1963 and 1972

Licensed Driver Status and Sex	Year	Trip Purpose													
		Work		Personal Business		School		Social-Recreation		Shopping		Home		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Male Driver	1963	40,600	62.1	11,240	17.2	2,490	3.8	6,000	9.2	2,820	4.3	2,230	3.4	65,380	100.0
	1972	37,410	57.6	14,050	21.7	3,020	4.7	5,710	8.8	2,540	3.9	2,170	3.3	64,900	100.0
Male Nondriver	1963	2,820	32.0	2,160	24.5	660	7.5	1,580	17.9	930	10.5	670	7.6	8,820	100.0
	1972	1,580	31.9	980	19.8	740	15.0	640	12.9	670	13.5	340	6.9	4,950	100.0
Total Male	1963	43,420	58.5	13,400	18.1	3,150	4.2	7,580	10.2	3,750	5.1	2,900	3.9	74,200	100.0
	1972	38,990	55.8	15,030	21.5	3,760	5.4	6,350	9.1	3,210	4.6	2,510	3.6	69,850	100.0
Female Driver	1963	14,030	46.0	6,200	20.3	500	1.6	3,630	11.9	5,080	16.6	1,090	3.6	30,530	100.0
	1972	17,910	46.0	9,220	23.7	2,590	6.6	4,670	12.0	3,690	9.5	840	2.2	38,920	100.0
Female Nondriver	1963	12,760	38.2	5,670	17.0	1,340	4.0	3,380	10.1	7,690	23.1	2,530	7.6	33,370	100.0
	1972	8,560	38.1	4,740	21.1	1,480	6.6	1,290	5.7	5,490	24.4	930	4.1	22,490	100.0
Total Female	1963	26,790	41.9	11,870	18.5	1,840	2.9	7,010	11.0	12,770	20.0	3,620	5.7	63,900	100.0
	1972	26,470	43.1	13,960	22.7	4,070	6.6	5,960	9.7	9,180	15.0	1,770	2.9	61,410	100.0
Total	1963	70,210	50.8	25,270	18.3	4,990	3.6	14,590	10.6	16,520	12.0	6,520	4.7	138,100	100.0
	1972	65,460	49.9	28,990	22.1	7,830	6.0	12,310	9.3	12,390	9.4	4,280	3.3	131,260	100.0

Source: SEWRPC.

Trip Purpose by Number of Autos Available Per Household: The percentage distribution of person trips by trip purpose to the Milwaukee CBD by the number of autos available per household remained relatively stable from 1963 to 1972, varying no more than 5 percent in any category except in trips to home in 0-auto households, trips for personal business in 1-auto households, and trips to school in 3-or-more auto households.

However, the actual number of trips for work, social-recreation, and home decreased in the period in each of 0-auto and 1-auto households and increased in each of 2-auto and 3 or more auto households. Trips for personal business decreased in 0-auto households and increased in every other category. Trips for school increased in each category, while trips for shopping decreased in each category. The most substantial change occurring in the period within a given category was the decline in work trips in 1-auto households from about 40,400 in 1963 to about 29,500 in 1972, or 27 percent (see Table 13).

Trip Purpose by Income Group: Approximately one-half of the trips to the Milwaukee CBD on an average weekday for the purposes of work, personal business, school, and shopping were generated by persons from households with an annual income between $4,000 and $11,999 in 1963, and by persons from households with an annual income between $8,000 and $15,999 in 1972. Over 60 percent of trips to home in the CBD were generated by persons from households with an annual income of less than $8,000 in 1963 and less than $12,000 in 1972.

Trips by purpose as a proportion of total trips of a given income group were generally similar between income groups with two exceptions. Persons living in households with an annual income of less than $4,000 made proportionately fewer trips to work and relatively more trips for shopping in the CBD than did those in other income groups. Also, persons living in households in the largest income category made a greater proportion of trips to the CBD for social-recreational purposes than did persons in other income groups (see Table 14).

Trip Purpose by Occupational Group: The opportunity for diverting persons in the major occupational groups from auto trips to transit trips for travel to the Milwaukee CBD on an average weekday is highlighted by the finding that within virtually every major occupational group, the majority or large plurality of total trips to the CBD both in 1963 and 1972 consisted of trips for the purpose of work; such trips because of their high degree of repetitiveness were, of all trips, most conveniently served by transit. In both 1963 and 1972 proportionally more trips for shopping and for personal business were made by housewives and retired persons than by persons in other groups: students, housewives and retired persons made proportionately more trips for social-recreational purposes than did persons in other groups (see Table 15).

Land Use at Destination of Trips to the Milwaukee CBD

More than one-half of the person trips to the Milwaukee CBD on an average weekday had destinations at commercial land uses, amounting to about 76,600, or 56 percent, in 1963, and about 75,800, or 58 percent, in 1972. These figures reflect the many commercial offices and large and small retail establishments situated in this area. Trips made to governmental

Table 13

PURPOSES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY THE NUMBER OF AUTOMOBILES AVAILABLE PER HOUSEHOLD: 1963 and 1972

Autos Available Per Household	Year	Trip Purpose													
		Work		Personal Business		School		Social-Recreation		Shopping		Home		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
0	1963	10,000	39.4	4,060	16.0	870	3.4	2,030	8.0	4,750	18.7	3,670	14.5	25,380	100.0
	1972	6,690	37.9	2,850	16.1	1,480	8.4	1,290	7.3	4,090	23.2	1,250	7.1	17,650	100.0
1	1963	40,380	52.8	14,410	18.8	2,430	3.2	8,270	10.8	8,230	10.8	2,730	3.6	76,450	100.0
	1972	29,520	48.3	16,690	27.3	2,980	4.9	4,670	7.6	5,320	8.7	1,950	3.2	61,130	100.0
2	1963	17,070	55.2	5,620	18.2	1,430	4.6	3,580	11.6	3,080	10.0	120	0.4	30,900	100.0
	1972	23,340	57.2	7,170	17.6	2,040	5.0	4,880	12.0	2,610	6.4	730	1.8	40,770	100.0
3 or More	1963	2,760	51.4	1,180	22.0	260	4.8	710	13.2	460	8.6	--	--	5,370	100.0
	1972	5,910	50.4	2,280	19.4	1,330	11.4	1,470	12.6	370	3.2	350	3.0	11,710	100.0
Total	1963	70,210	50.8	25,270	18.3	4,990	3.6	14,590	10.6	16,520	12.0	6,520	4.7	138,100	100.0
	1972	65,460	49.9	28,990	22.1	7,830	5.9	12,310	9.4	12,390	9.4	4,280	3.3	131,260	100.0

Source: SEWRPC.

and institutional land uses amounted to about 31,900, or 23 percent, in 1963 and 36,400, or 28 percent, in 1972. Trips to industrial land uses including wholesale and storage areas, amounted to about 15,300, or 11 percent, in 1963, and about 8,800, or 7 percent, in 1972. This decline may be attributed to the relocation of certain industrial firms from the CBD to other parts of the Region and beyond during the decade. Of the remaining land use categories, trips to residential land uses amounted to about 7,500, or 5 percent, in 1963 and about 4,800, or 4 percent, in 1972, the decline resulting largely from the demolition of numerous residential structures in the CBD through urban renewal and transportation facility improvement programs during the period; and trips to "other" land uses, the category including transportation, communication, and utility land uses as well as recreational, and open land and water areas, amounted to about 6,800, or 5 percent, in 1963 and to about 5,500, or 4 percent, in 1972.

Land Use by Mode of Travel: The percentage distribution of trips by land use by mode of travel, as shown in Table 16, indicated some differences between 1963 and 1972. During the period, trips to commercial and governmental-institutional land uses increased as a percent of total within each major mode while the percent of trips to industrial land uses showed a decline within each major mode. The percent of auto passenger and mass transit passenger trips made to residential land uses declined from 1963 to 1972 while the percent of auto driver trips to such land uses showed a slight increase. The percentage of auto passenger and mass transit trips made to "other" land uses also showed declines from 1963 to 1972 while the percent of auto driver travel to these areas remained constant and the percent of travel by other modes showed a substantial increase.

Land Use by Trip Purpose: Table 17 which presents land use by trip purpose, provides an indication of the reasons trips are made to particular types of establishments in the CBD. As would be expected, trips to go home were the primary purpose of trips to residential land uses in both 1963 and 1972. In both years trips to work constituted the bulk of travel to industrial land uses and the plurality of trips made to commercial and governmental-institutional land uses. Trips to "other" land uses were made primarily for the purposes of work, personal business, or social-recreation.

The volume of trips to attend work at commercial and residential land uses remained relatively similar from 1963 to 1972, while the volume of such trips to governmental-institutional and "other" land uses increased moderately and those to industrial land uses decreased substantially in the period. The volume of trips to conduct personal business at residential and industrial land uses remained similar from 1963 to 1972 while trips for such purposes at commercial and institu-

Table 14

PURPOSES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY HOUSEHOLD ANNUAL INCOME: 1963 and 1972

Annual Household Income (1972 Constant $)	Year	Trip Purpose													
		Work		Personal Business		School		Social-Recreation		Shopping		Home		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
0 to 3,999	1963	4,060	32.6	2,640	21.2	700	5.6	1,190	9.5	2,430	19.5	1,450	11.6	12,470	100.0
	1972	1,460	29.0	1,080	21.5	420	8.3	600	11.9	1,170	23.3	300	6.0	5,030	100.0
4,000 to 7,999	1963	13,860	45.8	6,130	20.3	1,220	4.0	2,680	8.9	3,630	12.0	2,720	9.0	30,240	100.0
	1972	4,760	40.9	3,130	26.9	590	5.1	480	4.1	1,650	14.2	1,030	8.8	11,640	100.0
8,000 to 11,999	1963	20,060	53.0	6,850	18.1	1,450	3.8	4,550	12.0	4,080	10.8	880	2.3	37,870	100.0
	1972	11,100	49.3	5,970	26.5	1,230	5.5	1,700	7.6	2,060	9.2	430	1.9	22,490	100.0
12,000 to 15,999	1963	12,920	60.7	3,020	14.2	730	3.4	2,160	10.1	2,030	9.5	440	2.1	21,300	100.0
	1972	11,530	54.8	4,910	23.3	950	4.5	1,750	8.3	1,780	8.5	120	0.6	21,040	100.0
15,000 to 21,999	1963	6,120	59.1	1,310	12.7	260	2.5	1,090	10.5	1,010	9.8	560	5.4	10,350	100.0
	1972	8,000	54.7	3,020	20.6	520	3.5	1,720	11.8	790	5.4	580	4.0	14,630	100.0
22,000 or More	1963	3,150	54.4	800	13.8	70	1.2	1,270	21.9	460	8.0	40	0.7	5,790	100.0
	1972	9,980	60.2	2,150	13.0	700	4.2	2,570	15.5	890	5.4	290	1.7	16,580	100.0
Total[a]	1963	60,170	51.0	20,750	17.6	4,430	3.7	12,940	11.0	13,640	11.5	6,090	5.2	118,020	100.0
	1972	46,830	51.2	20,260	22.2	4,410	4.8	8,820	9.7	8,340	9.1	2,750	3.0	91,410	100.0

[a] *Total excludes 20,080 trips in 1963 and 39,850 trips in 1972 for which the household income was not reported.*

Source: SEWRPC.

tional land uses increased, and those at "other" land uses decreased. The volume of trips to attend school at institutional land uses increased sharply during the period, while trips for social-recreational purposes at commercial and governmental-institutional land uses decreased moderately, and trips for shopping at commercial land uses decreased significantly.

It is important to note that the decline in trips to industrial land uses for the purpose of attending work—6,300 trips or 46 percent—represented the greatest absolute loss in trip volumes from 1963 to 1972 in any of the land use categories for any trip purpose and was the only land use type which showed a significant decline in work trips. Therefore, the decline in total work trips is very closely tied to this apparent loss in industrial employment in the CBD. Also showing substantial declines in trip volumes from 1963 to 1972 were only two other land use-trip purpose categories: travel to shopping at commercial establishments declined 4,200 trips or 26 percent; and, travel to residential land uses for the purpose of going home declined 2,600 trips or 40 percent. In total, between 1963 and 1972 these three areas of decline—industrial work trips, commercial shopping trips, and residential home trips—created a loss of approximately 13,100 trips to the CBD, a figure far in excess of the decline of 6,800 trips observed in total CBD person travel during the period.

Table 15

PURPOSES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY OCCUPATION: 1963 and 1972

Occupation	Year	Trip Purpose													
		Work		Personal Business		School		Social-Recreation		Shopping		Home		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Professional, Technical, and Kindred	1963	12,320	67.2	1,820	9.9	120	0.7	1,670	9.1	1,170	6.4	1,220	6.7	18,320	100.0
	1972	13,330	63.7	2,880	13.8	310	1.5	2,190	10.4	1,320	6.3	900	4.3	20,930	100.0
Managers, Officials, and Proprietors	1963	8,010	65.8	2,010	16.5	30	0.3	1,200	9.8	420	3.4	510	4.2	12,180	100.0
	1972	11,550	76.3	1,560	10.3	170	1.1	1,030	6.8	370	2.5	460	3.0	15,140	100.0
Clerical and Kindred	1963	22,160	77.4	1,860	6.5	140	0.5	1,750	6.1	1,630	5.7	1,100	3.8	28,640	100.0
	1972	18,670	77.0	2,730	11.3	170	0.7	920	3.8	1,120	4.6	640	2.6	24,250	100.0
Sales	1963	7,770	78.2	750	7.5	180	1.8	1,070	10.8	170	1.7	--	--	9,940	100.0
	1972	6,310	73.1	1,400	16.2	160	1.9	460	5.3	240	2.8	60	0.7	8,630	100.0
Craftsmen, Foremen, and Kindred	1963	5,980	59.3	1,850	18.3	210	2.1	800	7.9	630	6.2	620	6.2	10,090	100.0
	1972	2,880	49.2	1,630	27.8	260	4.4	550	9.4	140	2.4	400	6.8	5,860	100.0
Operatives and Kindred	1963	4,420	48.0	1,940	21.1	230	2.5	730	8.0	1,270	13.8	610	6.6	9,200	100.0
	1972	2,460	42.5	2,150	37.1	200	3.5	330	5.7	520	9.0	130	2.2	5,790	100.0
Private Household	1963	90	32.1	40	14.3	--	--	110	39.3	40	14.3	--	--	280	100.0
	1972	--	--	--	--	10	5.5	50	27.8	90	50.0	30	16.7	180	100.0
Service Workers	1963	6,060	70.6	1,130	13.2	80	0.9	530	6.2	620	7.2	160	1.9	8,580	100.0
	1972	6,290	63.8	1,570	15.9	350	3.6	1,000	10.1	440	4.5	210	2.1	9,860	100.0
Laborers and Farm Workers	1963	700	53.0	350	26.5	--	--	120	9.1	80	6.1	70	5.3	1,320	100.0
	1972	880	44.0	1,040	52.0	--	--	60	3.0	--	--	20	1.0	2,000	100.0
Housewives and Other Unpaid Home Workers	1963	1,280	7.1	6,880	38.0	240	1.3	2,570	14.2	6,490	35.8	650	3.6	18,110	100.0
	1972	1,460	10.5	5,670	40.6	480	3.4	2,530	18.1	3,710	26.6	110	0.8	13,960	100.0
Students	1963	1,190	9.6	2,930	23.5	3,570	28.7	2,610	20.9	1,610	12.9	550	4.4	12,460	100.0
	1972	1,570	10.2	3,800	24.8	5,490	35.8	2,200	14.4	1,900	12.4	370	2.4	15,330	100.0
Retired and Incapacitated	1963	230	3.2	2,650	37.3	120	1.7	1,260	17.7	2,150	30.2	700	9.9	7,110	100.0
	1972	60	0.8	2,990	42.0	80	1.1	840	11.8	2,210	31.0	950	13.3	7,130	100.0
Unemployed	1963	--	--	1,060	56.7	70	3.7	170	9.1	240	12.8	330	17.7	1,870	100.0
	1972	--	--	1,570	71.4	150	6.8	150	6.8	330	15.0	--	--	2,200	100.0
Total	1963	70,210	50.8	25,270	18.3	4,990	3.6	14,590	10.6	16,520	12.0	6,520	4.7	138,100	100.0
	1972	65,460	49.9	28,990	22.1	7,830	6.0	12,310	9.3	12,390	9.4	4,280	3.3	131,260	100.0

Source: SEWRPC.

Table 16

LAND USE AT INTERNAL PERSON TRIP DESTINATIONS IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY MODE OF TRAVEL: 1963 and 1972

Mode of Travel	Year	Land Use											
		Residential		Commercial		Industrial		Governmental-Institutional		Other		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Auto Driver	1963	2,230	3.4	34,090	52.4	8,870	13.7	16,660	25.6	3,210	4.9	65,060	100.0
	1972	2,820	3.8	40,110	54.0	6,300	8.5	21,430	28.8	3,660	4.9	74,320	100.0
Auto Passenger	1963	1,500	6.9	11,720	54.2	1,590	7.4	4,640	21.5	2,170	10.0	21,620	100.0
	1972	1,010	3.7	15,820	58.0	1,360	5.0	7,950	29.2	1,120	4.1	27,260	100.0
Mass Transit	1963	3,660	7.3	30,290	59.9	4,870	9.6	10,360	20.5	1,370	2.7	50,550	100.0
	1972	930	3.2	19,700	67.9	1,160	4.0	6,550	22.6	670	2.3	29,010	100.0
Other	1963	70	8.1	530	60.9	10	1.1	210	24.1	50	5.8	870	100.0
	1972	10	1.5	150	22.4	10	1.5	420	62.7	80	11.9	670	100.0
Total	1963	7,460	5.4	76,630	55.5	15,340	11.1	31,870	23.1	6,800	4.9	138,100	100.0
	1972	4,770	3.6	75,780	57.8	8,830	6.7	36,350	27.7	5,530	4.2	131,260	100.0

Source: SEWRPC.

Table 17

LAND USE AT INTERNAL PERSON TRIP DESTINATIONS IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY TRIP PURPOSE: 1963 and 1972

Trip Purpose	Year	Land Use											
		Residential		Commercial		Industrial		Governmental-Institutional		Other		Total	
		Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent	Trips	Percent
Work	1963	270	0.4	39,810	56.7	13,760	19.6	13,770	19.6	2,600	3.7	70,210	100.0
	1972	230	0.4	39,820	60.8	7,420	11.3	14,840	22.7	3,150	4.8	65,460	100.0
Personal Business	1963	150	0.6	12,820	50.8	1,190	4.7	8,400	33.2	2,710	10.7	25,270	100.0
	1972	270	0.9	16,770	57.9	1,080	3.7	9,070	31.3	1,800	6.2	28,990	100.0
School	1963	--	0.0	110	2.2	--	0.0	4,880	98.8	--	0.0	4,990	100.0
	1972	10	0.1	280	3.6	--	0.0	7,540	96.3	--	0.0	7,830	100.0
Social-Recreation	1963	520	3.6	7,640	52.4	120	0.8	4,820	33.0	1,490	10.2	14,590	100.0
	1972	370	3.0	6,830	55.5	190	1.5	4,400	35.8	520	4.2	12,310	100.0
Shopping	1963	--	0.0	16,250	98.4	270	1.6	--	0.0	--	0.0	16,520	100.0
	1972	--	0.0	12,080	97.5	140	1.1	110	0.9	60	0.5	12,390	100.0
Home	1963	6,520	100.0	--	0.0	--	0.0	--	0.0	--	0.0	6,520	100.0
	1972	3,890	90.9	--	0.0	--	0.0	390	9.1	--	0.0	4,280	100.0
Total	1963	7,460	5.4	76,630	55.5	15,340	11.1	31,870	23.1	6,800	4.9	138,100	100.0
	1972	4,770	3.6	75,780	57.8	8,830	6.7	36,350	27.7	5,530	4.2	131,260	100.0

Source: SEWRPC.

The Location of Travel to the Milwaukee CBD: 1963, 1972

Between 1963 and 1972 land use changes occurring in the Milwaukee CBD included not only a reduction in industrial and residential land uses, and the execution of an extensive urban renewal program, but also included the relocation of the railroad stations, the construction of freeway facilities, and the expansion of facilities associated with the Police Station, County Courthouse, and City of Milwaukee Museum, among others. Examination on a zonal level of the origins and destinations of trips destined for the Milwaukee CBD indicates the similarities and differences between 1963 and 1972 in travel patterns related to the CBD and reflects to some extent the changes occurring in this CBD during the period. The trip volumes presented in the following maps illustrate expanded and adjusted 1963 and 1972 home interview travel survey data.

Origins of Person Trips to the CBD: 1963, 1972: Maps 1 and 2 show the distribution of person trips to the Milwaukee CBD by zone of origin. In both 1963 and 1972 the attraction of the Milwaukee CBD on an average weekday extended into virtually every part of the Southeastern Wisconsin Region—urban as well as rural. The largest concentrations of such origins, as would be expected, were found in both years to be within the highly populated areas in proximity to the CBD. Comparisons of Map 1 and Map 2 illustrate the expansion from 1963 to 1972 in the areas of attraction to this CBD both within the City of Milwaukee and in its near northern and western suburbs. The Milwaukee CBD itself was also a point of origin in both years for substantial numbers of trips that were made entirely within this CBD. Beyond the most highly populated areas, the attraction to the CBD generally declined with increasing distance. Since tripmaking between two given points is largely reciprocal, the distributional patterns shown on this map may also serve as a representation of the distributional pattern of person trip destinations upon leaving the CBD.

Origins of Transit Trips to the CBD: 1963, 1972: Maps 3 and 4 show the distribution of transit trips to the Milwaukee CBD on an average weekday by zone of origin in 1963 and 1972. The reduction in transit travel during the period is emphasized through a comparison of these maps which indicates a notable decline in the number of zones originating significant volumes of transit trips and, also, a general contraction toward the CBD in the location of such zones. Significant, also, is a decline from 1963 to 1972 in the transit trip volumes in the originating zones in the central areas of the city as shown in the insets. Of those originating zones which are somewhat removed from the proximity of the CBD and maintain significant CBD transit trip volumes, one set of zones, zones 154, 155, 157, and 158 are notable for sustaining transit trip volumes in 1972 which were equivalent to those volumes found in 1963. The area encompassed by this set of zones was found to consist largely of households with relatively low ratios of automobile availability.

Person Trip Destinations in the CBD: In both years 55 percent of the person trips to the CBD, or 76,000 in 1963 and 72,500 in 1972, were attracted by only four of the 17 traffic analysis zones which comprise the total Milwaukee CBD. Located within these four zones in both 1963 and 1972 were such important buildings as the Courthouse, the Public Museum, the State Office Building and the Central Library, as well as more than a score of the largest commercial office structures. Reflecting changes in travel patterns to the CBD during the period is the finding that one of the four major attracting zones was different in 1972 than in 1963; namely, zone 4 which used to contain one of the railroad stations and which attracted over 15,000 trips in 1963 but only 8,900 trips in 1972 while zone 2 which attracted less than 10,000 trips in 1963 attracted slightly more than 10,000 trips in 1972. In 1963 the single zone receiving the greatest number of trips was zone 1 which attracted 23,500 trips or 17 percent of total person trips to the CBD on the average weekday while in 1972 zone 7 attracted more trips than any other CBD zone with 26,300 person trips, or 20 percent of the total. The increased attractiveness of zone 7 is believed to be due, in part, to the expansion of the facilities associated with the Police Station, County Courthouse, and the City of Milwaukee Museum during the period.

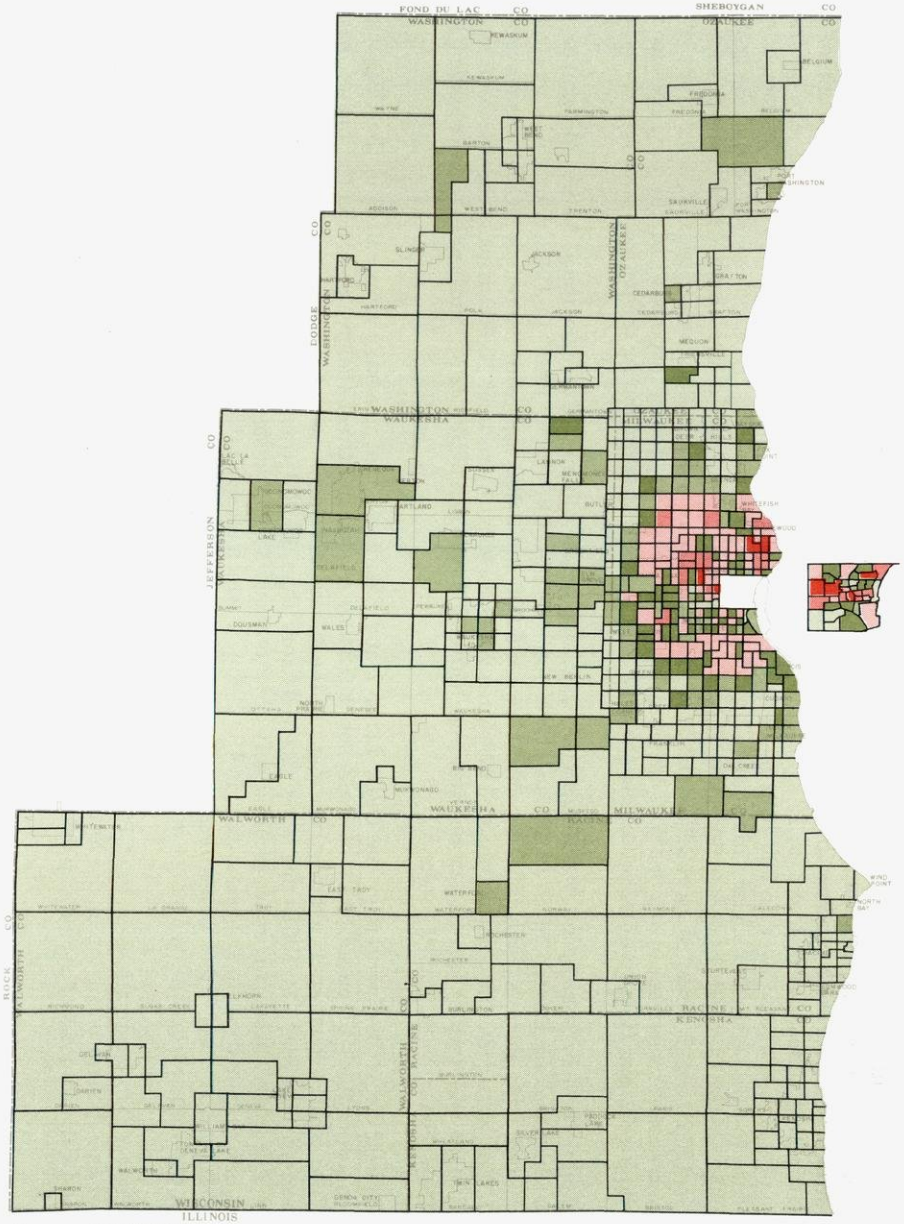
Comparison of Map 5 and Map 6 indicates that significant volumes of person travel to the Milwaukee CBD were not so highly concentrated in 1972 within a few zones of the CBD as in 1963. In 1963, four zones received an excess of 15,000 trips each and five zones received between 5,000 and 9,999 trips with the remaining eight zones receiving less than 5,000 trips each. In comparison, in 1972 three zones received more than 15,000 trips each; one zone received between 10,000 and 14,999 trips; six zones received between 5,000 and 9,999 trips; and seven zones received less than 5,000 trips each.

Transit Trips Destinations in the CBD: Maps 7 and 8 indicate that generally those areas in the CBD with the greatest concentrations of person trips in 1963 and 1972 also tended to attract the greater concentrations of mass transit trips. Also clearly illustrated in these two maps is the substantial decline which occurred in transit travel in this CBD on the average weekday. In 1963, one zone received more than 10,000 transit trips; three zones received between 5,000 and 9,999 transit trips, two zones received between 2,500 and 4,999 transit trips and the remaining 11 zones received less than 2,500 transit trips. In sharp contrast, in 1972, zone 1 which received the most transit trips in the CBD, accounted for only 6,100 trips; three other zones received between 2,500 and 4,999 trips; and, the remaining 13 zones received less than 2,500 transit trips on the average weekday.

Person Trip Destinations in the CBD by Trip Purpose: The diversity of travel to the Milwaukee CBD and a representation of the changes occurring in the location of travel within this CBD since 1963 are indicated on Maps 9 through 16 which show the volumes of person trip destinations by trip purpose on an average weekday in 1963 and 1972.

Map 1

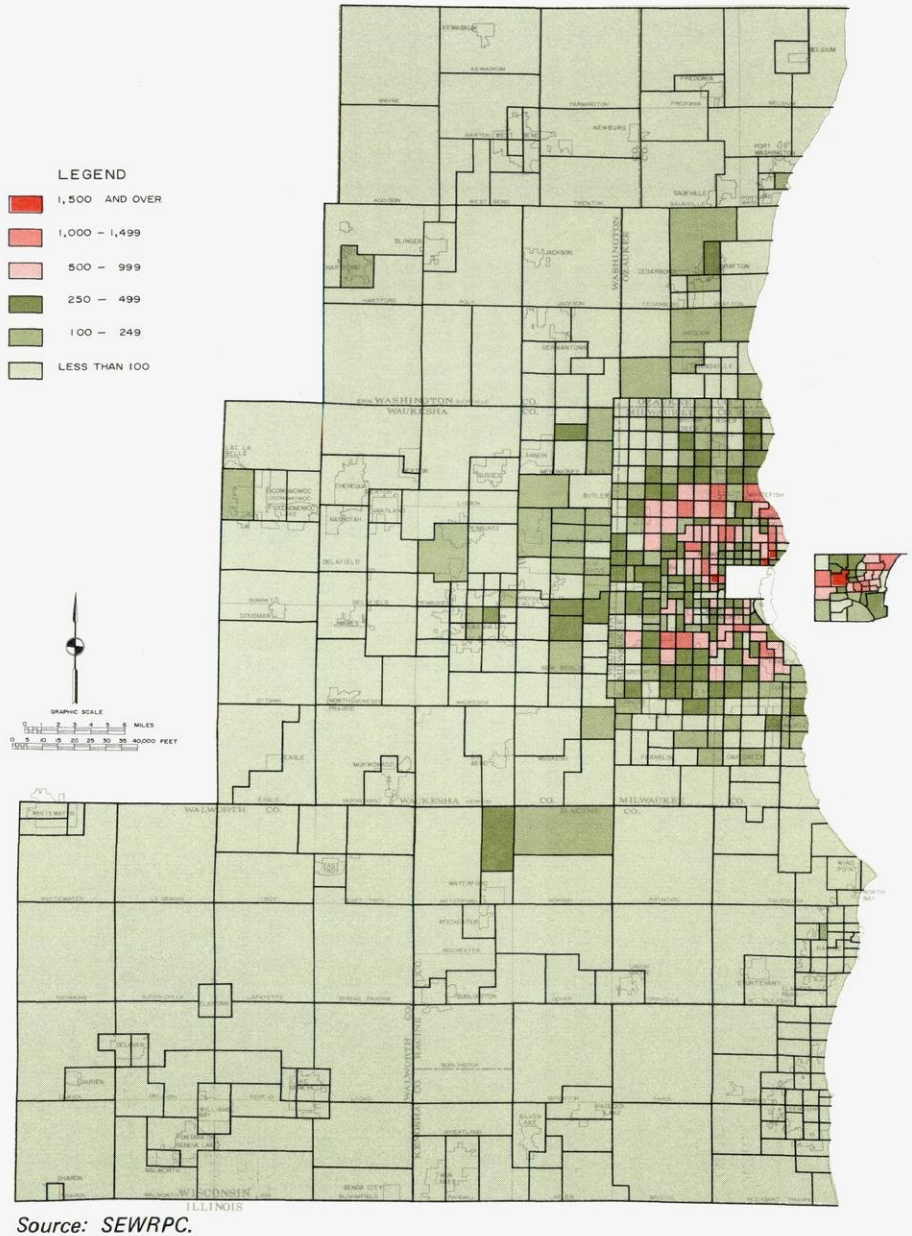
ORIGINS OF PERSON TRIPS TO THE MILWAUKEE CBD
AVERAGE WEEKDAY: 1963



Source: SEWRPC.

Map 2

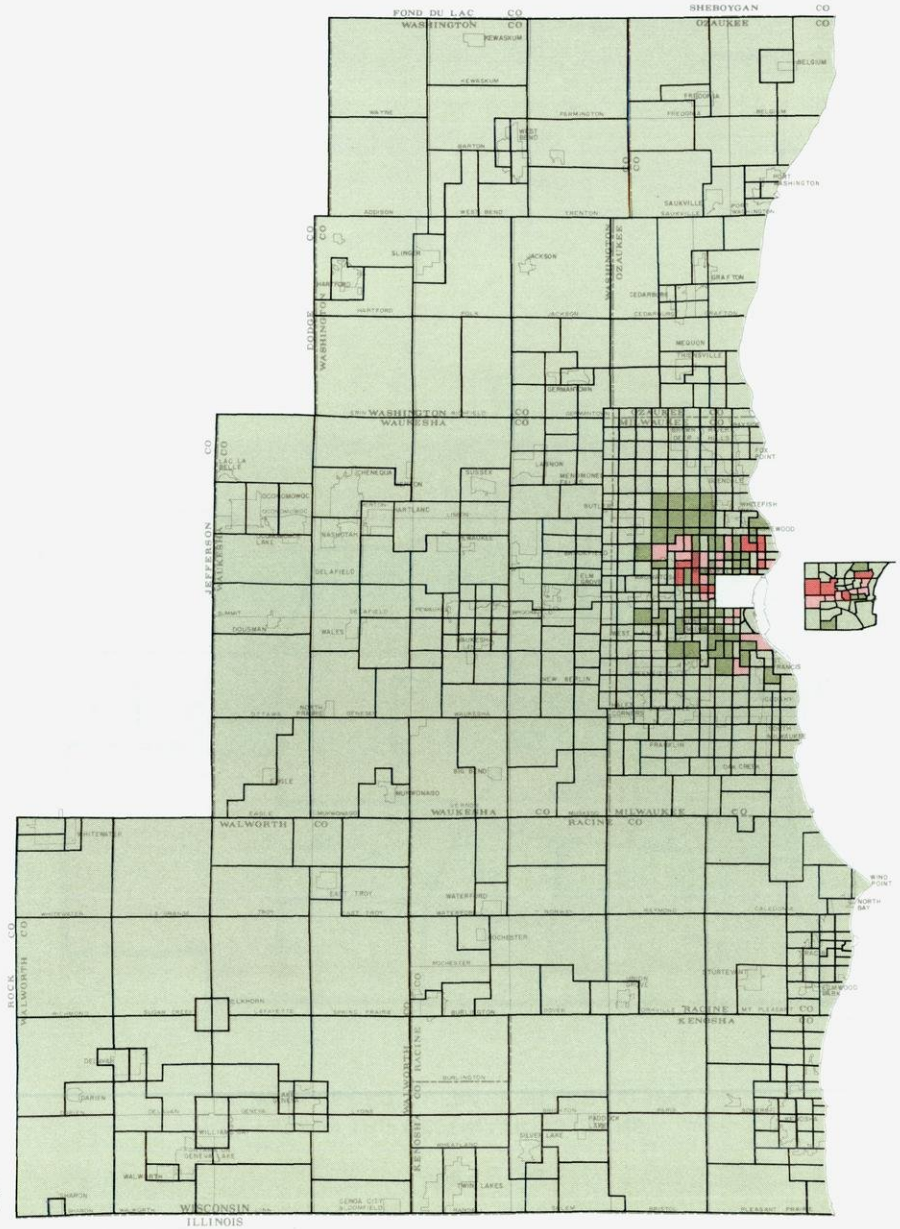
ORIGINS OF PERSON TRIPS TO THE MILWAUKEE CBD
AVERAGE WEEKDAY: 1972



Source: SEWRPC.

Map 3

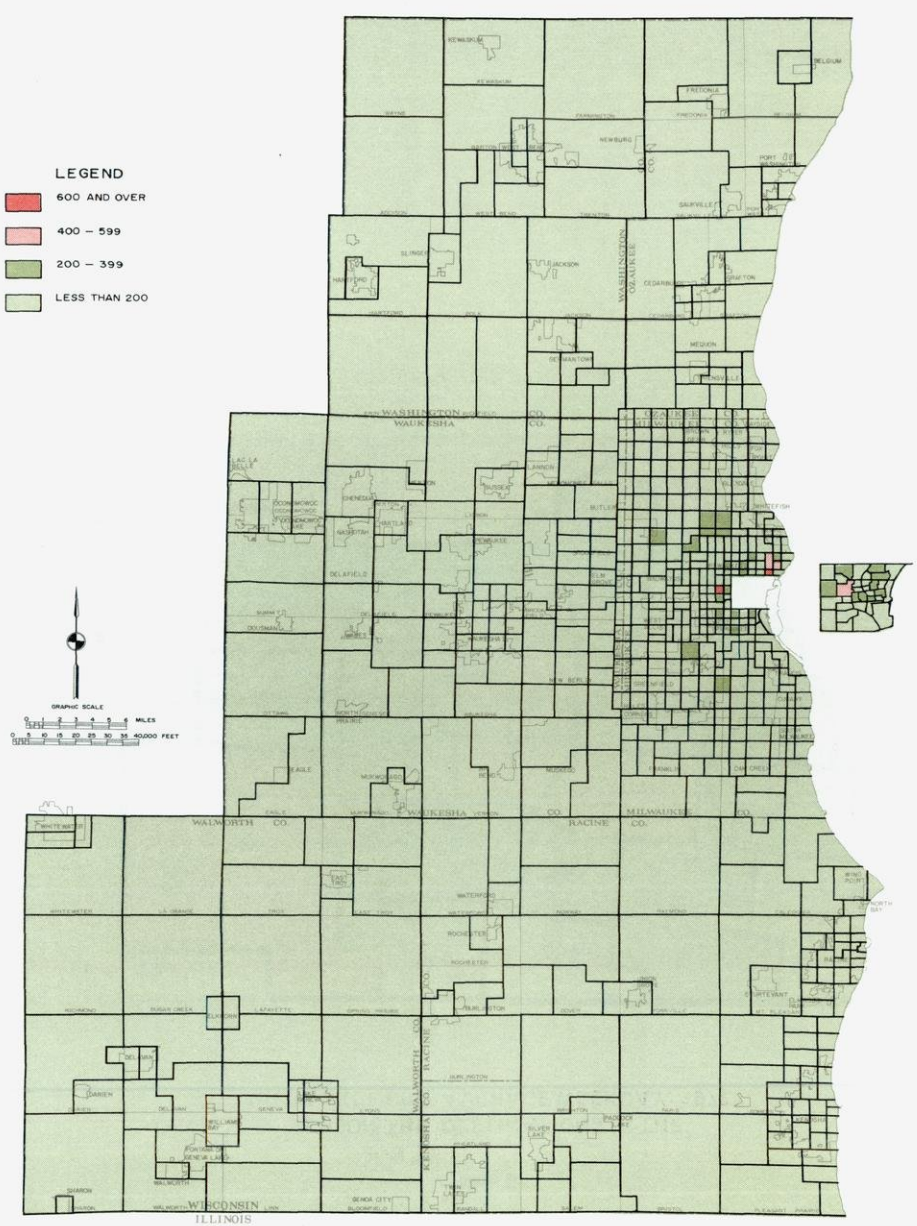
ORIGINS OF MASS TRANSIT TRIPS TO THE MILWAUKEE CBD
AVERAGE WEEKDAY: 1963



Source: SEWRPC.

Map 4

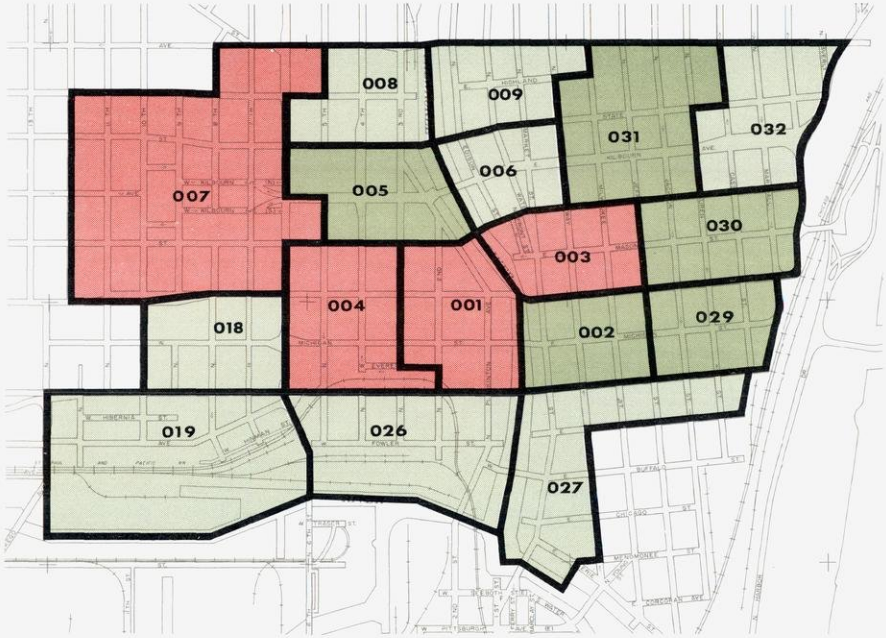
ORIGINS OF MASS TRANSIT TRIPS TO THE MILWAUKEE CBD
AVERAGE WEEKDAY: 1972



Source: SEWRPC.

Map 5

PERSON TRIP DESTINATIONS IN THE
MILWAUKEE CBD, AVERAGE WEEKDAY: 1963



LEGEND

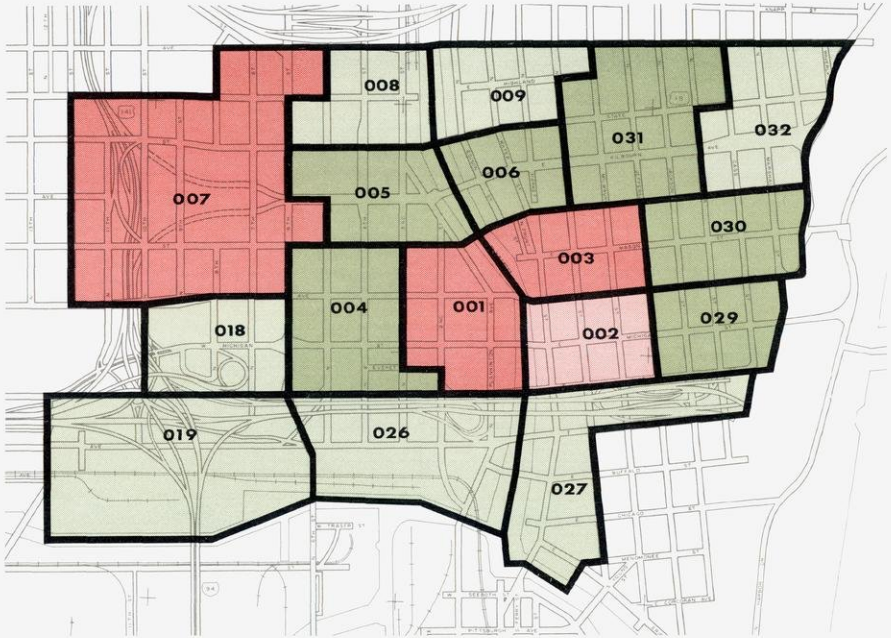
- 15,000 AND OVER
- 10,000–14,999 (NONE)
- 5,000–9,999
- LESS THAN 5,000
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE
0 4000 8000 12000 16000

Source: SEWRPC.

Map 6

PERSON TRIP DESTINATIONS IN THE
MILWAUKEE CBD, AVERAGE WEEKDAY: 1972



LEGEND

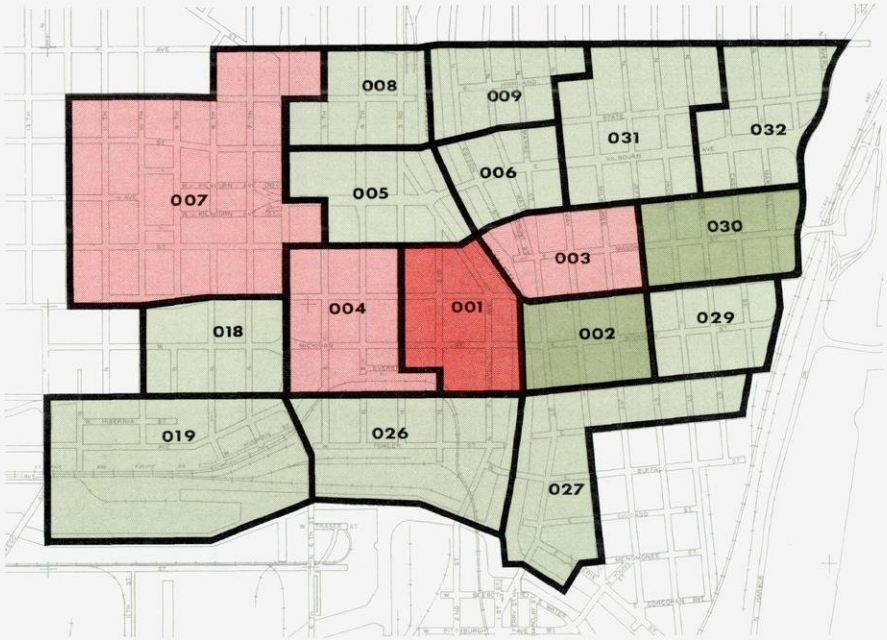
- 15,000 AND OVER
- 10,000–14,999
- 5,000–9,999
- LESS THAN 5,000
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE
0 4000 8000 12000 16000

Source: SEWRPC.

Map 7

MASS TRANSIT TRIP DESTINATIONS IN THE MILWAUKEE CBD, AVERAGE WEEKDAY: 1963



LEGEND

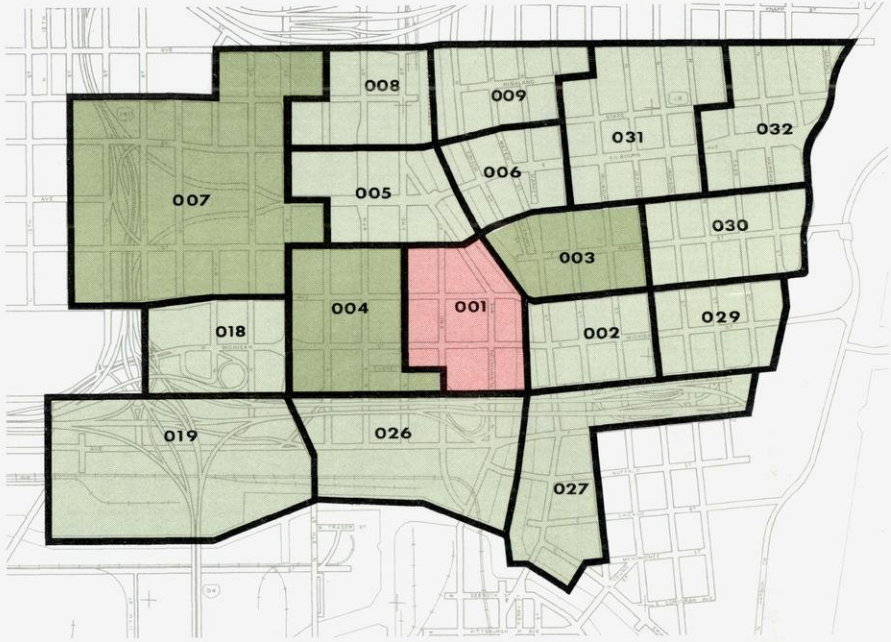
- 10,000 AND OVER
- 5,000–9,999
- 2,500–4,999
- LESS THAN 2,500
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE
0 4000 8000 12000 16000

Source: SEWRPC.

Map 8

MASS TRANSIT TRIP DESTINATIONS IN THE MILWAUKEE CBD, AVERAGE WEEKDAY: 1972



LEGEND

- 10,000 AND OVER (NONE)
- 5,000–9,999
- 2,500–4,999
- LESS THAN 2,500
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE
0 4000 8000 12000 16000

Source: SEWRPC.

Comparison of the four major CBD zones in 1972 with the four major zones in 1963 indicated that zone 1 attracted similar volumes in both years within each trip purpose except for a decline in social-recreational trips; both zone 3 and zone 7 attracted similar volumes in 1963 and 1972 within each trip purpose except for increases in social-recreational trips; zone 4 which was prominent in 1963 but not in 1972 showed losses in work, personal business and social-recreational trips, while attracting similar volumes of shopping trips in both years; and zone 2 which was prominent in 1972 but not in 1963 attracted similar volumes of work trips in both years, sustained a loss in shopping trips, and received increased volumes of personal business and social-recreational trips.

These maps indicate that in both years significant volumes of trips for the purposes of work, personal business, and social-recreation were more widely distributed throughout the CBD than trips made to shopping. In addition, major concentrations of trips made for the purposes of shopping or conducting personal business were more widely dispersed throughout the CBD in 1972 than in 1963.

Work Trip Destinations in the CBD: The distribution of work trip destinations on an average weekday in the Milwaukee CBD remained very similar from 1963 to 1972 as shown in Maps 9 and 10. Significant change in work trip volumes from 1963 to 1972 occurred in only three zones; no significant change occurred in zones receiving more than 7,500 such trips. In 1963 three zones attracted more than 7,500 work trips; two zones attracted between 5,000 and 7,499 work trips; five zones attracted between 2,500 and 4,999 work trips; and seven zones attracted less than 2,500 such trips. In 1972 three zones attracted more than 7,500 work trips; one zone attracted between 5,000 and 7,499 work trips; six zones attracted between 2,500 and 4,999 work trips; and seven zones attracted less than 2,500 such trips.

Shopping Trip Destinations in the CBD: Although the total number of trips made for the purpose of shopping in the Milwaukee CBD on the average weekday declined from 1963 to 1972, a greater number of zones attracted substantial volumes of shopping trips in 1972 than in 1963. In both years zone 1 and zone 4 attracted over 3,000 shopping trips. In 1963 one zone attracted between 1,000 and 2,999 shopping trips and one zone attracted between 500 and 999 shopping trips with the remaining 13 zones attracting less than 500 such trips. In 1972, one zone attracted between 1,000 and 2,999 shopping trips; three zones attracted between 500 and 999 shopping trips; and 11 zones attracted less than 500 such trips (see Maps 11 and 12).

Personal Business Trip Destinations in the CBD: Maps 13 and 14 indicate that major concentrations of personal business trips within the Milwaukee CBD were also less highly centralized in 1972 than in 1963. In both years on the average weekday zone 1 and zone 7 received more than 4,000 trips for the purpose of conducting personal business. Two zones received between 2,500 and 3,999 personal business trips in both years while three zones attracted between 1,000 and 2,499 such trips in 1963 as compared to six zones attracting such volumes in 1972. In 1963 ten zones in the CBD received less than 1,000 personal business trips on the average weekday; whereas, in 1972 only seven zones received less than 1,000 such trips.

Social-Recreational Trip Destinations in the CBD: Comparison of Map 15 and Map 16 indicates substantial differences between 1963 and 1972 in the patterns of weekday social-recreational travel to the Milwaukee CBD. For this one purpose the major volumes of travel appear to be concentrated within fewer zones in 1972 than in 1963. Whereas in 1963 only one zone received more than 2,000 social-recreational trips and six zones received between 1,000 and 1,999 such trips, in 1972 two zones received more than 2,000 social-recreational trips and only two zones received between 1,000 and 1,999 such trips. In 1963 four zones attracted between 500 and 999 social-recreation trips and six zones received less than 500 such trips while in 1972 six zones attracted between 500 and 999 social-recreational trips and seven zones received less than 500 such trips.

Time Patterns of Travel

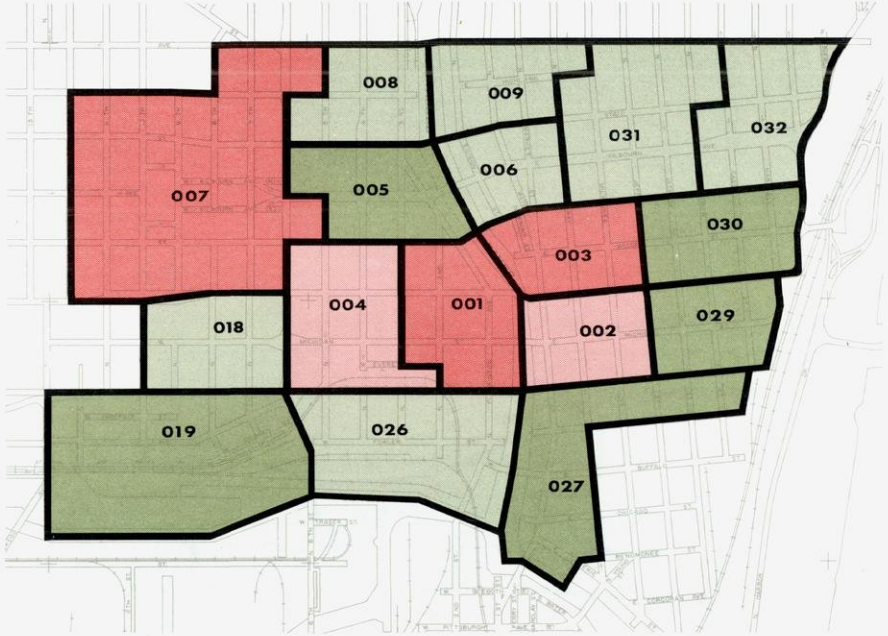
Although total person trip volumes entering the Milwaukee CBD on an average weekday have declined somewhat, the regular ebb and flow of travel has remained substantially the same both in the proportion of trips by trip purpose within the hourly distributions and in the general time patterns of travel throughout the day as indicated in Figures 1 and 2. The only notable difference between the years was an increase in 1972 in travel to the CBD at midday.

The patterns formed in these figures show the relative inactivity of the early morning hours followed by a sharp peak in the hour beginning at 7:00 a.m., as thousands of commuters made their morning journey to work and as students and trainees traveled to attend secondary public, technical, and specialty training schools. Later in the morning, continuing until early evening, many hundreds of persons arrived in the Milwaukee CBD each hour on various personal business errands and to shop. The 1972 pattern indicates graphically the decline in the number of shopping trips destined for the CBD and the increase in the number of personal business trips to the CBD since 1963. Readily recognizable in this figure, also, are those trips made to the CBD for social-recreational purposes, such as luncheon engagements—or later in the evening—dinner, the theatre, or a cafe.

The hourly distributional pattern of persons arriving and departing and the accumulation of persons within the Milwaukee CBD in 1963 and 1972 is shown in Figures 3 and 4. The peak period of arrival in the CBD on an average weekday in both years occurred in the two hour period from 7:00 a.m. to 9:00 a.m., constituting slightly more than one-third of total

Map 9

WORK TRIP DESTINATIONS IN THE
MILWAUKEE CBD, AVERAGE WEEKDAY: 1963



LEGEND

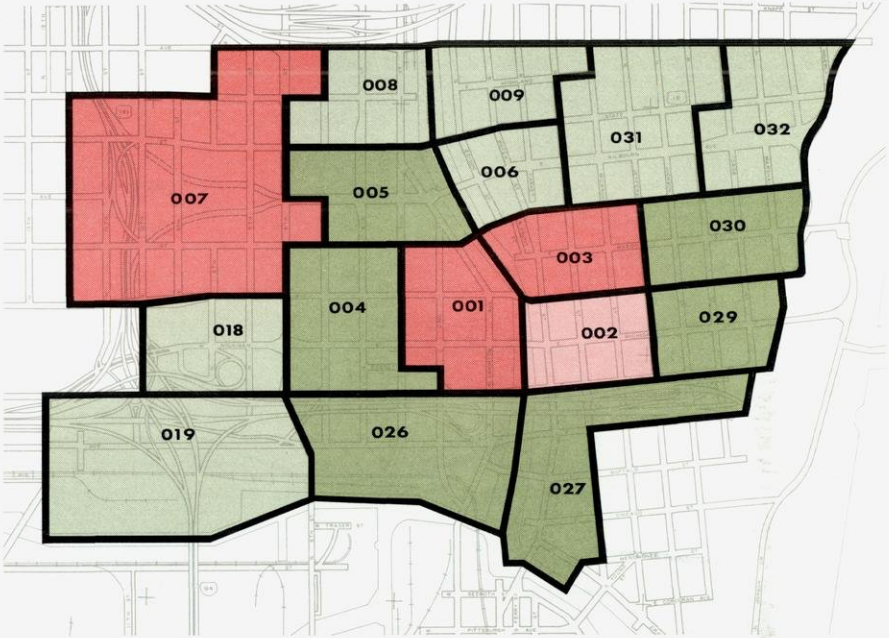
- 7,500 AND OVER
- 5,000-7,499
- 2,500-4,999
- LESS THAN 2,500
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE
0 4000 8000 12000 16000

Source: SEWRPC.

Map 10

WORK TRIP DESTINATIONS IN THE
MILWAUKEE CBD, AVERAGE WEEKDAY: 1972



LEGEND

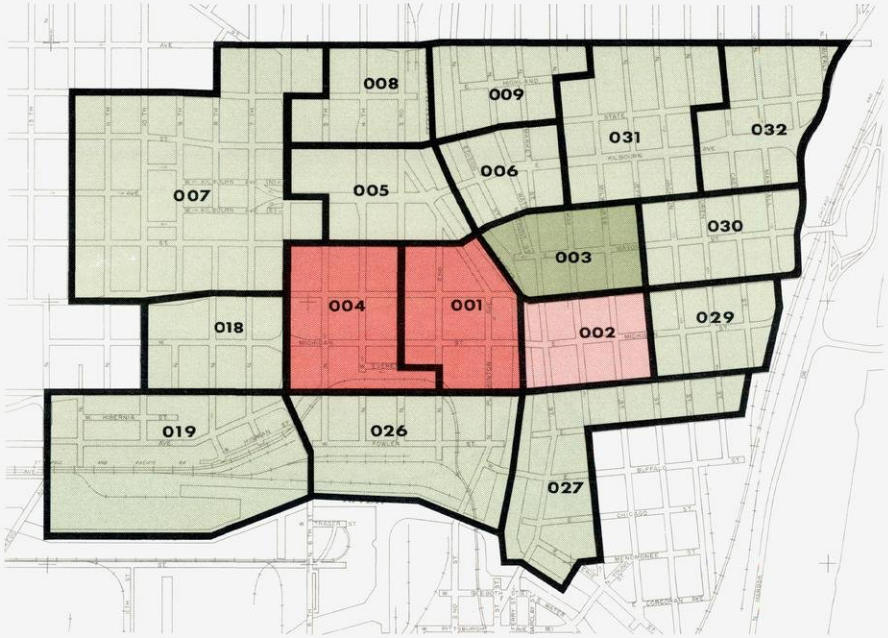
- 7,500 AND OVER
- 5,000-7,499
- 2,500-4,999
- LESS THAN 2,500
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE
0 4000 8000 12000 16000

Source: SEWRPC.

Map 11

SHOPPING TRIP DESTINATIONS IN THE
MILWAUKEE CBD, AVERAGE WEEKDAY: 1963



LEGEND

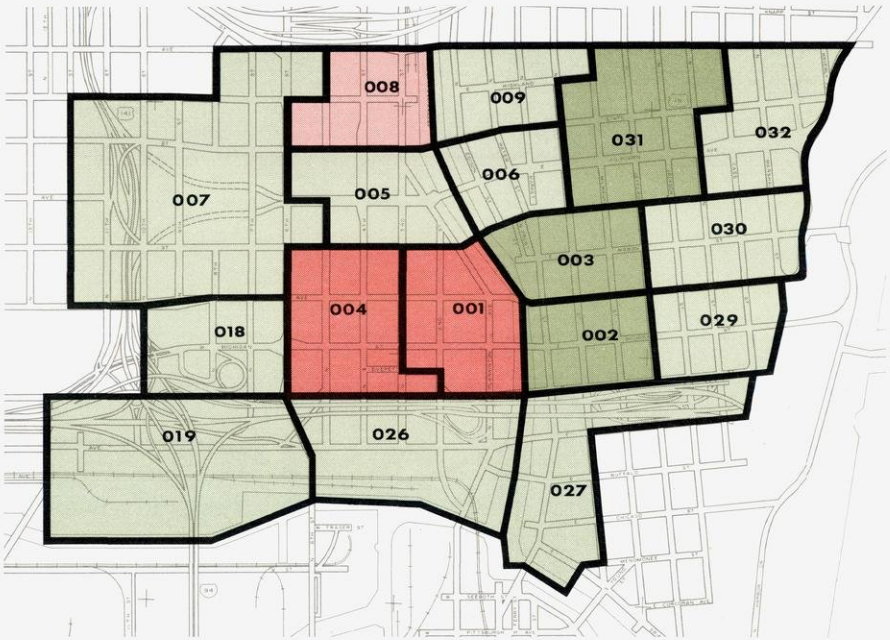
- 3,000 AND OVER
- 1,000–2,999
- 500–999
- LESS THAN 500
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE 0 4000 8000 12000 16000

Source: SEWRPC.

Map 12

SHOPPING TRIP DESTINATIONS IN THE
MILWAUKEE CBD, AVERAGE WEEKDAY: 1972



LEGEND

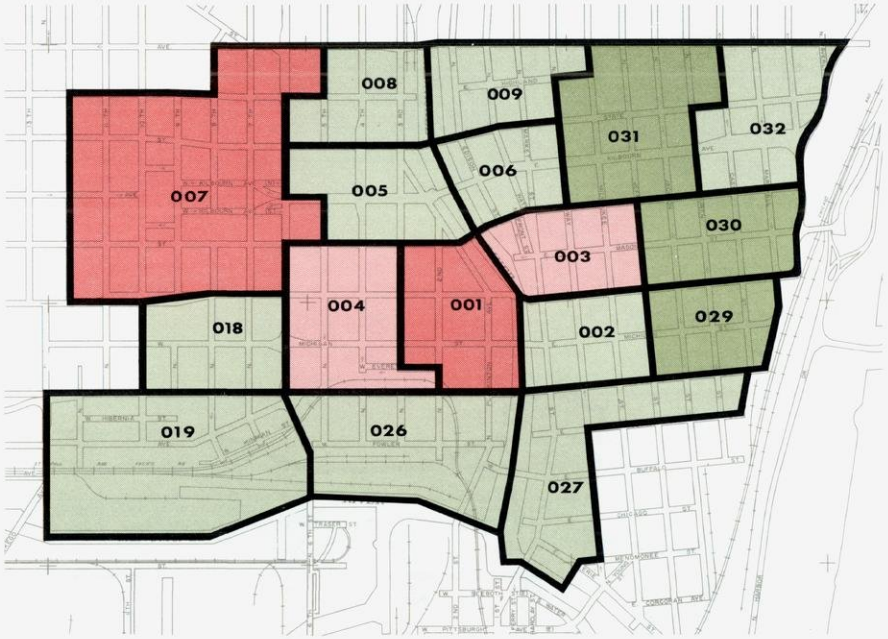
- 3,000 AND OVER
- 1,000–2,999
- 500–999
- LESS THAN 500
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE 0 4000 8000 12000 16000

Source: SEWRPC.

Map 13

PERSONAL BUSINESS TRIP DESTINATIONS IN THE MILWAUKEE CBD, AVERAGE WEEKDAY: 1963



LEGEND

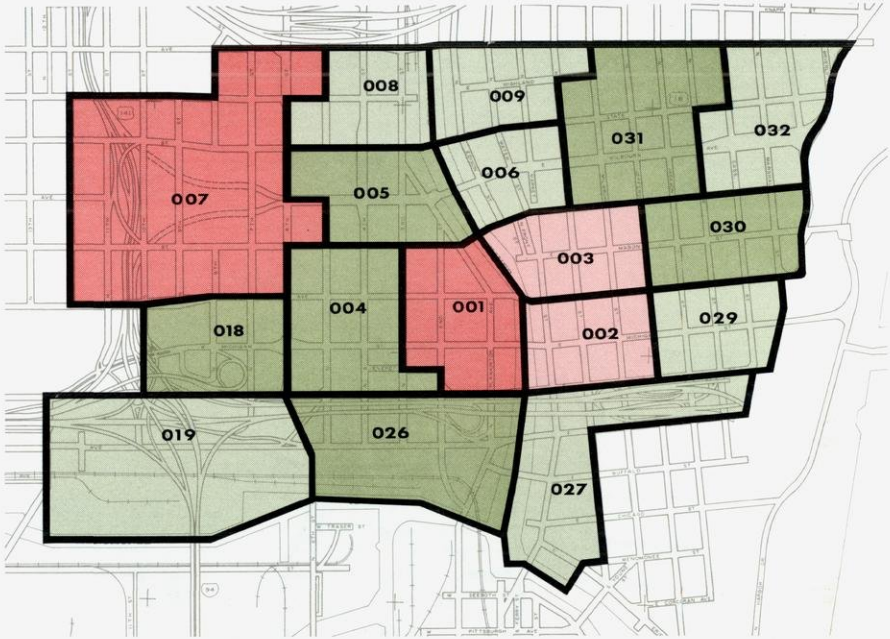
- 4,000 AND OVER
- 2,500–3,999
- 1,000–2,499
- LESS THAN 1,000
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE

Source: SEWRPC.

Map 14

PERSONAL BUSINESS TRIP DESTINATIONS IN THE MILWAUKEE CBD, AVERAGE WEEKDAY: 1972



LEGEND

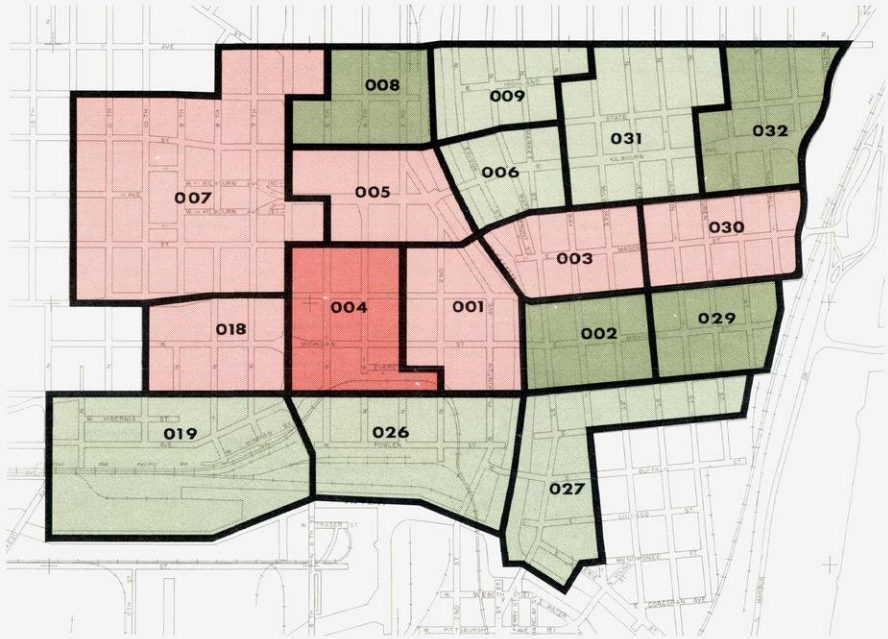
- 4,000 AND OVER
- 2,500–3,999
- 1,000–2,499
- LESS THAN 1,000
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE

Source: SEWRPC.

Map 15

SOCIAL-RECREATION TRIP DESTINATIONS IN THE MILWAUKEE CBD, AVERAGE WEEKDAY: 1963



LEGEND

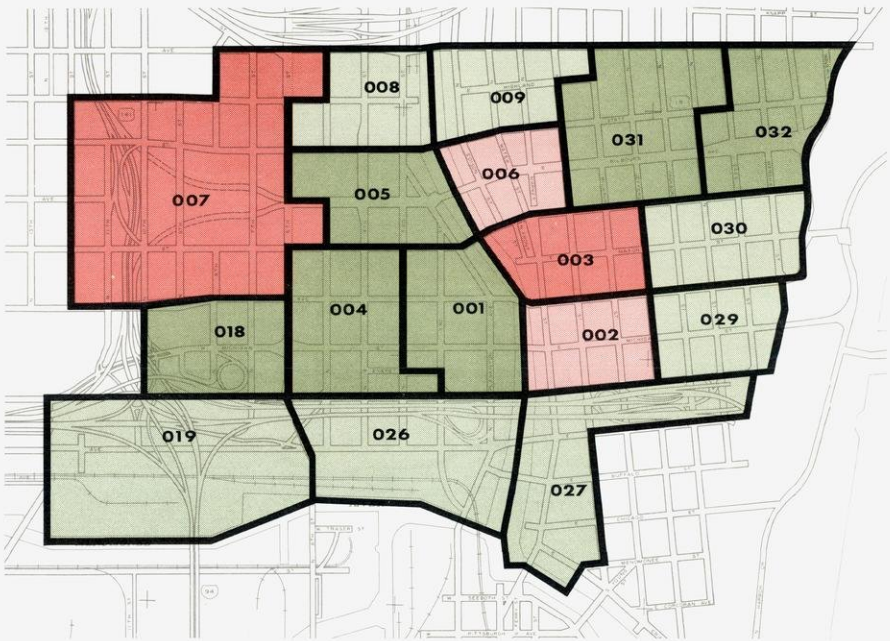
- 2,000 AND OVER
- 1,000-1,999
- 500-999
- LESS THAN 500
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE 0 4000 8000 12000 16000

Source: SEWRPC.

Map 16

SOCIAL-RECREATION TRIP DESTINATIONS IN THE MILWAUKEE CBD, AVERAGE WEEKDAY: 1972



LEGEND

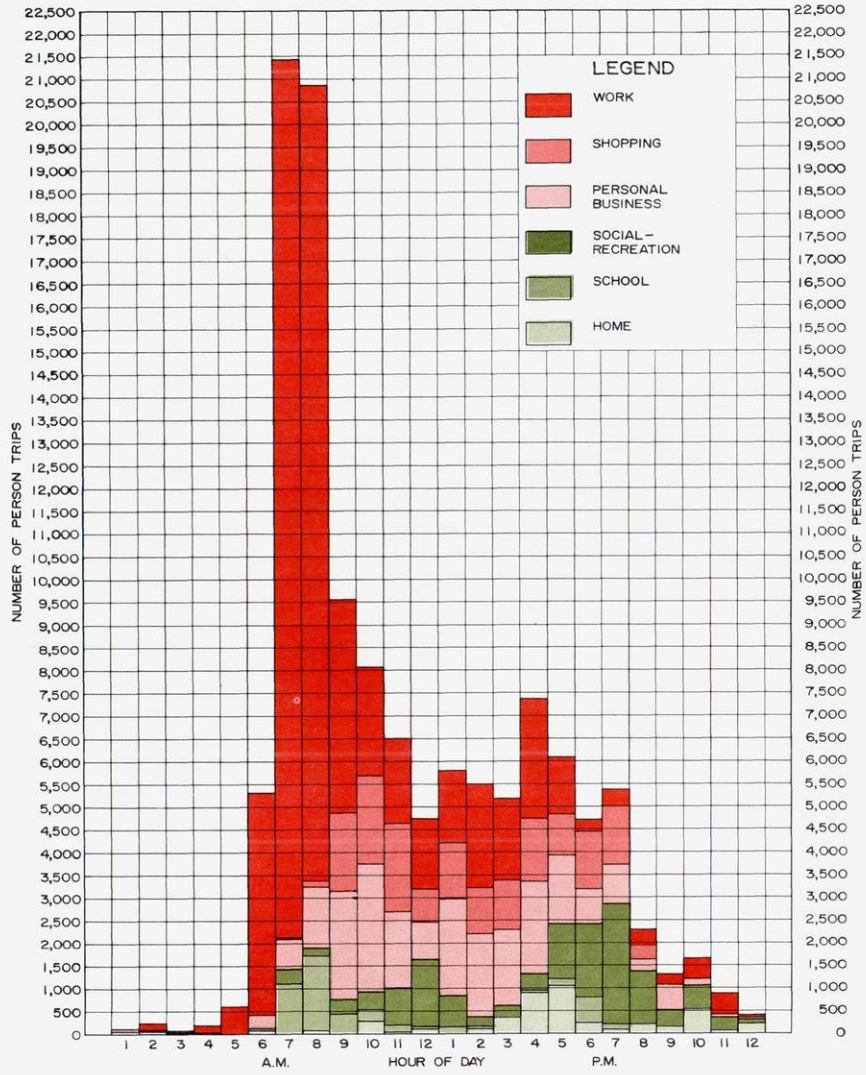
- 2,000 AND OVER
- 1,000-1,999
- 500-999
- LESS THAN 500
- ZONE BOUNDARY
- 009 ZONE NUMBER

GRAPHIC SCALE 0 4000 8000 12000 16000

Source: SEWRPC.

Figure 1

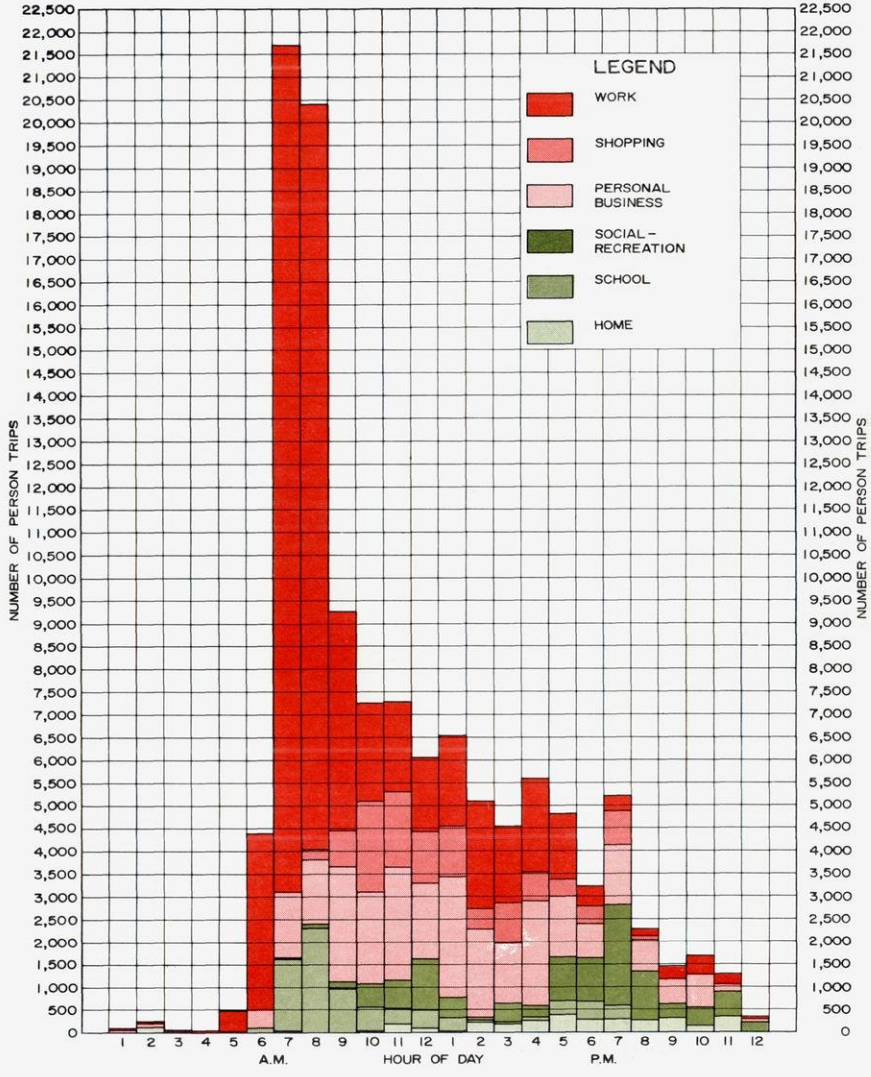
HOURLY DISTRIBUTION OF PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD BY TRIP PURPOSE ON AN AVERAGE WEEKDAY IN 1963



Source: SEWRPC.

Figure 2

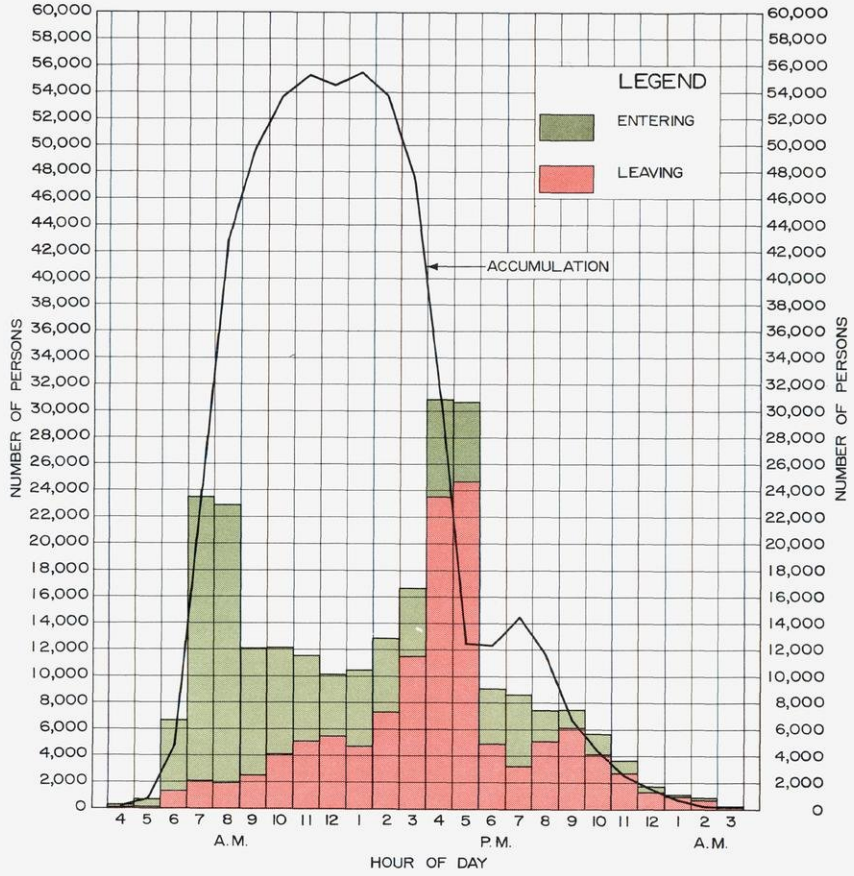
HOURLY DISTRIBUTION OF PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD BY TRIP PURPOSE ON AN AVERAGE WEEKDAY IN 1972



Source: SEWRPC.

Figure 3

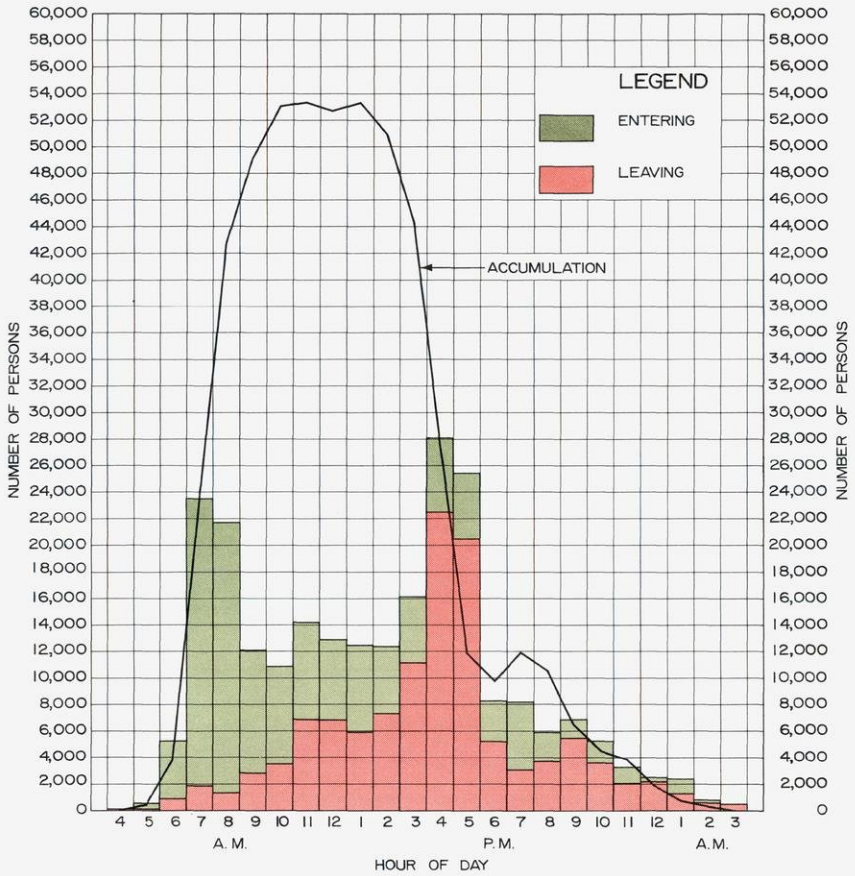
HOURLY DISTRIBUTION OF PERSONS ENTERING AND LEAVING AND THE ACCUMULATION OF PERSONS IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY IN 1963



Source: SEWRPC.

Figure 4

HOURLY DISTRIBUTION OF PERSONS ENTERING AND LEAVING AND THE ACCUMULATION OF PERSONS IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY IN 1972



Source: SEWRPC.

persons entering the CBD on the average weekday both in 1963 and in 1972. The peak period of departure from the CBD, which occurred in the hours beginning at 4:00 p.m. and 5:00 p.m., was not quite so pronounced in 1972, constituting 42,980 persons, or 36 percent of total persons leaving the CBD on an average weekday, as compared to 48,280 persons, or 39 percent of total persons leaving the CBD on an average weekday in 1963. Excluding the resident and transient population of the CBD, the maximum accumulation of persons in the CBD per average weekday in 1963 occurred at the hour beginning at 1:00 p.m., amounting to a total of approximately 55,600 persons, while in 1972 the maximum accumulation occurred in the hour beginning at 11:00 a.m., amounting to approximately 53,500 persons.

The patterns shown in Figures 5 and 6 of automobiles entering and leaving the Milwaukee CBD and the accumulation of automobiles within the CBD are almost replicas of those for persons shown in Figures 3 and 4. The maximum accumulations of automobiles in the CBD occurred at the hour beginning at 1:00 p.m., in 1963, amounting to a total of approximately 21,800 autos and at the hour beginning at 11:00 a.m., amounting to a total of about 21,300 autos. In 1972, the greatest accumulation of automobiles in the CBD was found to occur at the hour beginning at 10:00 a.m., with 26,900 automobiles followed by a sustained volume of 26,700 automobiles at 11:00 a.m., and a secondary peak of 26,300 automobiles at 1:00 p.m. It is notable that although the accumulation of persons in the CBD is slightly less in 1972 than in 1963, the accumulation of automobiles in the CBD was substantially greater in 1972 than in 1963, with the number of automobiles in 1972 accumulated within each hour from 8:00 a.m., through 3:00 p.m., being in excess of the peak accumulation achieved in 1963.

Aspects Affecting the Completion of Trips Destined for the CBD: 1963, 1972

The attractiveness of a central business district and thus the volumes of travel to that district while determined largely by the concentration of employment and commercial, personal, and social-recreational facilities and services available in the CBD also are affected by the ease with which the trip can be completed in terms of both parking availability and in the number of blocks found necessary to walk to the ultimate destination. The purposes of the trips and the duration of the stay in the CBD also bear an impact upon the types of parking deemed desirable by the tripmakers and the walking distance which is considered acceptable.

Parking in the CBD: As indicated in Table 18, the number of spaces available for parking in the Milwaukee CBD increased from approximately 26,700 in 1963 to 30,700 in 1972, or by 15 percent. The number of parking spaces in privately-owned surface lots was found to have increased from 13,900 in 1963 to 15,700 in 1972, or 13 percent; in privately-owned parking structures from 4,100 to 8,400, or 105 percent; and, in city-owned parking structures from 1,300 to 2,200, or 69 percent. In contrast, declines were found in the number of spaces in city-owned surface lots from 2,300 to 600, or 74 percent, and in the number of curb spaces on city streets from 5,100 to 3,800, or 26 percent.

Privately-owned surface lots accounted for slightly more than one-half of total parking spaces both in 1963 and 1972, while privately owned parking structures accounted for about 15 percent in 1963 and 27 percent in 1972; curb space accounted for 19 percent and 12 percent respectively; city-owned surface lots accounted for 9 percent and 2 percent, respectively; and city-owned parking structures accounted for 5 percent and 7 percent respectively.

The totals of approximately 26,700 spaces available in 1963 and of approximately 30,700 in 1972 were more than adequate on an overall basis to accommodate the 21,800 autos in 1963 and the 26,900 in 1972, previously shown to be the maximum accumulation of automobiles in the CBD on an average weekday in those years. Another indication of the overall adequacy of the parking in the Milwaukee CBD is set forth in a report prepared by a nationally known consulting firm.[3] This report recommends that a desirable level of parking supply for a downtown which serves an urbanized area the size of Milwaukee's ranged from 0.22 spaces per person trip destination by auto (about 19,100 spaces in 1963 and 22,400 spaces in 1972) in order to achieve minimum standards, to 0.27 spaces per person trip destination by auto (approximately 23,400 spaces in 1963 and 27,400 spaces in 1972) in order to achieve desirable standards, both levels well below the 26,700 spaces available in 1963 and the 30,700 available in 1972.

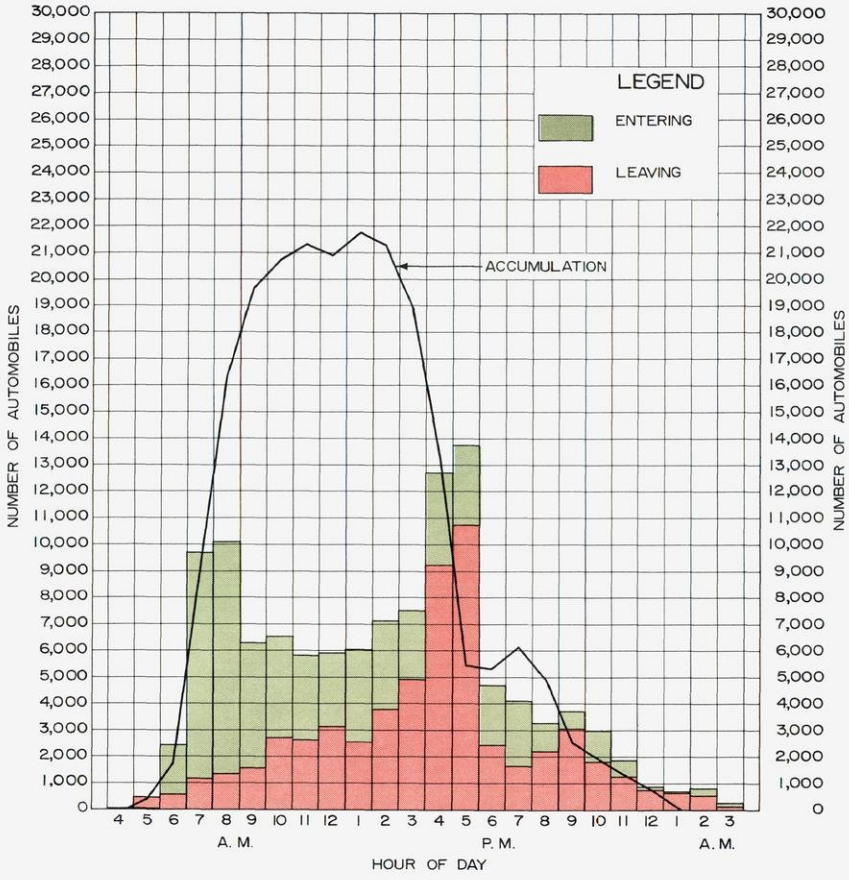
CBD Parking Supply Usage by Regional Residents: The 1963 and 1972 survey findings indicate that the number of autos which had destinations in the Milwaukee CBD on an average weekday increased from about 65,100 in 1963 to 74,300 in 1972, or 14 percent. Of these autos about 59,800, or 91 percent of the 1963 total, and about 65,900, or 89 percent of the 1972 total, parked in public and private parking facilities; about 4,000 in 1963, 6 percent, and about 6,500 in 1972, 9 percent, were not parked at all, but circulated within the area to pick up or discharge passengers; about 1,200 in 1963, or 2 percent, and 1,900 in 1972, also 2 percent, were parked in residential properties; and 110 in 1963 and 30 in 1972, or a fraction of 1 percent in each instance, were parked at garages or service stations for service or repairs.

---

[3] *Parking in the City Center, Wilbur Smith and Associates, New Haven, Connecticut, 1965.*

Figure 5

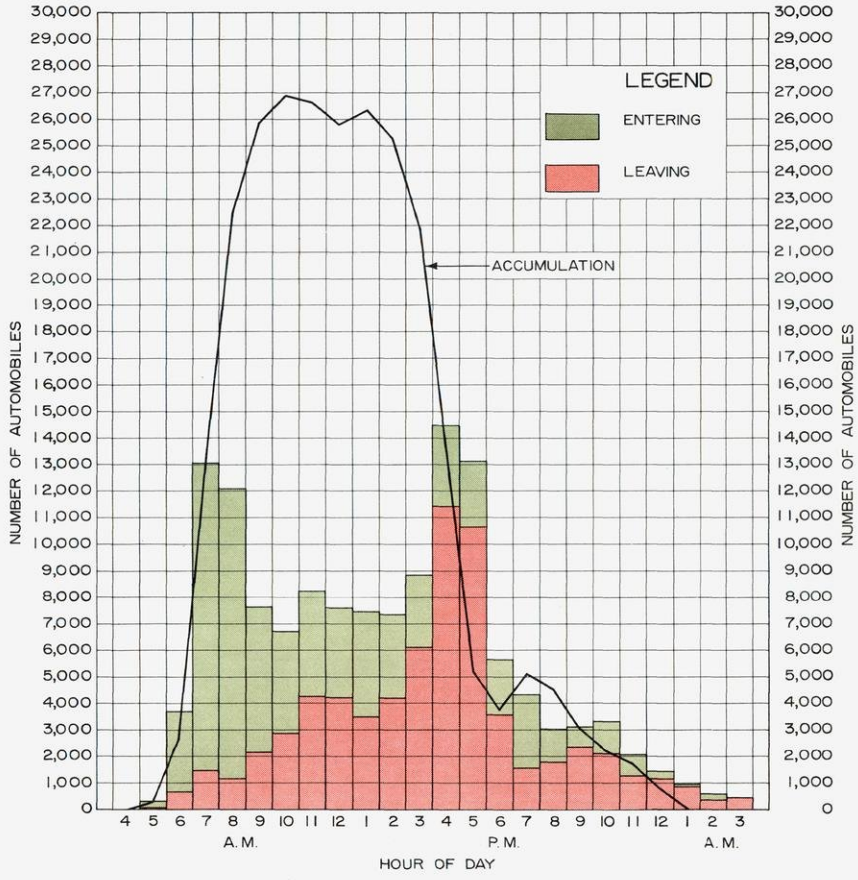
HOURLY DISTRIBUTION OF AUTOMOBILES ENTERING AND LEAVING AND THE ACCUMULATION OF AUTOMOBILES IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY IN 1963



Source: SEWRPC.

Figure 6

HOURLY DISTRIBUTION OF AUTOMOBILES ENTERING AND LEAVING AND THE ACCUMULATION OF AUTOMOBILES IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY IN 1972



Source: SEWRPC.

Of the 59,800 autos in 1963 and the 60,600 autos in 1972 which were parked in public and private parking facilities, about 32,800, or 50 percent, in 1963 and 40,700, or 55 percent, in 1972 were parked in surface parking lots; about 23,800, or 36 percent, in 1963 and 18,100, or 24 percent, in 1972 were parked in curb spaces on city streets; and about 3,200, or 5 percent, in 1963 and about 7,100, or 10 percent, in 1972 were parked in parking structures. As shown in Table 19, despite the increases and decreases in the number of vehicles utilizing the various types of parking, the average number of vehicles per space per day remained substantially similar from 1963 to 1972 with the only significant difference indicated by an increase in the average autos per space per day of surface lots from 2.02 autos to 2.50 autos. It is believed that this increase was generated by the reduction during the period in the supply of curb spaces, producing a shift by auto drivers from curb space parking toward greater utilization of the surface lots which showed very little change in the number of available spaces during the period.

The average of vehicles per space per day in parking structures, 0.59 vehicles in 1963 and 0.67 in 1972, is considerably below the average utilization of curb and surface lot spaces. Not only do parking structures not attract the large amounts of short-term parking which would tend to increase the ratios, but also the data supplied by the home interview surveys do not measure the impact of transient travel on the CBD. Therefore, nonregional residents who are staying in the CBD to conduct business, to attend conventions, or for social-recreational purposes, among others, and are garaging their automobiles during the visit in one of the many hotels or other parking structures are not represented in the ratios.

Duration of Parking in the CBD by Parking Type: Of the automobiles indicated by the home interview surveys as being parked in public and private parking facilities in the Milwaukee CBD on an average weekday, 28 percent in 1963 and 24 percent in 1972 remained parked for less than one hour; 44 percent in 1963 and 38 percent in 1972, less than two hours; 61 percent in 1963 and 54 percent in 1972, less than four hours; and 72 percent in 1963 and 69 percent in 1972, less than eight hours, leaving, therefore, 28 percent in 1963 and 31 percent in 1972 which were parked for a period of eight or more hours. Table 20 indicates that autos parked in curb spaces, particularly metered curb spaces, tended to remain parked for much shorter periods of time than those parked in surface lots or parking structures. Eighty-eight percent and 58 percent of autos at metered and unmetered curb spaces, respectively, in 1963, and 85 percent and 51 percent of autos at such spaces in 1972 remained parked for less than two hours while only 17 to 31 percent in 1963 and 19 to 38 percent in 1972 of autos parked in paid or free parking lots and structures remained for such a short period.

Table 18

PARKING SUPPLY IN THE MILWAUKEE CBD BY TYPE OF PARKING FACILITY: 1963 and 1972

Type of Parking	Year	Number of Spaces	Percent of Total Spaces	Percent Change 1963-1972
Privately Owned Surface Lots	1963	13,900	52.1	12.9
	1972	15,700	51.1	
City Owned Surface Lots	1963	2,300	8.6	- 73.9
	1972	600	2.0	
Subtotal Surface Lots	1963	16,200	60.7	0.6
	1972	16,300	53.1	
Privately Owned Parking Structures	1963	4,100	15.3	104.9
	1972	8,400	27.3	
City Owned Parking Structures	1963	1,300	4.9	69.2
	1972	2,200	7.2	
Subtotal Parking Structures	1963	5,400	20.2	96.3
	1972	10,600	34.5	
Curb Spaces	1963	5,100	19.1	- 25.5
	1972	3,800	12.4	
Total	1963	26,700	100.0	15.0
	1972	30,700	100.0	

Source: SEWRPC.

Free Versus Paid Parking in the CBD: As indicated in Table 21 on an average weekday in the Milwaukee CBD, approximately one-half of the 32,800 autos in 1963 and the 40,700 autos in 1972 which were parked in surface lots were parked free of charge; of the 3,200 autos in 1963 and 7,100 autos in 1972 parked in parking structures, a fee was charged 72 percent of the time in 1963 and 77 percent of the time in 1972; of the 23,800 autos in 1963 and the 18,100 autos in 1972 parked at curb spaces a fee was charged 35 percent of the time in 1963 and 44 percent of the time in 1972.

Table 19

USE OF PARKING SUPPLY IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY TYPE OF PARKING FACILITY: 1963 and 1972

Type of Parking	Year	Number of Spaces	Percent of Total Spaces	Number of Vehicles Utilizing Spaces	Percent of Total Vehicles	Average Vehicles Per Space Per Day
Surface Lots	1963	16,200	60.7	32,790	54.8	2.02
	1972	16,300	53.1	40,700	61.8	2.50
Parking Structures	1963	5,400	20.2	3,200	5.4	0.59
	1972	10,600	34.5	7,080	10.7	0.67
Curb Spaces	1963	5,100	19.1	23,800	39.8	4.67
	1972	3,800	12.4	18,110	27.5	4.77
Total	1963	26,700	100.0	59,790	100.0	2.24
	1972	30,700	100.0	65,890	100.0	2.15

Source: SEWRPC.

Table 20

PERCENTAGE DISTRIBUTION OF PARKING IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY DURATION AND TYPE OF PARKING: 1963 and 1972

Parking Duration (In Hours)	Year	Type of Parking						Total
		Curb Space		Surface Lot		Parking Structure		
		Free	Meter	Free	Paid	Free	Paid	
Less than 1.0	1963	41.0	63.6	17.3	11.3	11.2	13.5	28.3
	1972	31.4	60.2	25.4	7.7	17.2	8.6	23.6
1.0-1.9	1963	16.8	24.7	13.8	12.9	6.1	13.7	15.8
	1972	19.7	25.0	12.3	11.9	2.7	16.0	14.7
2.0-3.9	1963	15.1	6.7	16.0	23.5	15.4	21.7	16.6
	1972	22.4	3.6	10.0	20.7	26.9	19.7	15.6
4.0-7.9	1963	9.2	2.4	11.9	16.0	13.7	10.8	10.9
	1972	12.8	7.4	14.8	17.4	17.6	19.4	15.0
8.0 and Over	1963	17.9	2.6	41.0	36.3	53.6	40.3	28.4
	1972	13.7	3.8	37.5	42.3	35.6	36.3	31.1
Total	1963	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	1972	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: SEWRPC.

Table 21

TYPE OF PARKING UTILIZED IN THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY NUMBER OF VEHICLES BY TRIP PURPOSE: 1963 and 1972

Type of Parking	Year	Number of Vehicles by Trip Purpose						Total	
		Work	Personal Business	School	Social-Recreation	Shopping	Home	Number	Percent
Curb Free	1963	7,210	3,760	1,000	2,680	800	--	15,450	23.8
	1972	3,640	2,630	1,380	1,710	570	290	10,220	13.8
Curb Paid	1963	3,420	3,040	110	710	1,070	--	8,350	12.8
	1972	3,010	3,230	280	590	780	--	7,890	10.6
Subtotal of Curbs	1963	10,630	6,800	1,110	3,390	1,870	--	23,800	36.6
	1972	6,650	5,860	1,660	2,300	1,350	290	18,110	24.4
Surface Lot Free	1963	11,950	1,420	140	1,920	1,470	130	17,030	26.2
	1972	13,080	3,270	280	2,000	890	270	19,790	26.6
Surface Lot Paid	1963	10,440	2,180	440	1,170	1,340	190	15,760	24.2
	1972	14,140	2,240	1,430	1,830	1,220	50	20,910	28.1
Subtotal of Surface Lots	1963	22,390	3,600	580	3,090	2,810	320	32,790	50.4
	1972	27,220	5,510	1,710	3,830	2,110	320	40,700	54.7
Parking Structure Free	1963	810	40	--	--	--	60	910	1.4
	1972	1,500	50	--	50	50	--	1,650	2.2
Parking Structure Paid	1963	1,730	40	40	120	40	320	2,290	3.5
	1972	4,200	560	160	320	190	--	5,430	7.3
Subtotal of Parking Structures	1963	2,540	80	40	120	40	380	3,200	4.9
	1972	5,700	610	160	370	240	--	7,080	9.5
Subtotal of Curbs, Surface Lots, Parking Structures	1963	35,560	10,480	1,730	6,600	4,720	700	59,790	91.9
	1972	39,570	11,980	3,530	6,500	3,700	610	65,890	88.6
Residential Property	1963	100	40	--	--	--	1,020	1,160	1.8
	1972	10	70	--	--	20	1,770	1,870	2.5
Not Parked	1963	260	3,200	--	400	140	--	4,000	6.1
	1972	430	5,970	80	40	10	--	6,530	8.8
Service and Repair	1963	70	40	--	--	--	--	110	0.2
	1972	10	20	--	--	--	--	30	0.1
Subtotal not Parked at Curbs, Surface Lots, Parking Structures	1963	430	3,280	--	400	140	1,020	5,270	8.1
	1972	450	6,060	80	40	30	1,770	8,430	11.4
Total	1963	35,990	13,760	1,730	7,000	4,860	1,720	65,060	100.0
	1972	40,020	18,040	3,610	6,540	3,730	2,380	74,320	100.0

Source: SEWRPC.

Type of Parking in the CBD by Trip Purpose: Table 21 also indicates that on an average weekday in both 1963 and 1972 the majority of auto drivers in the Milwaukee CBD for work and shopping purposes tended to use off-street parking. In 1963 auto drivers in the CBD for the purpose of conducting personal business or in order to attend school were more likely to park in curb spaces than to use off-street facilities while in 1972 such drivers were apt to use either off-street or on-street facilities. Of auto drivers in the CBD for social-recreational purposes in 1963, approximately one-half tended to use off-street facilities with the remainder utilizing curb spaces. However, in 1972 nearly two-thirds of auto drivers making social-recreational trips to the CBD on an average weekday utilized off-street facilities.

A notable change occurring during the period is the declining use of free curb spaces—from 7,200 autos in 1963 to 3,600 autos in 1972 for a decrease of 3,600 autos—by auto drivers destined for work in the CBD and a corresponding increase in autos parked in paid surface lots—from 10,400 autos in 1963 to 14,100 autos in 1972 for an increase of 3,700 autos. This change is in accord with the decline shown in available curb spaces in the CBD and the increase found in the average vehicles per space per day in surface lot usage as shown previously in Table 19.

Blocks Walked at Destination in the CBD by Trip Purpose and Mode of Travel
The highly convenient locations of parking facilities and the only slightly less convenient locations of bus stops in the Milwaukee CBD made it possible both in 1963 and 1972 for the very large majority of tripmakers to this area to walk no more than a block or two after parking their autos or debarking from transit vehicles to reach their ultimate destinations. The walking distance became somewhat less convenient for some tripmakers from 1963 to 1972 as the percentage of those walking less than two blocks decreased for auto drivers from 92 percent to 82 percent; for auto passengers from 97 percent to 90 percent, and for mass transit passengers from 83 percent to 79 percent. These changes are believed to be partially attributable to the general dispersal of parking facilities from the central area toward the periphery of the CBD, including, for example, the construction since 1963 of the MacArthur Square Parking Plaza and of the lake shore parking lot on the former Chicago and Northwestern Railroad Company property, both near the periphery of the CBD and both among the largest parking facilities within the CBD. The 1963 and 1972 percentage distributions of blocks walked by trip purpose, as shown in Table 22, exhibit relatively few conspicuous differences from the 1963 and 1972 distributions within each mode of travel for all purposes, except in the percentage of trips to shop and trips to home by mass transit passengers in 1963 and in trips to work and to school by auto drivers.

Deserving emphasis is the finding that, although walking distance to the ultimate destination has increased within each mode from 1963 to 1972, auto-related travel remains more convenient than mass transit travel within every trip purpose category other than school in which 59 percent of mass transit passengers are discharged within one block of their ultimate destination and only 38 percent of the auto drivers find parking within one block of their ultimate destination. This finding has special significance in view of the fact, discussed previously, that while the volumes of total CBD destinations by mass transit have declined substantially from 1963 to 1972 within each of the purposes of work, personal business, social-recreation, shopping, and home, the volume of mass transit trips to the CBD for the purpose of attending school has not only held during the period, but has increased.

COMPARISON OF CBD AND REGIONAL TRIPMAKING TRENDS: 1963 TO 1972

The preceding discussion has documented the differences and similarities in travel habits and patterns affecting the Milwaukee CBD in 1963 and 1972. To assess more fully the degree of change in CBD tripmaking during the period, certain CBD trends must be compared to the equivalent trends in the Region. Although the decline of 5 percent in CBD trip volumes initially may appear modest, such a decline in view of a 25 percent increase in total regional tripmaking during the period suggests stagnation and a downward trend in the attractiveness of this Region's largest urban center. Therefore, comparisons of changes in travel in the CBD from 1963 to 1972 as such changes relate to changes in regional tripmaking during the period assume particular importance.

Internal Person Travel: CBD and Region
As shown in Table 23 in 1963, when 138,100 internal person trips were destined for the Milwaukee CBD on the average weekday, there were 3,603,000 such trips being made within the Region each day. At that time, the 1.25 square miles of the CBD attracted 3.8 percent of the regional travel. In 1972, with the CBD attracting 131,260 of 4,504,900 internal person trips in the Region, the proportion of regional travel attracted to this CBD declined to 2.9 percent. As already noted, although regional tripmaking increased by 25 percent from 1963 to 1972, the volume of trips to the CBD declined by 5 percent during the period.

Mode of Travel: CBD and Region
While the Region experienced a 34 percent increase in auto driver travel, as shown also in Table 23, auto driver trips to the CBD increased only 14 percent. In contrast, auto passenger travel to the CBD increased at a slightly greater rate, 26 percent, than the increase in regional auto passenger trips, 25 percent, and the decline in CBD mass transit travel mirrored the decline in transit trips experienced in the Region.

The smaller increase in CBD auto driver tripmaking than in regional auto driver tripmaking, although accounting for a portion of the CBD decline in total tripmaking during the period, was not the only major contributing factor. If CBD auto driver travel had shown the same percentage increase from 1963 to 1972 as regional auto driver travel, there would have been an additional 12,700 CBD auto driver trips in 1972 producing total CBD travel of approximately 143,900 trips for an increase of 4 percent since 1963—an increase still substantially lower than the 25 percent increase observed in regional tripmaking. More greatly affecting total CBD tripmaking was the decline in mass transit trips to the CBD which mirrored the decline in regional transit travel. As shown in Table 24, which presents the percentage distribution of person trips in the Region and in the CBD by mode of travel, in 1963 mass transit travel represented 37 percent of CBD tripmaking as

Table 22

PERCENTAGE DISTRIBUTION OF TRAVEL MODES BY THE PURPOSES OF INTERNAL PERSON TRIPS DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY THE NUMBER OF BLOCKS WALKED AT DESTINATION: 1963 and 1972

	Blocks Walked											
	Less than 1		1.0-1.9		2.0-2.9		3.0-3.9		4 and Over		Total	
	1963	1972	1963	1972	1963	1972	1963	1972	1963	1972	1963	1972
Work												
Auto Driver	84.5	67.1	4.1	12.9	4.9	8.0	2.0	4.8	4.5	7.2	100.0	100.0
Auto Passenger	93.6	75.3	1.9	10.6	1.8	6.5	0.9	1.8	1.8	5.8	100.0	100.0
Mass Transit	62.5	50.0	18.2	24.4	11.8	15.6	4.4	5.0	3.1	5.0	100.0	100.0
Other	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0
Personal Business												
Auto Driver	92.8	79.0	4.2	9.8	1.8	6.9	0.3	2.8	0.9	1.5	100.0	100.0
Auto Passenger	93.2	79.6	5.0	15.3	1.0	2.9	--	1.3	0.8	0.9	100.0	100.0
Mass Transit	67.7	53.1	13.9	23.9	9.5	10.6	6.7	10.4	2.2	2.0	100.0	100.0
Other	100.0	85.5	--	14.5	--	--	--	--	--	--	100.0	100.0
School												
Auto Driver	88.3	38.4	3.9	14.9	7.8	13.5	--	12.3	--	20.9	100.0	100.0
Auto Passenger	84.3	100.0	--	--	--	--	--	--	15.7	--	100.0	100.0
Mass Transit	61.3	59.3	14.4	18.7	13.3	12.7	3.2	5.8	7.8	3.5	100.0	100.0
Other	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0
Social-Recreation												
Auto Driver	94.1	73.9	3.1	11.3	1.7	6.8	--	4.7	1.1	3.3	100.0	100.0
Auto Passenger	93.5	76.6	4.7	5.2	0.9	14.6	--	2.3	0.9	1.3	100.0	100.0
Mass Transit	72.1	66.5	13.4	17.5	9.3	11.8	3.7	4.2	1.5	--	100.0	100.0
Other	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0
Shopping												
Auto Driver	89.5	75.5	6.3	13.6	2.0	7.9	2.0	1.6	0.2	1.4	100.0	100.0
Auto Passenger	91.4	81.5	2.9	13.9	2.8	3.2	--	--	2.9	1.4	100.0	100.0
Mass Transit	85.5	72.6	8.9	17.2	1.3	5.8	3.0	2.0	1.3	2.4	100.0	100.0
Other	--	--	--	--	--	--	--	--	--	--	100.0	100.0
Home												
Auto Driver	84.9	99.1	7.9	0.9	3.6	--	3.6	--	--	--	100.0	100.0
Auto Passenger	95.6	95.2	4.4	4.8	--	--	--	--	--	--	100.0	100.0
Mass Transit	53.2	42.2	24.3	46.2	16.2	8.8	2.1	2.8	4.2	--	100.0	100.0
Other	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0
All Purposes												
Auto Driver	87.8	70.6	4.3	11.7	3.7	7.6	1.4	4.4	2.8	5.7	100.0	100.0
Auto Passenger	93.1	78.9	3.4	10.9	1.5	5.9	0.3	1.4	1.7	2.9	100.0	100.0
Mass Transit	67.0	56.3	16.0	22.7	9.9	12.4	4.2	5.0	2.9	3.6	100.0	100.0
Other	100.0	97.6	--	2.4	--	--	--	--	--	--	100.0	100.0

Source: SEWRPC.

Table 23

MODES OF INTERNAL PERSON TRIPS IN THE REGION AND DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY: 1963 and 1972

Area, Year	Internal Person Trips by Mode				
	Auto Driver	Auto Passenger	Mass Transit	Other	Total
Region 1963	2,165,740	985,120	324,340	127,900	3,603,000
Region 1972	2,897,050	1,227,400	186,160	194,300	4,504,910
Percent Change 1963-1972	33.8	24.6	-42.6	51.9	25.0
CBD 1963	65,060	21,620	50,550	870	138,100
CBD 1972	74,320	27,260	29,010	670	131,260
Percent Change 1963-1972	14.2	26.1	-42.6	-23.0	-5.0
CBD as Percent of Region 1963	3.0	2.2	15.6	0.7	3.8
CBD as Percent of Region 1972	2.6	2.2	15.6	0.3	2.9

Source: SEWRPC.

opposed to only 9 percent of regional tripmaking. Consequently, while the decline of 43 percent in transit tripmaking had a relatively small effect on total regional travel, this decline had a major impact on CBD trip volumes and accounted for the largest portion of the disparity between growth in regional versus CBD travel by mode.

Trip Purpose: CBD and Region

As shown in Table 25 much greater increases were found in regional trip volumes than in CBD trip volumes within each trip purpose other than "school." Trips to school increased 57 percent in the CBD and 33 percent in the Region. In contrast, trips to work increased by more than 11 percent in the Region and declined 7 percent in the CBD; to personal business increased 41 percent in the Region and only 15 percent in the CBD; to social-recreational activities increased 20 percent in the Region while declining 16 percent in the CBD; to shopping increased 28 percent in the Region while declining 25 percent in the CBD; and, to home increased 26 percent in the Region while declining 34 percent in the CBD. Consequently, within each trip purpose category other than "school," CBD trips in 1972 represented a smaller percentage of total regional travel than in 1963.

The importance of the decline of 7 percent in work trips to the CBD as opposed to the 12 percent increase in regional work trips since 1963 is indicated in Table 26. Trips to work accounted for 18 percent and 16 percent of total regional travel in 1963 and 1972, respectively; whereas, such trips accounted for 51 percent and 50 percent of CBD travel in 1963 and 1972, respectively. As a result of the differing distributions of regional and CBD trips by trip purpose, the lack of growth in CBD work trips more greatly affected total CBD trip volumes than may be at first apparent: the decline in CBD work trips not only accounted for the largest absolute decline in trip volumes within any given trip purpose, but also represents a primary reason for the lack of growth in total CBD tripmaking during the period. If trips to work within the CBD had increased from 1963 to 1972 at the same rate as within the Region, the CBD would have received 78,284 trips to work, or 12,824 more work trips than actually obtained in 1972. Other important factors contributing to the lack of growth in total CBD tripmaking are: 1) the relatively slow growth in CBD trips for the purpose of conducting personal business—such trips representing 22 percent of total CBD tripmaking; and 2) in contrast to regional increases, the substantial declines in trips for shopping and social-recreational purposes—such trips representing 9 percent each of total CBD trip volumes.

Auto Driver Trip Purpose: CBD and Region

Table 27 indicates that within each major trip purpose—work, personal business, social-recreation, and shopping—

Table 24

PERCENTAGE DISTRIBUTION OF INTERNAL PERSON TRIPS IN THE REGION AND DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY MODE OF TRAVEL: 1963 and 1972

Mode of Travel	Internal Person Trips (Percent)			
	Region		CBD	
	1963	1972	1963	1972
Auto Driver	60.1	64.3	47.1	56.6
Auto Passenger	27.4	27.2	15.7	20.8
Mass Transit	9.0	4.1	36.6	22.1
Other	3.5	4.4	0.6	0.5
Total	100.0	100.0	100.0	100.0

Source: SEWRPC.

Table 25

PURPOSES OF INTERNAL PERSON TRIPS IN THE REGION AND DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY: 1963 and 1972

Area and Year	Purpose of Internal Person Trips						
	Work	Personal Business	School	Social-Recreation	Shopping	Home	Total
Region 1963	664,380	465,360	165,470	423,380	425,520	1,458,890	3,603,000
Region 1972	740,780	654,920	219,940	508,140	544,930	1,836,200	4,504,910
Percent Change 1963-1972	11.5	40.7	32.9	20.0	28.1	25.9	25.0
CBD 1963	70,210	25,270	4,990	14,590	16,520	6,520	138,100
CBD 1972	65,460	28,990	7,830	12,310	12,390	4,280	131,260
Percent Change 1963-1972	- 6.8	14.7	56.9	- 15.6	- 25.0	- 34.4	- 5.0
CBD as Percent of Region 1963	10.6	5.4	3.0	3.4	3.9	0.4	3.8
CBD as Percent of Region 1972	8.8	4.4	3.6	2.4	2.3	0.2	2.9

Source: SEWRPC.

substantially greater percentage increases in auto driver travel occurred in the Region than in the CBD. Of trips by auto drivers, trips to work increased 21 percent in the Region and 11 percent in the CBD; trips to personal business increased 45 percent in the Region, 31 percent in the CBD; to social-recreational activities increased almost 19 percent in the Region, declined 7 percent in the CBD; and to shopping increased 38 percent in the Region, declined 23 percent in the CBD. Of minor purposes, the number of auto driver trips to home increased 38 percent in both the Region and the CBD and the number of auto driver trips to school increased 172 percent in the Region and 109 percent in the CBD. In addition, CBD auto driver trips to work as a percent of regional travel declined 0.6 percent from 1963 to 1972; to personal business declined 0.4 percent; to social-recreational activities declined 0.7 percent; and to shopping declined 0.9 percent.

Mass Transit Passenger Trip Purpose: CBD and Region

From 1963 to 1972 the volume of CBD mass transit trips by trip purpose as shown in Table 28 declined in the Region in every trip purpose category while in the CBD declines were recorded for every trip purpose category other than trips to school which increased 29 percent during the period. From 1963 to 1972 mass transit trips to work declined 51 percent in the Region and 45 percent in the CBD; to personal business declined 32 percent in the Region and 50 percent in the CBD; to social-recreation, 57 percent in the Region, 68 percent in the CBD; to shopping, 33 percent in the Region, 30 percent in the CBD; to home 44 percent in the Region, 74 percent in the CBD. Although the percentage decline in mass transit trips to work in the CBD was not so great as the regional decline, the loss of these transit work trips accounted for the greatest absolute decline in CBD trip volumes (11,980 trips) for any trip purpose category of any mode of travel (see Table 27).

Land Use at Destination: CBD and Region

From 1963 to 1972 travel in the Region increased to every land use type except industrial; whereas, in the Milwaukee CBD, travel declined to every land use type except governmental-institutional. During the period, trips to residential land uses increased 22 percent in the Region, declined 36 percent in the CBD; to commercial land uses increased 37 percent in the Region, declined 1 percent in the CBD; to industrial land uses declined 2 percent in the Region and 42 percent in the CBD; to governmental-institutional land uses, increased 35 percent in the Region and 14 percent in the CBD; and, to 'other' land uses increased 8 percent in the Region, declined 19 percent in the CBD. Consequently by each land use type, CBD trips in 1972 represented a smaller percentage of total regional travel than in 1963 (see Table 29).

The importance of the differences between the rate of change in the Region and the CBD in trips made to governmental-institutional, commercial, and industrial land uses

Table 26

PERCENTAGE DISTRIBUTION OF INTERNAL PERSON TRIPS IN THE REGION AND DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY TRIP PURPOSE: 1963 and 1972

Trip Purpose	Internal Person Trips (Percent)			
	Region		CBD	
	1963	1972	1963	1972
Work	18.4	16.4	50.8	49.9
Personal Business	12.9	14.5	18.3	22.1
School	4.6	4.9	3.6	5.9
Social-Recreation	11.8	11.3	10.6	9.4
Shopping	11.8	12.1	12.0	9.4
Home	40.5	40.8	4.7	3.3
Total	100.0	100.0	100.0	100.0

Source: SEWRPC.

Table 27

PURPOSES OF AUTO DRIVER TRIPS IN THE REGION AND DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY: 1963 and 1972

Area and Year	Purpose of Auto Driver Trips						
	Work	Personal Business	School	Social-Recreation	Shopping	Home	Total
Region 1963	501,190	324,470	12,800	218,990	261,510	846,780	2,165,740
Region 1972	604,600	470,550	34,830	259,530	361,960	1,165,580	2,897,050
Percent Change 1963-1972	20.6	45.0	172.1	18.5	38.4	37.6	33.8
CBD 1963	35,990	13,760	1,730	7,000	4,860	1,720	65,060
CBD 1972	40,020	18,040	3,610	6,540	3,730	2,380	74,320
Percent Change 1963-1972	11.2	31.1	108.7	- 6.6	- 23.3	38.4	14.2
CBD as Percent of Region 1963	7.2	4.2	13.5	3.2	1.9	0.2	3.0
CBD as Percent of Region 1972	6.6	3.8	9.6	2.5	1.0	0.2	2.6

Source: SEWRPC.

Table 28

PURPOSES OF MASS TRANSIT TRIPS IN THE REGION AND DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY: 1963 and 1972

Area and Year	Purposes of Mass Transit Trips						
	Work	Personal Business	School	Social-Recreation	Shopping	Home	Total
Region 1963	83,950	21,390	33,100	18,040	21,000	146,860	324,340
Region 1972	40,790	14,570	26,470	7,740	14,140	82,450	186,160
Percent Change 1963-1972	- 51.4	- 31.9	- 20.0	- 57.1	- 32.7	- 43.9	- 42.6
CBD 1963	26,510	6,400	2,570	2,980	8,730	3,360	50,550
CBD 1972	14,530	3,190	3,320	950	6,140	880	29,010
Percent Change 1963-1972	- 45.2	- 50.2	29.2	- 68.1	- 29.7	- 73.8	- 42.6
CBD as Percent of Region 1963	31.6	29.9	7.8	16.5	41.6	2.3	15.6
CBD as Percent of Region 1972	35.6	21.9	12.5	12.3	43.4	1.1	15.6

Source: SEWRPC.

Table 29

DESTINATION LAND USE OF INTERNAL PERSON TRIPS IN THE REGION AND DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY: 1963 and 1972

Area and Year	Residential	Commercial	Industrial	Governmental Institutional	Other	Total
Region 1963	1,783,090	934,510	300,170	448,430	136,800	3,603,000
Region 1972	2,174,960	1,281,360	293,720	606,810	148,060	4,504,910
Percent Change 1963-1972	22.0	37.1	- 2.2	35.3	8.2	25.0
CBD 1963	7,460	76,630	15,340	31,870	6,800	138,100
CBD 1972	4,770	75,780	8,830	36,350	5,530	131,260
Percent Change 1963-1972	- 36.1	- 1.1	- 42.4	14.1	- 18.7	- 5.0
CBD as Percent of Region 1963	0.4	8.2	5.1	7.1	5.0	3.8
CBD as Percent of Region 1972	0.2	5.9	3.0	6.0	3.7	2.9

Source: SEWRPC.

is emphasized in Table 30. Trips to governmental-institutional land uses in the CBD which did not increase as greatly as regional travel to such land use types represented 23 percent of total CBD travel in 1963 and 28 percent in 1972 in contrast to only 13 percent of regional travel in 1963 and 14 percent in 1972. While trips to commercial land uses represented 26 percent and 28 percent of regional travel in 1963 and 1972, such trips accounted for 56 percent and 58 percent of CBD tripmaking in those years. If trips to commercial land uses—over 50 percent of which in the CBD are made for the purpose of attending work—had increased in the CBD at the regional rate, the CBD would have gained an additional 28,400 trips. Trips to industrial land uses accounted for 8 percent and 7 percent of regional tripmaking in 1963 and 1972 and for 11 percent and 7 percent of CBD tripmaking in those years. It is interesting to note the intensification in the CBD of the regional trend in declining trips to industrial land use. The Region showed a decline of 6,500 trips, or 2 percent, to industrial land uses and the CBD also showed a decline of 6,500 trips, or 42 percent, during the period. Since in both the Region and the CBD well over 80 percent of travel to industrial land uses was for the purpose of work, this disproportionate decline in the CBD coupled with a no-growth situation in the Region indicates a serious decline in what has been traditionally regarded as the primary economic base of the area.

Implications of Difference in CBD and Regional Trends in Tripmaking

The most significant differences in regional and Milwaukee CBD tripmaking trends are: 1) a 5 percent decline in CBD trip volumes in contrast to a 25 percent increase in regional tripmaking; 2) a smaller increase in CBD auto driver trips, 14 percent, in contrast to a 34 percent increase in regional auto driver trips; 3) a 7 percent decline in CBD work trips as opposed to a 12 percent increase in regional work trips; 4) declines of 16 percent and 25 percent in CBD trips for social-recreation and shopping purposes, respectively, in contrast to increases of 20 percent and 28 percent, respectively, in the Region; 5) a 1 percent decline in CBD trips to commercial land uses as opposed to a 37 percent increase in such trips in the Region; 6) a 42 percent decline in CBD trips to industrial land uses as opposed to a 2 percent decline in the Region; 7) due to the differing distributions of regional and CBD travel by mode, a major effect on CBD trip volumes in contrast to a relatively small effect on regional trip volumes from the 43 percent decline in both CBD and regional transit travel.

These declines in trip volumes have occurred despite markedly improved transportation access to the CBD. Since 1963 a freeway system has been constructed which allows fast, efficient auto travel directly to the CBD from nearly any part of the Region. The transit system has extended its service area for the CBD, maintained the routes available in 1963, and instituted the Freeway Flyer service. The only reduction in transit service to the CBD during the period occurred in the form of increased headways—an increase which would not have been necessary if ridership demand had been present. In addition, in both 1963 and 1972 the Milwaukee CBD has maintained a more than adequate parking supply. Therefore, the decline in trip volumes to the CBD rather than indicative of a physical inadequacy in the transportation system is symptomatic of a more crucial and less easily corrected condition, an actual decline in the ability of the CBD to attract trips.

This decline has its roots in losses in employment in the CBD as witnessed by the significant losses in transit trips to work and the insufficient growth in auto driver trips to work for an overall 7 percent decline in CBD work trips. The loss and/or insufficient growth in employment in the CBD would appear to be primarily attributable to the decline of the industrial base and the stagnation of the retail-commercial services element within the CBD as demonstrated by declines in tripmaking to industrial and commercial land uses. These losses in employment affect other tripmaking as well, since people tend to perform personal business transactions in the general area in which they work and incidental shopping trips are frequently made during the noon hour and immediately prior to or after working hours.

Also responsible for some of the decline in CBD tripmaking has been the growth of regional shopping centers located at points of easy access to both urban, rural, and suburban customers. These centers provide plentiful free parking, weatherproofed, aesthetically pleasing malls, a variety of retail stores within easy walking distance, and social-recreational opportunities in the form of movies and restaurants. A number of persons who previously regarded the CBD as the primary source of such activities or services have been diverted to the shopping centers. With this reduction of retail customer trade in the CBD the number of persons needed to directly or indirectly service these customers is reduced, thereby further reducing employment.

Table 30

PERCENTAGE DISTRIBUTION OF INTERNAL PERSON TRIPS IN THE REGION AND DESTINED FOR THE MILWAUKEE CBD ON AN AVERAGE WEEKDAY BY LAND USE: 1963 and 1972

Land Use	Internal Person Trips (Percent)			
	Region		CBD	
	1963	1972	1963	1972
Residential	49.5	48.3	5.4	3.7
Commercial	25.9	28.4	55.5	57.7
Industrial	8.3	6.5	11.1	6.7
Governmental-Institutional	12.5	13.5	23.1	27.7
Other	3.8	3.3	4.9	4.2
Total	100.0	100.0	100.0	100.0

Source: SEWRPC.

SUMMARY

Inventory Findings: 1963 and 1972

The highly developed 1.25 square mile Central Business District (CBD) of the City of Milwaukee constituted the singularly largest concentration of person and vehicle trip destinations within the Southeastern Wisconsin Region in both 1963 and 1972, no other area of comparable size producing a concentration one-half as large. A decline occurred in total internal person travel to, from, and within the Milwaukee CBD on an average weekday from approximately 262,200 trips in 1963 to approximately 250,700 trips in 1972, or about 4 percent. Of these trips, the number made to and from the CBD, respectively, amounted to about 124,000 in 1963 and 119,000 in 1972, in each direction and the number made entirely within the CBD amounted to about 14,000 in 1963 and 12,000 in 1972.

A sharp decline in mass transit travel to the CBD occurred during the period, from 50,500 trips per average weekday in 1963 to 29,000 in 1972, a decline of 43 percent. Counter to this trend were increases in auto driver travel from 65,100 trips per average weekday in 1963 to 74,300 trips in 1972, an increase of 14 percent; and in total auto passenger travel from 21,600 trips per average weekday in 1963 to 27,300 trips in 1972, an increase of 26 percent.

Accompanying the decline in CBD mass transit ridership was a substantial decline from 1963 to 1972 in the already small number of "choice" transit trips. In 1963 of the total of 50,500 transit trips destined for the CBD on an average weekday, only 7,100 or 14 percent, represented "choice" trips and by 1972 there were less than 2,500 such trips (1,500 of which were trips to work), or only 8 percent of the total of 29,000 mass transit trips made to the CBD on an average weekday. Should these downward trends in choice ridership continue it is conceivable that mass transit ridership to the CBD, as well as elsewhere in the Region, will consist almost entirely of captive transit riders.

The importance of the Milwaukee CBD as a center of employment is indicated by the tens of thousands of work trips destined for this area, 70,200 in 1963 and 65,500 in 1972, such trips accounting in both years for about one-half of the person trips destined for the CBD and for about 11 percent of the total work trips made within the Region in 1963 and 9 percent in 1972. Next in importance were trips to transact personal business which amounted to 25,300 or 18 percent, in 1963 and to 29,000, or 22 percent, in 1972; trips to shopping, 16,500, or 12 percent, in 1963 and 12,400, or 9 percent, in 1972; and, trips to social-recreational activities, 14,600, or 11 percent, in 1963 and 12,300, or 9 percent, in 1972. Of the remaining trips to the Milwaukee CBD on an average weekday in 1963 and 1972, respectively, school trips amounted to 5,000, or 4 percent, and 7,800, or 6 percent, and trips to home amounted to 6,500, or 5 percent, and 4,300, or 3 percent.

The volume of trips to commercial and residential land uses for the purpose of attending work remained fairly similar from 1963 to 1972; to governmental-institutional and "other" land uses, increased; and to industrial land uses, declined substantially. The decline in trips to industrial land uses for the purpose of attending work—6,300 trips or 46 percent—represented the greatest absolute loss in trip volumes from 1963 to 1972 in any land use category for any trip purpose and was the only land use type which showed a significant decline in work trips. Therefore, the decline in total CBD work trips appears to be very closely related to an apparent loss in industrial employment in the CBD.

Also showing substantial declines in trip volumes from 1963 to 1972 were only two other land use-trip purpose categories: travel to shopping at commercial establishments declined 4,200 trips, or 26 percent; and, travel to residential land uses for the purpose of going home declined 2,600 trips, or 40 percent.

In total, between 1963 and 1972, three types of trips—industrial work trips, commercial shopping trips, and residential home trips—accounted together for a loss of approximately 13,100 trips to the CBD, a figure far in excess of the decline of 6,800 trips observed in total CBD person travel during the period.

In both 1963 and 1972 on an average weekday the Milwaukee CBD attracted person trips from virtually every part of the Southeastern Wisconsin Region—urban as well as rural. The largest concentrations of CBD trip origins were found in both years to be within the highly populated areas located in proximity to the CBD while beyond these areas the attraction to the CBD generally declined with increasing distance. From 1963 to 1972 the significant areas of attraction to this CBD were found to have expanded both within Milwaukee County and in its near northern and western suburbs. In contrast, the number of zones originating significant volumes of transit trips not only declined during the period but also were found to have contracted toward the CBD.

Hourly distributions indicated that the maximum accumulation of persons in the CBD per average weekday in 1963 occurred at the hour beginning at 1:00 p.m., amounting to a total of approximately 55,600 persons, while in 1972 the maximum accumulation occurred in the hour beginning at 11:00 a.m., amounting to approximately 53,500 persons. The maximum accumulations of automobiles in the CBD occurred at the hour beginning at 1:00 p.m., in 1963, amounting to a total of about 21,800 autos and at the hour beginning at 11:00 a.m., amounting to a total of about 21,300 autos. In 1972 the greatest accumulation of autos in the CBD was found to occur at the hour beginning at 10:00 a.m., with 26,900 automobiles followed by a sustained volume of 26,700 autos at 11:00 a.m., and a secondary peak of 26,300 autos at

1:00 p.m. Although the accumulation of persons in the CBD was slightly less in 1972 than in 1963, the accumulation of automobiles in the CBD was substantially greater in 1972 than in 1963, with the number of automobiles in 1972 accumulated within each hour from 8:00 a.m. through 3:00 p.m., being in excess of the peak accumulation in 1963.

Accommodating this increase in the accumulation of autos within the CBD was an increase in the number of parking spaces available from approximately 26,700 in 1963 to 30,700 in 1972, or 15 percent. The convenience of parking within the CBD made it possible for 92 percent of auto drivers in 1963 and 82 percent in 1972 to walk less than two blocks from their vehicles to their ultimate destinations, whereas, 83 percent of mass transit passengers in 1963 and 79 percent in 1972 walked less than two blocks to their ultimate destination.

Comparison of CBD and Regional Tripmaking

In 1963 when 138,100 internal person trips were destined for the Milwaukee CBD on the average weekday, there were 3,603,000 such trips being made within the Region each day. At that time the CBD attracted 3.8 percent of the regional travel. In 1972, with the CBD attracting 131,260 of 4,504,900 internal person trips in the Region, the proportion of regional travel attracted to this CBD declined to 2.9 percent. Although regional tripmaking increased by 25 percent from 1963 to 1972, the volume of trips to the CBD declined by 5 percent during the period.

While the Region experienced a 34 percent increase in auto driver travel from 1963 to 1972, auto driver trips to the CBD increased only 14 percent. If CBD auto driver travel had shown the same percentage increase from 1963 to 1972 as regional auto driver travel, there would have been an additional 12,700 CBD auto driver trips in 1972 producing total CBD travel of approximately 143,900 trips for an increase of 4 percent since 1963—an increase still substantially lower than the 25 percent increase observed in regional tripmaking.

In 1963 mass transit travel represented 37 percent of CBD tripmaking as opposed to only 9 percent of regional tripmaking. Consequently, while the decline by 1972 of 43 percent in transit tripmaking had a relatively small effect on total regional travel, this decline had a major impact on CBD trip volumes and accounted for the largest portion of the disparity between growth in regional versus CBD travel by mode.

Trips to work increased by more than 11 percent in the Region and declined 7 percent in the CBD from 1963 to 1972. Trips to work accounted for 18 percent and 16 percent of total regional travel in 1963 and 1972, respectively; whereas, such trips accounted for 51 percent and 50 percent of CBD travel in 1963 and 1972, respectively. As a result of the differing distributions of regional and CBD trips by trip purpose, the lack of growth in CBD work trips more greatly affected total CBD trip volumes than may be at first apparent: the decline in CBD work trips not only accounted for the largest absolute decline in trip volumes within any trip purpose, but also represents a primary reason for the lack of growth in total CBD tripmaking during the period.

Other factors contributing to the lack of growth in total CBD tripmaking were: 1) the relatively slow growth in CBD trips for the purpose of conducting personal business—an increase of 15 percent in the CBD as opposed to 41 percent in the Region; and, the substantial decline in CBD trips for shopping—a 25 percent decline in the CBD as opposed to a 28 percent increase in the Region—and social-recreational—a 16 percent decline in the CBD as opposed to a 20 percent increase in the Region.

Although the percentage decline in mass transit trips to work in the CBD, 45 percent, was not so great as the regional decline, 51 percent, the loss of these transit work trips accounted for the greatest absolute decline in CBD trip volumes—11,980 trips—for any trip purpose category of any mode of travel.

From 1963 to 1972 trips to commercial land uses increased 37 percent in the Region while declining 1 percent in the CBD. Whereas trips to commercial land uses represented 26 percent and 28 percent of regional travel in 1963 and 1972, such trips accounted for 56 percent and 58 percent of CBD tripmaking in those years. If trips to commercial land uses—over 50 percent of which are made in the CBD for the purpose of attending work—had increased in the CBD at the regional rate, the CBD would have gained an additional 28,400 trips.

It is interesting to note the intensification in the CBD of the regional trend in declining trips to industrial land use, with the Region showing a decline of 6,500 trips, or 2 percent, to industrial land uses and the CBD also showing a decline of 6,500 trips, or 42 percent, during the period. Since in both the Region and the CBD well over 80 percent of travel to industrial land uses was made for the purpose of work, this disproportionate decline in trips to such land uses in the CBD coupled with a no-growth situation in the Region represents a potentially serious problem in the vitality and importance of what has traditionally been regarded as the economic base of the area.

THE CHANGING FACTORIAL ECOLOGY OF MILWAUKEE'S BLACK GHETTO

by Richard A. Karsten, Harold McConnell, and Marilyn Ragusa[1]

INTRODUCTION

The socioeconomic conditions of black ghettos with the concomitant sociological and physiological pathologies are among the most compelling problems facing urban America today. According to Rose's (1971) definition, an urban ghetto may be considered to be "the territory which is occupied by black people in American cities and which has evolved out of a system of residential allocation permitting no freedom of choice." Thus, the term carries with it no implications of quality of environment or social status, but refers simply to a residential enclave in which ultimately the only competitors for housing are members of a single race. On the other hand (although exceptions may be noted), in our pluralistic society, blacks living in ghettos generally do not enjoy the same quality of life as their fellow white Americans (U. S. Environmental Protection Agency, 1973; Morrill, 1972). In this sense alone, black ghettos may be considered spatially separate colonies in our cities. This problem is compounded by the fact that, as Morrill (1972) has demonstrated, ghettos have developed most significantly in the last 60 years and are currently continuing to grow. The ghettoization process goes on, as do those social evils which are the consequences of it.

Rose (1971) has described this process as "an increase in the number of black households and decrease in the number of white households within some prescribed zone, a process set in motion by one group's refusal to share social space with the other." Numerous authors, including Meyer (1970), suggest that it is one which results in social disorganization, and Schmandt, Goldbach, and Vogel (1971) have noted that changes in urban structure must be made in order to develop the necessary measures to ameliorate the resultant social ills which accompany ghetto growth. The effects are far-reaching and involve more than blacks: concomitant with the ghettoization process is the decline of the central city's population as a consequence of flight of white residents to the suburbs, a spreading and accelerating pattern of urban deterioration, suburban sprawl, and racial polarization (Paulson, 1973).[2] If those social ills which accompany ghettoization are to be prevented in the future (and ghettoization itself, for that matter), decision-makers must be made cognizant of the causes of these phenomena and those socioeconomic factors associated with them. Hence, antecedent socioeconomic conditions must be recognized if they are to be treated in order to, at worst, ameliorate the effects of the process, or, at best, prevent it.

SPIN-OFF EFFECTS OF THE HOUSING MARKET

Housing quality, as both Rose (1971) and Mercer (1972) have noted, is one of the key factors in the ghettoization process, since there is normally a positive spatial association between black residential neighborhoods and areas of low housing quality. In particular, those zones of residential occupance known as urban ghettos have developed in response to the manner in which housing markets operate (Rose, 1969). Moreover, the National Urban League (1971) has stated, "Deterioration spirals as maintenance declines. Neighborhood flight accelerates, first by investors and then by the socially mobile, until only the poor, the aged and the severely deprived remain." The eventual effect, as the U. S. Department of Health, Education and Welfare has pointed out (1970), is that the neighborhood, the dwelling unit, educational level of the population, and occupation strongly associate with physiological pathology as well as sociological pathology and suggest that those people living in black ghettos have a "deterioration of ... attitudes toward their own worth and their opportunities for participation in the society, which lead to feelings of alienation from the social group as a whole." This sense of alienation was in no small way manifested in the urban upheavals of the 1960's. As Schmandt (1972) has so succinctly stated, "We have witnessed a decade of acute social ferment marked by intensifying conflicts over poverty, race, resource allocation, and the use and distribution of social power."

NATURE OF THE STUDY

Milwaukee, Wisconsin, like most northern cities, has, since, during, and after World War II, experienced a tremendous growth in its black population and expansion of its black ghetto.[3] As revealed in Table 1, the percentage of black population in Milwaukee increased from 1.50 percent in 1940 to 14.65 percent in 1970. This empirical study addresses itself, in

---

[1] *Mr. Karsten is Assistant Professor, Department of Community Affairs, University of Wisconsin Extension. Dr. McConnell and Ms. Ragusa are associates of Mr. Karsten who participated in the conduct of this study and the preparation of this paper.*

[2] *Todd (1972) found that the black ghetto in Milwaukee became more polarized from the white community between 1950 and 1970.*

[3] *Rose (1971) considers the Milwaukee ghetto to be a third-generation center wherein the growth was most rapid during and after World War II and due mainly to in-migration.*

a quantitative manner, to certain socioeconomic factors associated over time and space with black population movements in the present ghetto area and purports to test the general hypothesis that expansion of the ghetto is essentially a function of facilitating antecedent conditions, i.e., that ghettoization is the result and not the cause of urban deterioration. It is implicit in this approach that a combination of socioeconomic indices and those pervading factors which may be elicited from such a combination more lucidly depicts the ghettoization process than sheer magnitude of the black population at any point in time. Obviously, those demographic shifts accompanying ghetto growth are polyphase in nature. Thus, a series of cross-sectional templates is developed which gives greater perspective to the population shifts. The algorithms (principal components analysis and minimum Euclidian distance grouping) are employed on data aggregated at the census tract level which Rose (1971) suggests is the optimum scale for quantitative urbanscape analysis.[4]

Table 1

PERCENT OF BLACK POPULATION IN THE CITY OF MILWAUKEE BY YEAR[a]

Year	Black
1850	0.49
1860	0.23
1870	0.25
1880	0.26
1890	0.22
1900	0.33
1910	0.26
1920	0.49
1930	1.30
1940	1.50
1950	3.42
1960	8.43
1970	14.65

[a]*Developed from Beverstock and Stuckert (1972).*

The Study Area

Beverstock and Stuckert (1972) divided Milwaukee County into 43 geographic areas or neighborhoods, employing methodology developed by the Social Science Research Committee (1962) of the University of Chicago (see Figure 1). In 1970, five such contiguous neighborhoods comprising 55 census tracts and located entirely within the City of Milwaukee, including Halyard Park, Garfield, Midtown, Lincoln Creek, and Riverside West, contained 94.2 percent of the city's black population (see Figure 2). The recent spread of the ghetto is exemplified by the fact that in 1940, a single core neighborhood, Halyard Park, contained 89.9 percent of all black residents in Milwaukee. By 1950, 91.9 percent was located in two adjoining neighborhoods, Halyard Park and Garfield. In 1960, 94.2 percent was located in three contiguous neighborhoods, Halyard Park, Garfield, and Midtown.[5]

The geographic concentration of poverty in those neighborhoods defining the study area may be depicted through an examination of numbers of families living below the official poverty level in 1970. Irrespective of racial affiliation, 1970 data indicate that 72 percent of families living below the poverty level in the Milwaukee Standard Metropolitan Statistical Area (SMSA) resided in the city. Forty-seven percent was confined to four neighborhoods in the study area, including Halyard Park, Garfield, Midtown, and Lincoln Creek. Applying a racial constraint, it was found that 28 percent of those families living below the poverty level in the Milwaukee SMSA was black. Almost all resided within the city, specifically in the Halyard Park, Garfield, Midtown, and Lincoln Creek neighborhoods.[6] In a previous analysis (Karsten, McConnell and Patterson, 1974), it was found that these neighborhoods and a fifth, Riverside West, were among those areas having the least desirable quality of life of the 43 neighborhoods in Milwaukee County and were those identified as the most susceptible to urban strain and socioeconomic stress.

Sequent Occupance in the Study Area

The growth of the Milwaukee ghetto has emanated from a single neighborhood, Halyard Park, an area in classical transition for a number of years. Halyard Park was a German neighborhood in the mid-1800's. By 1880, the prosperous Germans had largely been displaced by immigrants from eastern Europe. Around the turn of the century, large numbers of Russian Jewish refugees settled in the neighborhood. In 1919, because of overcrowding and housing deterioration, it was deemed to be one of the worst slum areas in Milwaukee. The Jewish population began leaving after World War I. By 1930, blacks had

---

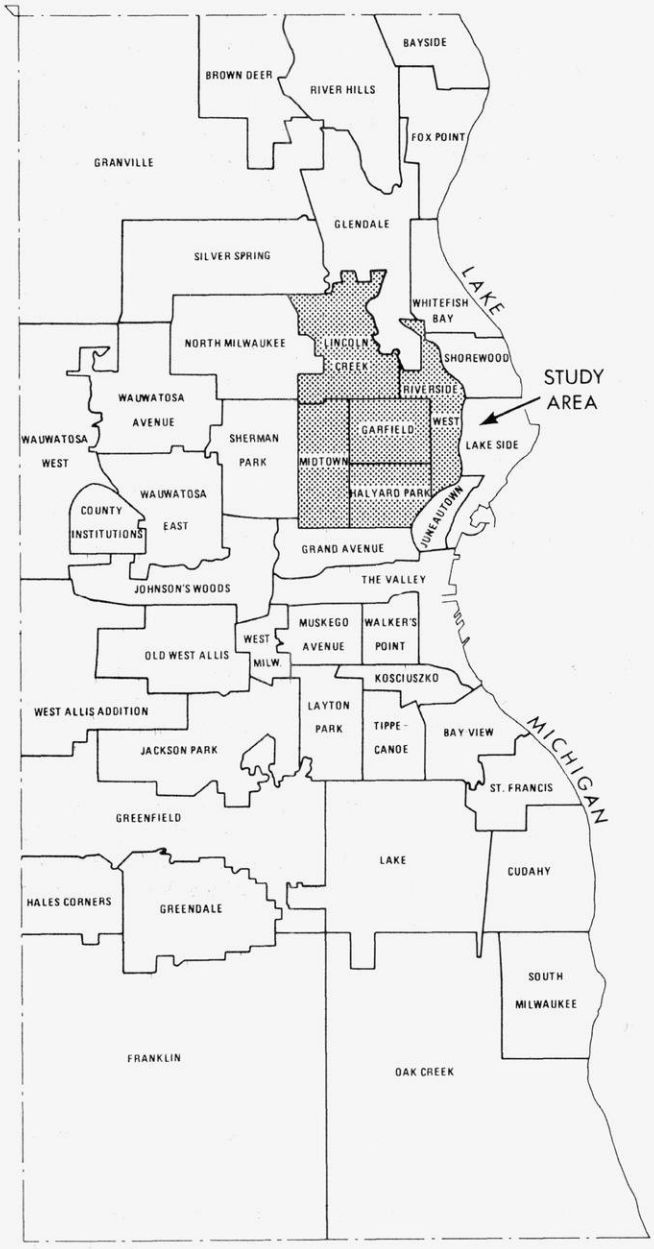
[4]*Rose (1971) identifies a ghetto neighborhood as one where the population exceeds 50 percent black; a ghetto fringe neighborhood as one where the population is from 50 to 74 percent black; and a ghetto core neighborhood as one where the black population is 75 percent or larger.*

[5]*In 1950, the City of Milwaukee contained 98.4 percent of Milwaukee County's black population and the county contained 99.4 percent of the SMSA's black population. In 1960, 99.1 percent of the county's black population resided in the city and the county contained 99.7 percent of the SMSA's black population. By 1970, the city contained 99.1 percent of the county's black population and 99.5 percent of the SMSA's black population resided in the city.*

[6]*Data are unavailable for Riverside West.*

Figure 1

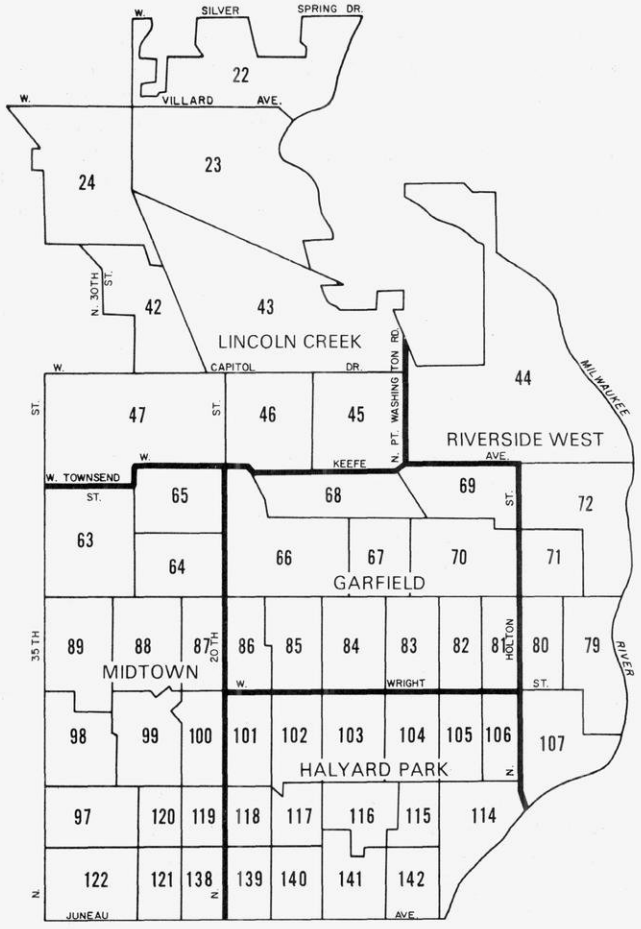
MILWAUKEE COUNTY COMMUNITY AREAS: 1970



Source: *UWM Cartographic Services.*

Figure 2

BOUNDARIES OF STUDY AREA



Source: UWM Cartographic Services.

begun to migrate into the area from the South. Except for four public housing areas, Halyard Park's buildings have continued to deteriorate and its population continues to leave in search of a better physical environment (Beverstock and Stuckert, 1972).

The Garfield neighborhood is the area where the second stage of ghettoization occurred in Milwaukee. In 1950, 3.0 percent of its population was black; in 1960, 48.4 percent; and by 1970, 85.8 percent was black. In the late 1800's, Garfield's residents were mainly of German origin. These people were attracted to the neighborhood by the opening of a number of factories. From its earliest period, Garfield has been and continues to be a lower-middle class and working class neighborhood. The northward migration of blacks in the 1960's resulted in a number of adverse social and economic changes in the area. The white population moved out, as did white-owned businesses which were, more often than not, not replaced by black-owned enterprises. Although the neighborhood has deteriorated, it is expected that Garfield will continue to be

a densely populated neighborhood for many years to come because, as blacks continue to migrate to Milwaukee, they will most likely have to find housing in either Garfield or neighboring Midtown as the result of economic pressures (Beverstock and Stuckert, 1972).[7]

Midtown is one of the most rapidly changing neighborhoods in Milwaukee. In 1960, it was basically a white, working-class, residential area. By 1970, it had changed to an area where 45.5 percent of its population was black. Because of a large industrial area to the north, most of the housing consists of two-unit and larger dwelling units, the bulk of which are rented to industrial workers. In the late 1800's, Germans comprised the majority of Midtown's population, with a small enclave of Hungarian emigrants in the southern section. These ethnic groups stayed on until the 1960's when blacks started moving in. Since that time, the neighborhood has suffered serious social and economic reversals. Overcrowding has increased, property and rental values have dropped, and Midtown's population consists mainly of young black families and older white families (Beverstock and Stuckert, 1972).

Lincoln Creek, containing a number of large industries, was, for many years, a stable neighborhood consisting of white, middle-income industrial workers. Large numbers of black families began moving into Lincoln Creek between 1960 and 1970. Because of the recent population shift in Lincoln Creek, the neighborhood situation appears to be in a state of imbalance. Lincoln Creek contains a large housing project that was originally built for veterans, but today this complex is but one of four serving low-income families in the area (Beverstock and Stuckert, 1972).

Riverside West, for years a Polish neighborhood with a small enclave of Italians, has changed greatly between 1950 and 1970. Although population has declined, the number of housing units has increased because of older dwelling units being subdivided for low-income housing. At the present time, Riverside West is a center of social unrest because of the changing ethnic composition of the neighborhood with blacks moving into the western sections and a growing Puerto Rican population in the southern portion (Beverstock and Stuckert, 1972).

THE ANALYSIS

The analysis utilized a number of population-free indices (Tables 2-4) which relate to the ghettoization process and which were deemed to reflect the factorial ecology of the Milwaukee ghetto. All of the variables were arrayed in accord with the normal probability law when assessed with a Kolomogorov-Smirnov one-sample test at the 0.10 level of significance.

Principal Components Analysis

Principal components analysis (Harman, 1967) was employed to rid the data set of redundancies by collapsing it into a smaller set of orthogonal attributes of the variables. Similar procedures were used by Thompson, et al (1962) in a study of economic health in New York State, by McConnell (1970) to analyze the socioeconomic health of large Illinois municipalities, and by Karsten, McConnell and Patterson (1974) to elicit spatial patterns of quality of life in Milwaukee County. [8] Denote the following:

- Z - N x m matrix of standard scores
- R - m x m matrix of Pearson product moment correlations between the standard scores
- p - m x p matrix of correlations between variables and attributes
- p' - m x p varimax rotation of p
- C - N x p matrix of standard scores on the attributes

N is the number of observations or census tracts (55), m is the number of variables (16), and p is the number of nontrivial attributes contained in the mix of variables (2).

The variables were standardized. Principal components analysis was performed on the R matrix, resulting in a new set of orthogonal components of the variables ($P_1, P_2, ..., P_{16}$). Despite the fact that several eigenvalues were larger than one for each year, it was deemed germane to retain only the first two principal components for further analysis since they resolve, respectively 64.9 percent and 12.5 percent of the variance in R (collectively, 77.4 percent) for 1950, 74.4 and 10.4 percent (collectively, 84.8 percent) for 1960, and 55.6 percent and 16.3 percent (collectively, 71.9 percent) for 1970. The attributes were identified after varimax rotation (Harman, 1967) and quantified by the algorithm

$$C = ZP\lambda^{-1}$$

where λ^{-1} is the inverse of the diagonal eigenvalue matrix. The columns of C are orthogonal and c_{ij} is the standardized magnitude of P_j accruing to the ith census tract.

---

[7] *Beverstock and Stuckert (1972) predict that an additional 30,000 blacks will move into Milwaukee in the next 15 years.*

[8] *Roseman, Christian and Bullamore (1972) employed a similar procedure in analyzing black communities.*

Table 2

VARIABLES AND PRINCIPAL COMPONENTS ANALYSIS
1950

Component	P_1	P_2
Eigenvalue	10.39	2.00
Percentage of total variance in R	64.90	12.50
$\lvert p'_{ij} \rvert \geq .50$	p'_{i1}	p'_{i2}
Variables		
Percent black population	0.84	
Percent of female civilian labor force 14 years and over employed as white collar workers	- 0.96	
Percent of male civilian labor force 14 years and over employed as white collar workers	- 0.94	
Median age of males	- 0.65	0.58
Median age of females	- 0.76	0.54
Population per household	0.81	
Median school years completed by persons 25 years and over	- 0.66	- 0.55
Median family income	- 0.92	
Median monthly contract rent	- 0.76	
Median value of owner occupied housing units	- 0.78	
Percent of total housing units owner occupied	- 0.86	
Percent of owner occupied housing units owned by nonwhites	0.85	
Percent of total housing units renter occupied	0.85	
Percent of renter occupied housing units rented by nonwhites	0.82	
Percent of total housing units vacant and available		- 0.79
Percent of housing units with 1.01 or more persons per room	0.95	

Interpretation of Attributes

1950. The first principal component (P_1) for 1950 is interpreted as an indicator of poverty (see Table 2). Census tracts with high positive scores (c_{j1}) on this attribute would be expected to have low levels of achievement in such areas as white collar employment, education, income, and quality and value of housing units. One would also expect to encounter comparatively youthful populations with large numbers of persons per household and crowded dwelling units. Although the percentage of the population which is black is strongly associated with this component, seven other variables have larger absolute "loadings." The fact that a number of other socioeconomic indices exceeded the black "loading" is considered to be indicative of antecedent conditions in the census tracts; i.e., those conditions which reflect low levels of environmental quality and overall quality of life existed prior to the major influx of blacks. Hence, census tracts scoring high on this component may be considered as having been economically, socially, and environmentally deprived and most prone to ghettoization.

The second principal component (P_2) for 1950 is deemed to be an elderly white population indicator. Positive scores on this attribute would have been associated with less mobile, poor, and poorly educated white populations with little housing available, living in economically and socially deprived census tracts.

1960. The first principal component (P_1) for 1960 is interpreted in the same manner as P_1 for 1950; those conditions of poor environmental quality and quality of life which were prevalent prior to general ghettoization of the study area continued to prevail in 1960 (see Table 3). In other words, expansion of the ghetto came upon the heels of pre-existing poverty, and not vice versa. The fact, however, that those conditions which were antecedent in 1950 became real ghetto attributes in 1960, is manifested by the high positive "loading" with percentage of housing units vacant and available in 1960.

Table 3

VARIABLES AND PRINCIPAL COMPONENTS ANALYSIS
1960

Component	P_1	P_2
Eigenvalue	11.90	1.66
Percentage of total variance in R	74.40	10.40
$\lvert p'_{ij} \rvert \geq .50$	p'_{i1}	p'_{i2}
Variables		
Percent black population	0.88	
Percent of female civilian labor force 14 years and over employed as white collar workers	- 0.96	
Percent of male civilian labor force 14 years and over employed as white collar workers	- 0.92	
Median age of males	- 0.84	
Median age of females	- 0.89	
Population per household	0.78	0.51
Median school years completed by persons 25 years and over	- 0.71	0.50
Median family income	- 0.94	
Median monthly contract rent	- 0.86	
Median value of owner occupied housing units	- 0.84	
Percent of total housing units owner occupied	- 0.86	
Percent of owner occupied housing units owned by nonwhites	0.85	
Percent of total housing units renter occupied	0.84	
Percent of renter occupied housing units rented by nonwhites	0.88	
Percent of total housing units vacant and available	0.77	
Percent of housing units with 1.01 or more persons per room	0.93	

The second principal component (P_2) for 1960 appears to be almost consumed by P_1. However, it is suggested that P_2 reflects overcrowding of occupied dwelling units, a condition consistent with expansion of the ghetto wherein many dwelling units become dilapidated and removed from the housing market, thereby increasing population pressures on inhabitable units. In any event, the elderly white population factor has been superceded by one indicative of active, rather than incipient, ghettoization.

1970. The first principal component (P_1) for 1970 is again considered to be a poverty attribute and P_2 is interpreted in the same manner as in 1960 (see Table 4). Thus, by 1970, the ghettoization process was completed for most of the study area and racial segregation had become a reality. These conditions, which are products of such socioeconomic forces as the housing market and are maintained by these forces, are indicated by the higher population per housing unit loading on P_2. Not only does this serve to illustrate Morrill's (1972) contention that black ghettos are spatially separate colonies in American cities, but it also makes most vivid Darden's (1974) contention that racial segregation is neither voluntary or socioeconomically advantageous to the inhabitants of ghettos.

Euclidian Distance Grouping

Those conditions which are indicative of low levels of environmental quality and quality of life and which are deemed to have prescribed the circumstances which facilitated in-migration by economically and socially deprived blacks are examined at this time. In order to understand the spatial array of these conditions in 1950 and their later effects, the census tract scores on the principal components were subjected to a minimum Euclidian distance grouping algorithm for each year. The procedure treats the census tract scores as image points in Euclidian two-space. Squared distances between points are arrayed in an B x N (55 x 55) matrix. At the initial step, those two census tracts most alike in terms of scores on the principal components are combined into a two-member group and their image points replaced by a single centroid. The process continues until such time as all census tracts are represented by a single image point at step N-1 (54). In all cases, three groups were elicited at step 52: 1) those census tracts most characteristic of ghettoization, 2) transitional census tracts or those imminently susceptible to ghettoization, and 3) those exhibiting the least propensity for ghettoization (see Figures 4, 6, and 8). Isolates from the grouping procedure were assigned with multiple discriminant analysis.

Table 4

VARIABLES AND PRINCIPAL COMPONENTS ANALYSIS
1970

Component	P_1	P_2
Eigenvalue	8.89	2.60
Percentage of total variance in R	55.60	16.30
$\lvert p'_{ij} \rvert \geq .50$	p'_{i1}	p'_{i2}
Variables		
Percent black population	0.80	
Percent of female civilian labor force 14 years and over employed as white collar workers	- 0.81	
Percent of male civilian labor force 14 years and over employed as white collar workers	- 0.82	
Median age of males	- 0.73	
Median age of females	- 0.73	- 0.54
Population per household	0.56	0.74
Median school years completed by persons 25 years and over	0.81	
Median family income	- 0.88	
Median monthly contract rent	- 0.80	
Median value of owner occupied housing units	- 0.68	
Percent of total housing units owner occupied	- 0.77	0.57
Percent of owner occupied housing units owned by nonwhites	0.71	
Percent of total housing units renter occupied	0.72	- 0.57
Percent of renter occupied housing units rented by nonwhites	0.82	
Percent of total housing units vacant and available	0.66	
Percent of housing units with 1.01 or more persons per room	0.53	

Beyond the fact that migration waves are evident, it is interesting to compare the maps of the groups with those depicting the ghettoization process from the standpoint of a single criterion, percentage of black population. For example, Figure 3 reveals that the ghetto was, for all practical purposes, confined to Halyard Park in 1950. Yet, Figure 4 suggests that nearly all census tracts (with the obvious exception of two in Lincoln Creek) possessed those socioeconomic characteristics which rendered them susceptible to ghettoization. Actual black occupancy lagged behind socioeconomic decline. The same conclusion may be drawn by comparing Figures 5 with 6 and 7 with 8, respectively, although the degree of correspondence increases with time.

CONCLUSIONS

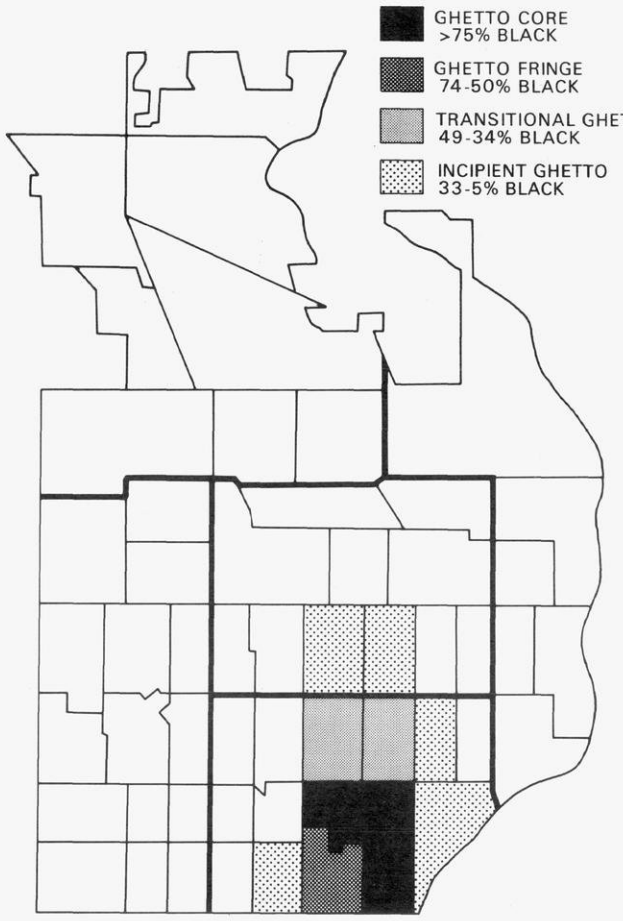
This study has provided empirical evidence to support the hypothesis that undesirable socioeconomic conditions prevailed in the present Milwaukee black ghetto prior to the actual expansion of the ghetto; i.e., most neighborhoods were experiencing low levels of quality of life before blacks moved in and that this situation facilitated the entry of socioeconomically deprived blacks. If urbanism is to survive, such antecedent conditons must be recognized and corrected, not only in Milwaukee, but in all of urban America so that all urban dwellers, whether white or black, may enjoy that degree of social satisfaction and mental well-being which may be equated with an acceptable quality of life. Hence, the capability of this study as a model for predicting future trends of ghettoization should not only provide a format for both public and private agencies for research and planning, but also serve as a catalyst for more incisive studies of one of urban America's most compelling problems.

Author's Acknowledgements

The authors wish to express their appreciation to Harold M. Rose, Professor and Chairman, the Department of Urban Affairs, University of Wisconsin-Milwaukee, for his helpful comments.

Figure 3

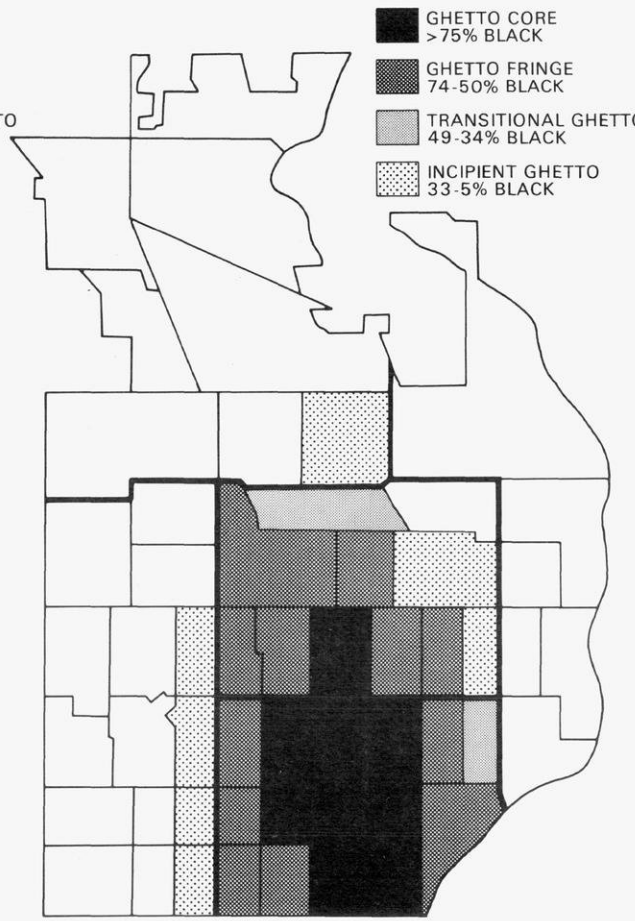
GHETTO AND POTENTIAL GHETTO: 1950



Source: UWM Cartographic Services.

Figure 5

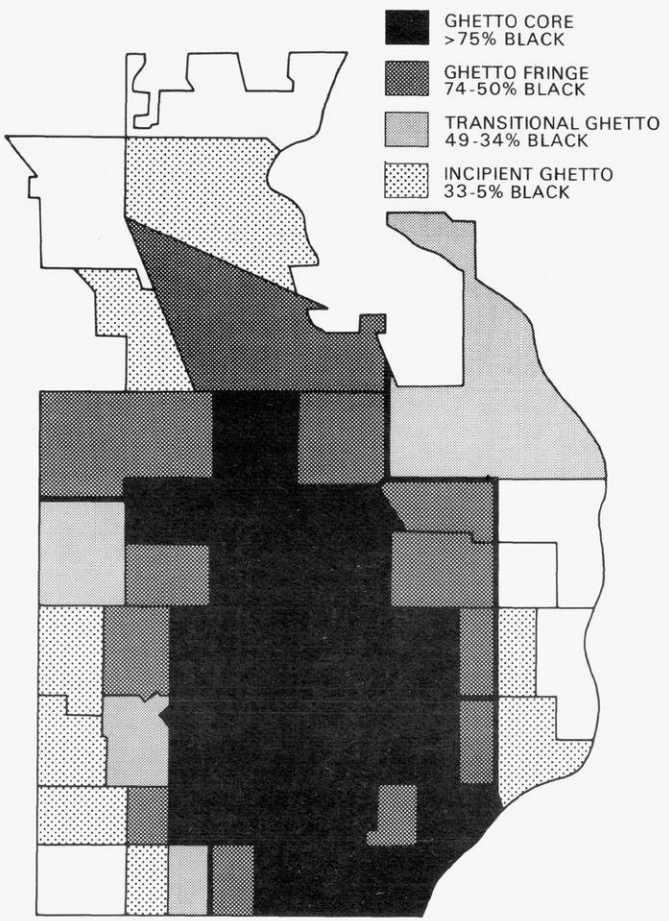
GHETTO AND POTENTIAL GHETTO: 1960



Source: UWM Cartographic Services.

Figure 7

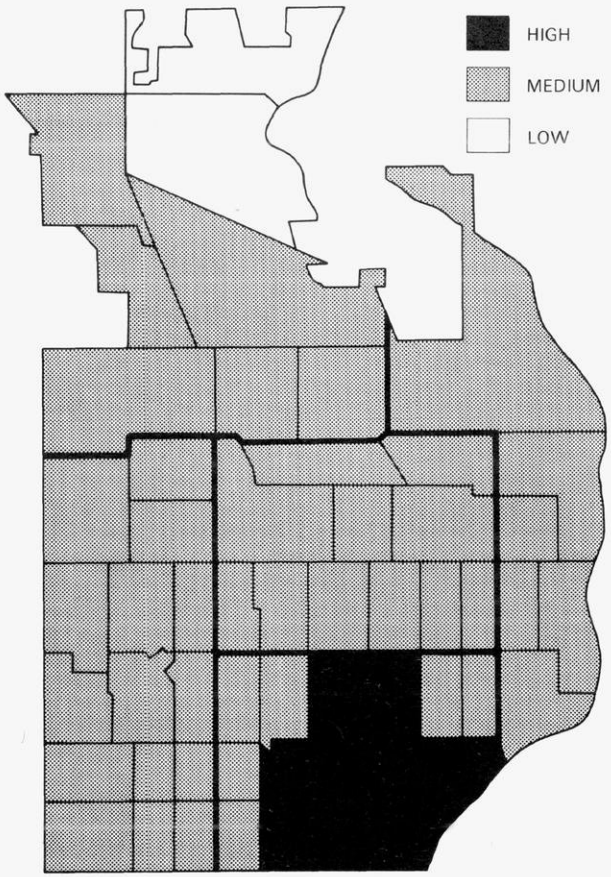
GHETTO AND POTENTIAL GHETTO: 1970



Source: UWM Cartographic Services.

Figure 4

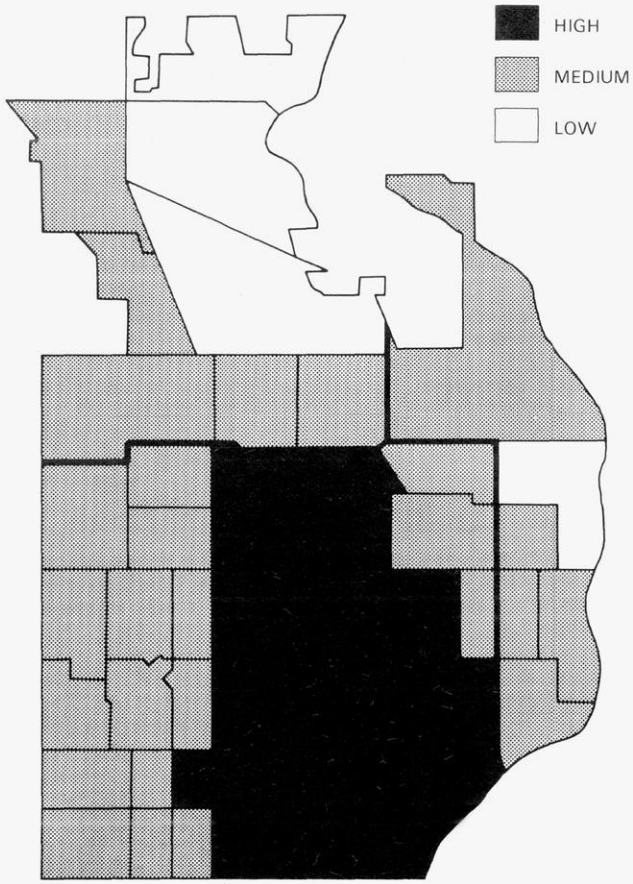
SUSCEPTIBILITY FOR GHETTOIZATION: 1950



Source: UWM Cartographic Services.

Figure 6

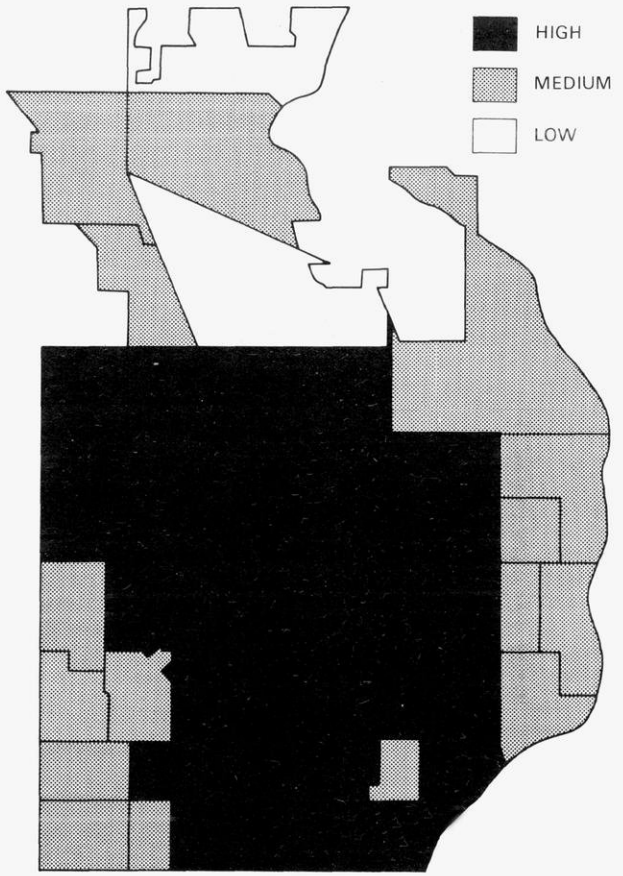
SUSCEPTIBILITY FOR GHETTOIZATION: 1960



Source: UWM Cartographic Services.

Figure 8

SUSCEPTIBILITY FOR GHETTOIZATION: 1970



Source: UWM Cartographic Services.

Appendix A

REFERENCES

Beverstock, Frances and Stuckert, Robert P. (editors), 1972, Metropolitan Milwaukee Fact Book: 1970: The Milwaukee Urban Observatory, The University of Wisconsin-Extension, Milwaukee, Wisconsin, 549 pp.

Darden, Joe T., 1974, "Recent Publication": The Professional Geographer, Vol. XXVI, No. 2, pp. 233-234.

Harman, Harry H., 1967, Modern Factor Analysis: University of Chicago Press, Chicago, Illinois, 474 pp.

Karsten, Richard A., McConnell, Harold and Patterson, Thomas D., 1974, "A Preliminary Spatial Analysis of Quality of Life in Milwaukee County, Wisconsin": Transactions of the Wisconsin Academy of Sciences, Arts and Letters, Vol. LXII, pp. 227-243.

McConnell, Harold, 1970, "Socioeconomic Health of Illinois Municipalities": Transactions of the Illinois State Academy of Science, Vol. 63, No. 3, pp. 273-284.

Mercer, John, 1972, "Housing Quality and the Ghetto": in, Perspectives in Geography 2, Geography of the Ghetto, Perceptions, Problems, and Alternatives, Harold M. Rose and Harold McConnell (editors), Northern Illinois University Press, De Kalb, Illinois, pp. 143-167.

Meyer, David R., 1970, Spatial Variation of Black Urban Households: Research Paper No. 129, Department of Geography, The University of Chicago, Chicago, Illinois, 127 pp.

Morrill, Richard L., 1972, "A Geographic Perspective of the Black Ghetto": in, Perspectives in Geography 2, Geography of the Ghetto, Perceptions, Problems, and Alternatives, Harold M. Rose and Harold McConnell (editors), Northern Illinois University Press, De Kalb, Illinois, pp. 27-58.

Paulson, Belden, 1973, "Urban Dilemma: Contributing Factors": Journal of Extension, Vol. XI, No. 1, pp. 15-22.

Rose, Harold M., 1969, Social Processes in the City: Race and Urban Residential Choice: Commission on College Geography Resource Paper No. 6, Association of American Geographers, Washington, D.C., 34 pp.

_____ 1971, The Black Ghetto: A Spatial Behavioral Perspective: McGraw-Hill Book Company, New York, N.Y., 147 pp.

Roseman, Curtis C., Christian, Charles M. and Bullamore, Henry W., 1972, "Factorial Ecologies of Urban Black Communities": in, Perspectives in Geography 2, Geography of the Ghetto, Perceptions, Problems, and Alternatives, Harold M. Rose and Harold McConnell (editors), Northern Illinois University Press, De Kalb, Illinois, pp. 240-255.

Schmandt, Henry J., 1972, "Solutions for the City as a Social Crisis", in, Urban America: Conflict and Change, J. John Palen and Karl H. Flaming (editors), Holt, Rinehart and Winston, Inc., New York, N.Y., pp. 356-368.

Schmandt, Henry J., Goldbach, John C. and Vogel, Donald B., 1971, Milwaukee: A Contemporary Urban Profile: Praeger Publishers, New York, N. Y., 244 pp.

Social Science Research Committee, 1963, Local Community Fact Book, Chicago Metropolitan Area, 1960: Social Science Research Committee, The University of Chicago, Chicago, Illinois, pp. xiii-xiv.

The National Urban League, 1971, The National Survey of Housing Abandonment: The Center for Community Change, The National Urban League, New York, N.Y., 118 pp.

Thompson, J. H., et al, 1962, "Toward a Geography of Economic Health: The Case of New York State": Annals of the Association of American Geographers, Vol. 52, No. 1, pp. 1-20.

Todd, William J., 1972, "A Factor Analysis of Black-White Polarization in Milwaukee, 1950-1970": Bulletin of the Illinois Geographical Society, Vol. XIV, No. 2, pp. 17-29.

U. S. Department of Health, Education, and Welfare, 1970, Man's Health and the Environment—Some Research Needs: National Institute of Environmental Health Services, U. S. Department of Health, Education, and Welfare, Washington, D. C., 258 pp.

U. S. Environmental Protection Agency, 1973, The Quality of Life Concept: A Potential New Tool for Decision-Makers: Environmental Studies Division, Office of Research and Monitoring, U. S. Environmental Protection Agency, Washington, D. C., 386 pp.

ENVIRONMENTAL CORRIDORS OF YESTERDAY AND TODAY

by Dr. Jeremy M. Katz, Research Psychologist, and Jeanne Sollen, SEWRPC Editor

INTRODUCTION

The regional emphasis on environmental corridors in recent years has not obscured the fact that an urban version of the same concept was originated and implemented in Milwaukee County two generations ago by Charles B. Whitnall and other members of the Milwaukee County Park Commission. The urban version of the environmental corridor—the parkway—was a factor in Whitnall's thinking as early as 1906, even though first plans for a Milwaukee County parkway system did not appear until 1924.

Apparently essentially conceived by Whitnall, the concept of the environmental corridor was rearticulated in Wisconsin in 1962 in a State Department of Resource Development report entitled Recreation in Wisconsin. The concept was adopted and applied by the Southeastern Wisconsin Regional Planning Commission which incorporated it into its regional land use plan as documented in SEWRPC Planning Report No. 7. In that study SEWRPC recommended permanent protection of all of the primary environmental corridors of the Region. These corridors which comprise about twenty percent of the total area of the Region encompass almost all of the best remaining elements of the natural resource base including the best remaining woodlands, wetlands, wildlife habitat, undeveloped floodlands and shorelands, rugged terrain and high relief topography, groundwater recharge areas, and sites having unusual recreational, historic, and scientific value. The continuity of the linear corridors is particularly important to their ecological as well as aesthetic value, and preservation of the corridors in essentially natural uses can do much to preserve the unique natural beauty as well as the overall environmental quality of the Region. In rural areas the corridors were proposed to be reserved through zoning and other land use controls, in urban and urbanizing areas by public purchase for park, parkway, and related green space use. That environmental and aesthetic importance is one significant link between the Commission's newer and Whitnall's original variations of the environmental corridor: both seek to preserve riverine areas so as to protect natural beauty and environmental quality and preserve certain recreational values and ecological functions that improve the quality of life within an area. A second link between the Commission's and Whitnall's variations of the environmental corridor has been the protection of riverine areas from urban development so as to preserve their natural floodplains in open use, thereby preserving floodwater storage areas, avoiding increases in flood discharges and stages, and minimizing flood damages. Studies by the Commission indicate that the filling and development of riverine areas may increase downstream 100-year recurrence interval flood discharges by a factor of six, a fact which Whitnall with great foresight appreciated but was unable to quantify.

One more factor in continuity between the old and the new concepts of the environmental corridor is the shared awareness of its economic advantages. The new concept differs from the old, however, in one important respect. It is highly quantitative. Where the delineation of corridor boundaries formerly was left to the informed intuition of those responsible for its establishment, today engineering data are available and are utilized to set precise floodplain boundaries.

In setting forth its criteria for the delineation of environmental corridors, SEWRPC recommends that three or more of the following seven natural resource elements be present: lakes and streams and their undeveloped shorelands and floodlands; soils exhibiting severe limitations for urban development; wetlands; woodlands; wildlife habitat areas; areas of rugged terrain and great relief; and significant geological formations and physiographic features. Moreover, the Commission indicates that the following natural resource-related elements should also be considered in delineating the corridors: existing outdoor recreation sites, potential outdoor recreation sites, sites having historic or other cultural value, sites having scientific value, and unusual scenic areas and vistas. Generally, environmental corridors correspond to riverine areas.

The classic definition of a parkway is a linear park usually following a major stream or watercourse and including the floodlands thereof and traversed by a parkway pleasure drive or other recreational trail. This definition is generally compatible with the SEWRPC definition of an environmental corridor. The formation of the corridor, it should be stated, however, and even its use for recreational purposes does not require the provision of a parkway drive. In Milwaukee County, where public acquisition of strips of land bordering waterways has been designed, and has come, to connect major parks over the years, the distinction between parkways and parks has become blurred. Parkways grew in size in some localities as additional parkland was acquired, or contracted as part of their territory was transferred to named parks. Today named parks along the parkway routes are integral parts of the parkway system and can hardly be separated from them. Nevertheless, parkways arose as a distinct concept under Whitnall's desire to ring the county with a continuum of parkland and to join the major parks, already located on major streams and on the Lake Michigan shoreline, with parkway drives so that a traveler could make a circular drive entirely in a parklike environment.

The remainder of this article falls into three parts: a presentation of Whitnall's philosophy of and arguments for the development of parkways and an account of his original plans; early land acquisitions and an examination of the chronological growth of the Milwaukee County parkway system; and brief consideration of the degree to which Whitnall's original hopes were realized.

ORIGINS OF A PARKWAY SYSTEM

Florist, banker, school board member and longtime Milwaukee County park commissioner, Charles B. Whitnall is accepted as the originator and foremost promoter of the parkway concept in Milwaukee County. He is considered the father of the Milwaukee County Park System, but even these distinctive titles fail to suggest the elastic range of his conservation interests and activities.

Almost like President Theodore Roosevelt, who fretted about the denuded mountain slopes of China as he set aside vast regions of the American West in national parks, Whitnall worried about proper aeration of the soil, the waste of sewage that might be used in fertilizers, the need to assure sufficient oxygen from plants even as he planned the outlines of the County park and parkway system.

"Why do we spend so much time in destroying the nature which should be assimilated during our development, and then attempt to retrieve it only in spots, for what is a park but an island of normal atmosphere surrounded by physical disintegration?" he asked about January 1906 in a report to be issued later by the newly formed Milwaukee County Park Commission.[1]

The two essentials of parks are trees and shrubbery, he observed a bit impatiently, shrugging off outdoor art and other amenities. He spoke in a utilitarian sense, for trees and shrubs produce the oxygen upon which people depend for life. As he put it, the "green leaves consume what is poisonous to us and return to its place the pure oxygen to breathe."[2]

Whitnall's concern extended to protecting both the air above the land and the aerated porous soil below, to insure a healthy earthen base for producing oxygen-giving plants. His concern encompassed too the water courses and their natural watersheds. He advised:

> We should acquire a control of the natural watersheds or the natural water sponges of absorption and the rivers, creeks and ravines or drains. Just where these are is easily ascertained by following our streams from outlet to their many sources. The land along streams is invariably the most beautiful and least useful generally for commercial purposes. And to allow a few people to fence in a river in which the whole adjacent country is contributor is a forfeiture of our birthright.[3]

His embryonic vision for a parkway plan, later expanded to a parkway ring connecting 13 major parks in the County, centered at this point on the north side of the City with inclusion of stretches of the Milwaukee and the Menomonee Rivers. He pointed out:

> This would give us a park averaging one-half mile wide and about twelve miles in length, having for its fundamental object the preservation of those forces which parking [parks and parkways] should conserve and with which we have been naturally endowed. At the same time, it puts the entire north half of the city on an important basis, equally accessible from all sides and for a drive or walk, an ordinary boulevard stands no comparison.[4]

In 1923, primarily through Whitnall's efforts while secretary of the Milwaukee County Park Commission, a "tentative study" for a metropolitan parkway system was issued. It proposed a greenbelt of scenic drives generally following the major waterways and circling the county. It was the intent in 1923, as later, that these parkway drives would link the major parts of the county into a chain of foliage so that a person entering the route at any point could return to the point of entry entirely in a parklike environment. Scenic parkway drives totaling 85 miles were envisioned in the 1920's, and about 30 miles of these have been built to date. Park and parkway acreage totaled more than 14,100 in September 1975 and, of this total, more than 10,800 acres were part of the parkway system.

---

[1] *Reprint of untitled report by C. B. Whitnall about 1906 issued by the Milwaukee County Park Commission.*

[2] *Ibid., p. 2.*

[3] *Ibid., p. 9.*

[4] *Ibid., p. 10.*

In arguing for the development of parkways, Whitnall emphasized economic factors in addition to factors of beauty and of storm drainage purposes. He pointed out that:

- Building parkways is cheaper than creating detached individual parks, since the native landscape and distinguishing features of the former are already present.

- Parkways provide inexpensive natural storm sewers. Once the County decided to keep streams clean, the necessity of constructing a system of sanitary sewers brought into existence the Metropolitan Sewerage Commission. The Sewerage Commission concluded that in order to have the sewers flow by gravity, the most inexpensive course would be to follow the streams where necessary grades already existed. In place of building a second set of storm sewers, it was more economical to use the natural streams for this purpose. Hence, a system of parkways appeared to be the most economical and beautiful arrangement that could be devised for sewerage and water drainage purposes.

- Parkways increase the real estate value of adjacent land for residential development and hence are in the interests of private land developers.

- Parkways preserve the beauties of nature and provide linear recreational areas, and in this way improve the general quality of life of an urban area.

He amplified the third point saying that "the valleys of these streams are of least account for agricultural ... use or even for the location of industries. On the other hand, it has not taken long to convince our Real Estate Board and others interested in the establishment of desirable residential areas that parkways of this kind form a most beautiful and desirable basis from which to plat residential areas on each side, and we are departing from the checkerboard custom and are learning to plan the driveways or streets in harmony with the general contour, varying the size of the lots somewhat so that our residential areas are becoming more park-like."[5] It was not long before comparative land values in residential areas adjoining parkways and in those farther off demonstrated the truth of this proposition.

Under the "tentative study" the parkway ring, as shown on Map 1, would take sightseers over the following route: Beginning at Lake Michigan Parkway-North, one could travel a short distance to the Milwaukee River Parkway, which in turn would connect with Mud Creek Parkway (now Lincoln Creek Parkway) and extend west across the entire county to the Menomonee River Parkway. This parkway in turn would join Underwood Creek Parkway, and connect with the Root River Parkway, which in turn would join Oak Creek Parkway and finally terminate in Lake Michigan Parkway-South. The only present day exceptions to this "ring" concept are the northerly offshoot of the Milwaukee River Parkway, which would extend from Lincoln Park through the municipalities of Glendale and River Hills to the northern County line, and the eastern part of the Menomonee River Parkway. In a sense, the southwestern part of the Menomonee River Parkway and the Honey Creek and Kinnickinnic River Parkways do not really destroy but rather bisect the ring, since one could travel from the Menomonee River Parkway into Honey Creek Parkway, which would subsequently junction with the Kinnickinnic River Parkway and finally terminate in the northern portion of the Lake Michigan Parkway-South.

THE INCEPTION OF THE PARKWAY SYSTEM

For the purpose of this chronology of parkway acquisition, initial acquisition of detached parks acquired prior to the parkway system proposal presented in 1924 are not included. However, since such parks have been connected and absorbed into the parkways, they now are considered integral parts of the parkways.

Before the formal County parkway system came into being, total parkway acreage from 1911 to 1919 stood at 0.7 acre, attributable to a single parkway, Honey Creek. This parkway thus has the distinction of being the oldest County parkway by nearly a decade. The first parcel was acquired in January 1911 from the Manitowoc Trading Company shortly after acquisition by the County of its first parklands in October of 1910. The parkway experienced little expansion to 1929, a minor expansion in October 1930 when 74 acres of land were acquired by condemnation, gradual expansion from 1935 to 1959, and essentially no expansion since 1960, when total acreage stabilized at the current 159.9 acres. Plans call for the addition of 0.4 acre for an ultimate total of 160.3 acres. The parkway is the seventh largest in the County.

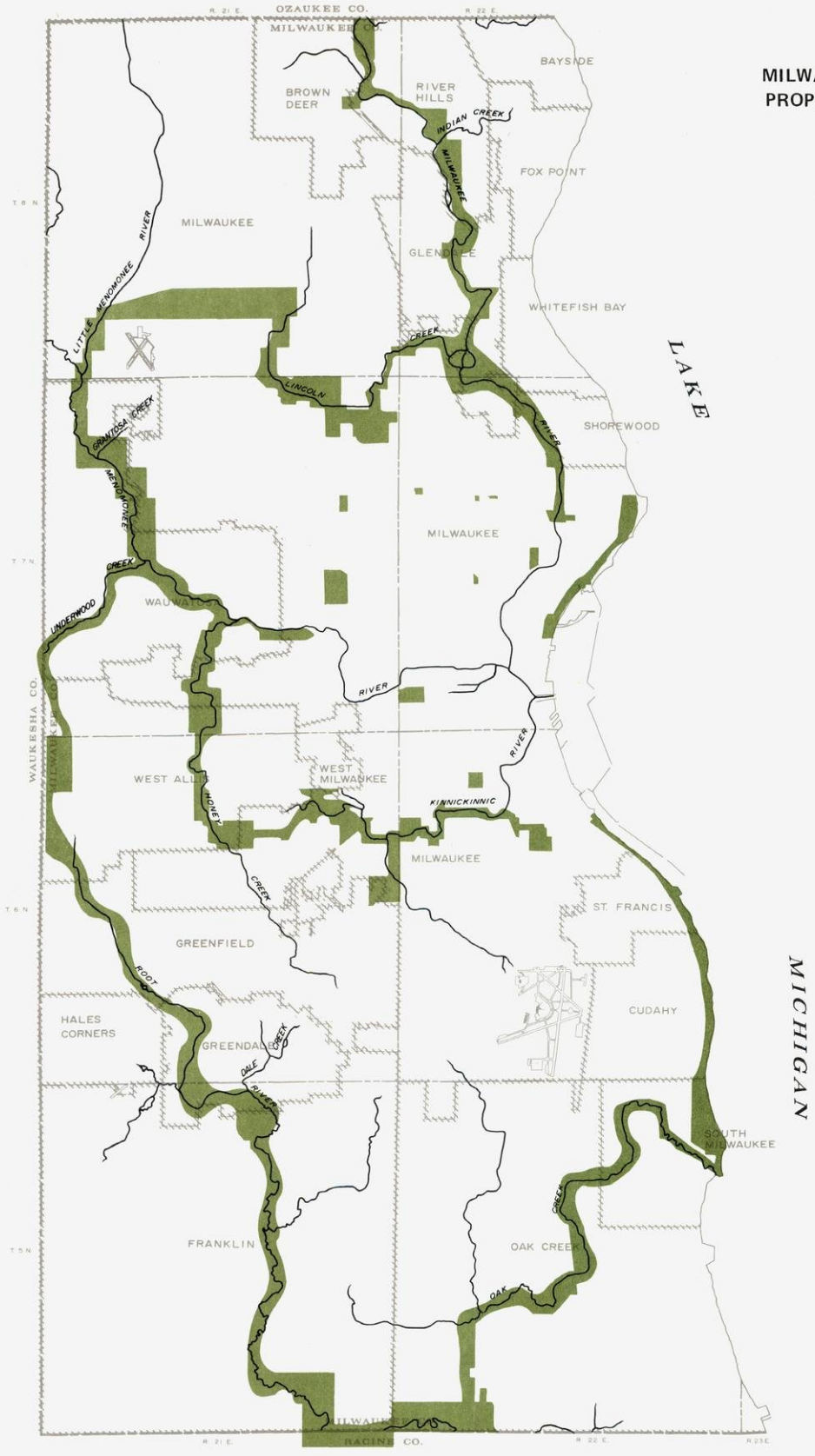
From 1920 to 1924, total parkway acreage in Milwaukee County increased to 18 acres through acquisition of a second parkway, the Grantosa Creek Parkway. The first parcel was 20 acres, acquired in July 1924 from a private party, Mr. and Mrs. Wenzel Wirth. From 1924 until 1944, the size of the parkway remained stable at 16.3 acres. However, in 1945, parkway size dropped to 14.7 acres and in 1950 to 9.7 acres at which it remains. Since no plans exist for expansion, Grantosa Creek Parkway is and should remain the smallest County parkway.

---

[5] *"Milwaukee County Parkways,"* Our Native Landscape, *April-July 1928, p. 4.*

Map 1

MILWAUKEE COUNTY PARKWAY SYSTEM AS PROPOSED BY CHARLES B. WHITNALL: 1923



Source: Milwaukee County Park Commission.

As already noted, the year 1923 marked the release by Whitnall of the first plan for parkway development in Milwaukee County, and rapid expansion of the parkway system occurred during the subsequent period, 1925 to 1929. During this time total parkway acreage increased from 18 to 109 with acquisition of lands for two new parkways—the Menomonee River and Root River Parkways. The Menomonee is the third oldest parkway in the County and the first to be acquired in this 1925-1929 interval. The original parcel was purchased from Beverly Hills, Inc., in July 1927. The parkway experienced gradual expansion from 1927 to 1939, more substantial expansion from 1940 to 1944, and the most rapid expansion from 1950 to 1954, when many purchases of moderate- to large-sized land parcels were made. Since 1955, little expansion of this parkway has taken place. In 1972 the parkway comprised 646 acres, and proposed expansion of about 68 acres would bring it to a total of 713 acres. After the Root River, Oak Creek, and Little Menomonee River Parkways, the Menomonee River Parkway is the fourth largest parkway in the County.

The Root River Parkway—fourth oldest parkway in the County—is the largest. The first parcel was acquired through donation of 0.8 acre in February 1929 by a private party, Bernard Jungbluth. Since then the parkway has experienced steady expansion. Very active expansion occurred during the period 1955 to 1959 when the size of the parkway increased by more than 625 acres. The most impressive expansion, however, took place between 1960 and 1964 when more than 1,160 acres were added through purchase of an exceptionally large number of moderately sized tracts. Since 1965 the rate of expansion has decreased markedly. In 1972 the parkway comprised 3,843 acres. It is proposed to be expanded by an additional 1,306 acres, bringing the total to more than 5,100 acres.

In 1924 the new Milwaukee County Regional Planning Department released a plan for a County parkway system supplementing the park system of the City of Milwaukee.[6] The plan indicated acceptance of Whitnall's ideas and elaborated detailed plans for the first acquisitions of land. The program concentrated first on obtaining lands within an area defined by a line one and one-half miles outside the City of Milwaukee and its suburbs of West Allis, Wauwatosa, and North Milwaukee, where real estate activity at the time was greatest. Map 2 shows lands proposed for earliest acquisition in the Cities of Milwaukee, West Allis, Wauwatosa, and what was then called North Milwaukee. Parkways proposed for this early development included parts of the Menomonee River, Honey Creek, Kinnickinnic River, and Lincoln Creek (then Mud Creek) Parkways.

The starting point of the Menomonee River Parkway was proposed to be where the Grand Avenue Viaduct (now Wisconsin Avenue) crossed the Menomonee River, or in the vicinity of N. 40th Street and W. Wisconsin Avenue just west of Marquette University Stadium. The parkway would then extend along the Menomonee River to the juncture of the river and W. Burleigh Street. Another parkway would follow Honey Creek from its juncture with the Menononee River south to the northern border of State Fair Park, from the southern border of State Fair Park to W. Lincoln Avenue, and finally to W. Oklahoma Avenue. A thin strip of parkway would extend east to approximately W. Cleveland Avenue and S. Hawley Road (S. 60th Street), where it would pick up a branch of the Kinnickinnic River and extend east to Jackson Park. From Jackson Park to Lake Michigan, the Kinnickinnic River Parkway was proposed to be a project of the City of Milwaukee. In the more northern part of the County the parkway system would extend from Lincoln Park along Mud Creek to the vicinity of the intersection of W. Hampton and N. 60th Street. Other parkways were not mentioned in connection with early land acquisition.

Although early plans for land acquisition would lead one to expect that the Mud Creek, Menomonee River, Honey Creek, and Kinnickinnic River Parkways should have experienced the earliest development compared to other County parkways which were not even mentioned in these plans, such does not appear to have been the case. In fact, the first parcel of land for Lincoln (Mud) Creek Parkway was purchased in 1945, considerably later than the acquisition of first land parcels for nearly all other County parkways. Moreover, it appears that the County did not even begin to acquire the proposed County portion of the Kinnickinnic River Parkway west of Jackson Park until at least after January 1, 1940. That parkway area was under City of Milwaukee jurisdiction until 1937.

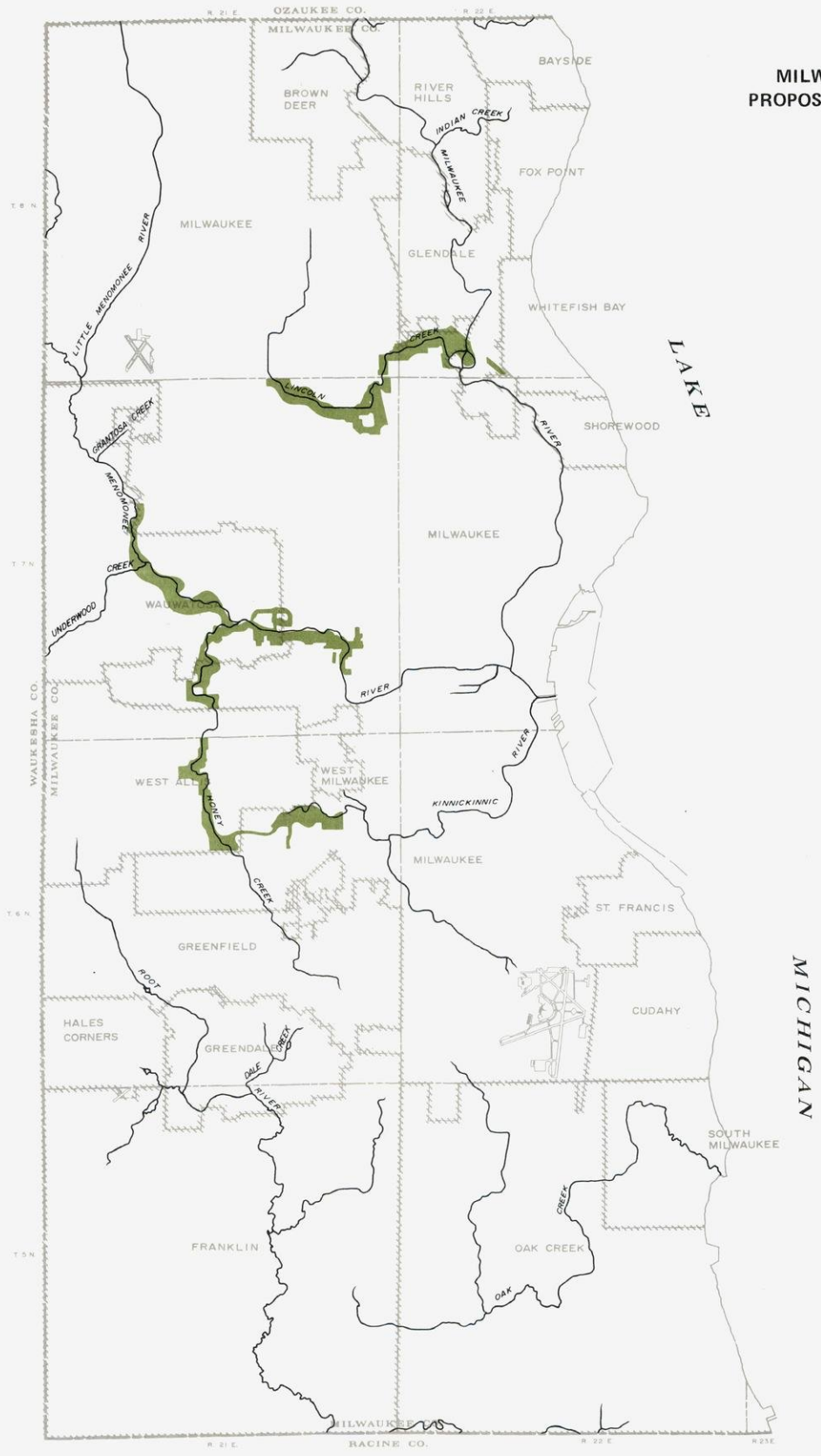
Unlike most major parks in Milwaukee County whose boundaries are the same today as when the parks were originally acquired, parkways generally experience substantial net expansion from the time of initial acquisition. Such addition of land occurred through a variety of means including direct purchase from private owners, transfer of municipal and County

---

[6] *As early as 1889, the first City of Milwaukee parks were operated under the direction of the City of Milwaukee Park Board. In 1907, the Milwaukee County Park Commission was formed under the Wisconsin State Statutes Chapter 27.04. Initial land purchases were made for Jacobus and Grant Parks in 1910, bringing total County park acreage to 87. In 1937, most parks within the County, regardless of municipal location, were transferred to County jurisdiction, and at that time the City of Milwaukee Park Board disbanded. This transfer was responsible for the first County land acquired for both the Kinnickinnic River and Lake Michigan Parkway—North. Moreover, the transfer put a large number of parks associated with parkways under County jurisdiction. For example, Jackson and Pulaski Parks associated with the Kinnickinnic River Parkway; Gordon, Kern, Lincoln, Pleasant Valley, and Riverside Parks associated with the Milwaukee River Parkway; Juneau and McKinley Parks associated with Lake Michigan Parkway—North; and South Shore Park associated with Lake Michigan Parkway—South were transferred from the City of Milwaukee at this time.*

Map 2

MILWAUKEE COUNTY PARKWAY LANDS
PROPOSED FOR EARLIEST ACQUISITION: 1923



Source: Milwaukee County Park Commission.

lands to County Park Commission jurisdiction, and acquisition through the vacation of streets and alleys, condemnation, exchange, or private donations. Losses of parkway lands also occurred for a variety of reasons, often connected with highway or sewerage use, street widenings, or private sale of designated surplus lands. These reasons caused losses of small acreages in the following parkways: Grantosa, 15.5; Honey Creek, 2.2; Lincoln Creek, 4.6; Little Menomonee River, 23.8; Milwaukee River, 6.7; Oak Creek, 3.4; Menomonee River, 50.8; Root River, 31.5; Underwood Creek, 5.3; Kinnickinnic, 5.1; and Lake Michigan South, 6.3. See Table 1 for the difference between acreages of parkways including named parks, representing named parks alone, and excluding named parks.

Plans for a County parkway system had been introduced in 1923 to the County Park Commission. In 1924 the newly created Milwaukee County Regional Planning Department proceeded with the preparation of more detailed plans based upon the Whitnall proposal. Work went forward in 1925. Steps were taken to acquire land; construction plans and specifications were prepared for three parkways; the parkway proposals were explained to interested persons; and facilitating legislation was passed that year by the State Legislature.

The legislation made use of experience which indicated that, wherever a well defined parkway had been developed, the property in its vicinity had increased in value. This proved true in Milwaukee County as early as 1925. Indeed, land values had increased along the route of the proposed County parkway system even before land had been acquired or any improvement authorized.[7]

In the City of Wauwatosa lots that could have been purchased two years before for $400 to $500 each now commanded as much as $2,000 to $2,500 on the strength of the anticipated parkway. Farmers in outlying districts testified in court condemnation proceedings that they considered their land values increased two or three times by being near the proposed parkway system. Some estimates given by landowners with tracts directly facing proposed parkway drives anticipated an increase in valuation from $60 to $100 per front foot. The 1925 annual report of the Milwaukee County Regional Planning Department also predicted that a mile of residential parkway would result in an increased assessed valuation of $1.08 million for a one-block depth of lots on each side of the parkway. It concluded:

> With an assessment rate of $30.00 per thousand the increased valuation of $1,080,000 will yield annually an additional $32,400 in the way of taxes. This may be considered almost entirely as gain to the public treasury, since no matter what the type of development, it is necessary

[7] *Milwaukee County Regional Planning Department, Second Annual Report, 1925, p. 9.*

Table 1

PARKWAYS RANKED BY TOTAL ACREAGE INCLUDING NAMED PARKS, CONNECTING NAMED PARKS, AND REPRESENTING NAMED PARKS: SEPTEMBER 1, 1975

Parkways Ranked by Total Acreage Including Named Parks: September 1, 1975

Root River	4,999.8 Acres
Oak Creek	1,055.5
Menomonee River	943.0
Little Menomonee River	836.5
Lake Michigan–South	832.8
Milwaukee River	739.9
Kinnickinnic River	405.3
Lake Michigan–North	369.8
Underwood Creek	249.9
Honey Creek	220.5
Lincoln Creek	129.5
Dale Creek	45.3
Grantosa Creek	9.7
Total	10,837.5

Parkways Ranked by Total Acreage of Park Lands Connecting Named Parks: September 1, 1975

Root River	3,807.0 Acres
Oak Creek	1,027.4
Little Menomonee River	836.5
Menomonee River	645.2
Kinnickinnic River	238.3
Underwood Creek	223.7
Honey Creek	159.9
Lincoln Creek	129.5
Milwaukee River	116.4
Lake Michigan–North	109.0
Dale Creek	45.3
Grantosa Creek	9.7
Lake Michigan–South	0.0
Total	7,347.9

Parkways Ranked by Total Acreage of Included Named Parks: September 1, 1975

Root River	1,192.8 Acres
Lake Michigan–South	832.8
Milwaukee River	623.5
Menomonee River	297.8
Lake Michigan–North	260.8
Kinnickinnic River	167.0
Honey Creek	60.6
Oak Creek	28.1
Underwood Creek	26.2
Dale Creek	0.0
Grantosa Creek	0.0
Lincoln Creek	0.0
Little Menomonee River	0.0
Total	3,489.6

Source: Milwaukee County Park Commission.

to have pavement, water, sewer, street lights, schools, and all of the other conveniences and necessities of modern city life, which cost as much for one type of house as for another.[8]

County authorities were finding that parkways, besides being beautiful and useful, also were financially rewarding, and they underscored their discovery by deciding upon a policy that would pay property owners a fair value, following appraisal, for all land taken but that would assess property owners affected by the improvement for the cost of acquisition and construction. In building the first unit of the County system in 1927, agreement was reached to have abutting property owners assessed for half the cost of the improvements and have the County pay the other half.

PARKWAY WORK IN THE 1920's

Mirrored in the annual reports of the Milwaukee County Regional Planning Department and the Milwaukee County Park Commission were the segment-by-segment progress of the new expanding program; the pride the County felt in it; and its impact on the financial as well as the physical environments.

From the annual reports:

1925: Topographic surveys and maps were made for about 1,500 acres of land located on Honey Creek and the Menomonee and Milwaukee Rivers.

1926: The year was devoted mostly to negotiations with property owners. Plans for additional units were added to plans for the original system that year from Menomonee and Little Menomonee Rivers, the Milwaukee River, Underwood Creek, Oak Creek, and the Kinnickinnic River.

1927: The first unit of the County parkway system was begun: about a mile of land dedicated to the County by abutting property owners along the Menomonee River from North Avenue to Burleigh Street. The 1927 report emphasized the floodplain benefits of parkways, still one of the principal reasons the modern Milwaukee County Park Commission finds the corridors valuable. Two photographs captioned "Good Park Land but Poor Platting Land" showed contrasting pictures of a home perched safely on a riverbank several feet above the water at normal water stage and the same home, its basement lapped at by floodwaters, at flood stage.

1928: The first unit, the mile from North Avenue to Burleigh Street along the Menomonee River, had been graded for parkway drive. A strip of land lying between river and road had been seeded and planted with trees and shrubs, and walks had been laid out. It was called a "creditable beginning" for the project.

The account asserted:

> When completed, this unit will be a fine example of what the whole parkway system will ultimately be for comfort and beauty, for appearance and reality.

The same year saw dedication of all the land needed for the Menomonee River Parkway from North Avenue to Currie Park by the owners of adjacent property; they would pay one-half of the drainage, paving, and grading costs. "This cooperation," said the report, "is the result of several years of educational and promotional work on the County parkway project."

Menomonee River south of North Avenue, May 9, 1924.

Photo Courtesy of Milwaukee County Park Commission.

West side, Mitchell Woods, Kinnickinnic Parkway, before improvements, June 1924.

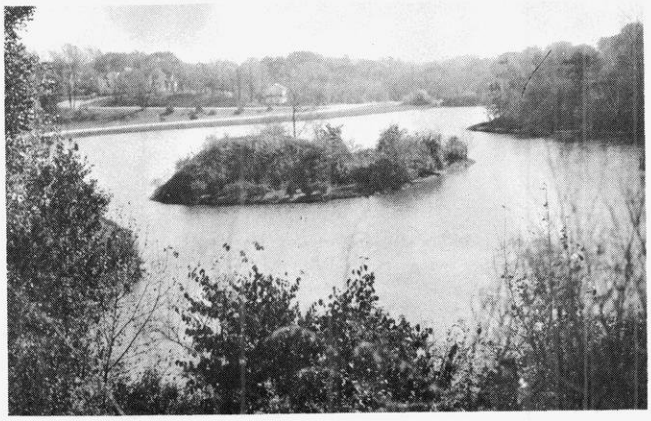
Photo Courtesy of Milwaukee County Park Commission.

[8] *Ibid., p. 24.*

PARKWAY WORK IN THE 1930's

During the five-year period 1930 through 1934, total County parkway acreage rose from 109 to 400 acres, and two new parkways—the Oak Creek and Milwaukee River Parkway—were added to the system. Oak Creek is thus the fifth oldest and next to the largest parkway in the County. The first parcel of 6.4 acres was purchased in June 1930 from the Chicago and North Western Railroad Company. From 1930 to 1944 the parkway experienced little expansion; from 1945 to 1959, steady expansion; and from 1960 to 1964, rapid expansion, with nearly 475 acres acquired.

Interestingly, this latter period of exceptional expansion corresponds to a similar period for the Root River Parkway. At this time, more than 1,000 acres were added to the Oak Creek and Root River Parkways combined, which was more acreage than that acquired by the entire parkway system from its inception in 1911 through 1944. From 1965 to the present, little further expansion of the parkway has taken place. Proposed additions to the Oak Creek Parkway of 288.2 acres should increase the ultimate area from the present 1,014 to 1,302.6 acres.



Lagoon, Oak Creek Parkway, 1935.

Photo Courtesy of Milwaukee County Park Commission.

The sixth oldest parkway and second to be added from 1930 to 1934 is the Milwaukee River Parkway. The original parcel of 0.6 acre was purchased in October 1934 from a private party, Mr. and Mrs. Louis Mesier. The number of acres of parkway lands continued to increase until June 1955, when a 15.6 acre tract was transferred to Kletzsch Park. Since 1960, parkway acreage has increased to approximately 116 acres. Proposed additions of 118.5 acres should bring the ultimate total to 234.8 acres. The Milwaukee River Parkway is the ninth largest in the County.

Creek widening in Root River Parkway, February 1934.

Photo Courtesy of Milwaukee County Park Commission.

Tree and shrub planting by Civilian Conservation Corps in Root River Parkway, May 1934.

Photo Courtesy of Milwaukee County Park Commission.

During the period 1935 to 1939, total County parkway acreage increased by over 950 acres to 1,350 acres, and three new parkways were added to the system through the transfer of public lands from Milwaukee County or the City of Milwaukee: Underwood Creek, the Kinnickinnic River, and Lake Michigan-North Parkways. The large-scale transfer of municipal parks and parkways to County jurisdiction took place in January 1937.

The seventh oldest parkway and the first added from 1935 to 1939 is the Underwood Creek Parkway. The initial parcel of 88.5 acres was transferred in February 1935 from County Institutions jurisdiction. From its inception through 1959 the parkway has experienced steady expansion to 1960 when the current total acreage of 223.3 was reached. Further expansion of 0.3 acre is proposed, which would bring the ultimate total to 223.6 acres. Underwood Creek Parkway is the sixth largest in the County.

Tied for the eighth oldest parkway in the County and the second and third to be added during 1935 to 1939 are the Kinnickinnic River Parkway and the Lake Michigan Parkway—North. The initial parcels of both were part of the January 1937 general transfer of municipal parks and parkway lands from City of Milwaukee to County jurisdiction.

The first parcel of the Kinnickinnic River Parkway, 139.2 acres, comprised over half the currently existing acreage. The parkway experienced steady expansion until June 1957 when 30 acres were transferred to create Baran Park. Current parkway acreage is 237. Proposed additions of 10.2 acres should bring the ultimate total to 247.8. The parkway is the fifth largest in the County.

The first parcel for the Lake Michigan Parkway—North, 93.3 acres, comprises almost 90 percent of current parkway acreage. The parkway has experienced a slight expansion of about 16 acres since its inception. Proposed additions to the parkway total 3.5 acres, to bring the ultimate total to 112.5. The parkway is the tenth largest in the County.

The Biennial Report for 1931-32: Improvements were made in three units of the system, one of them Root River Parkway. The County report explained: "In order to minimize the effects of floods on Root River, sections of the creek were widened and deepened, some retaining walls were built, and the banks were graded and seeded." This period also saw expansion of and much work on Honey Creek, the County's oldest parkway. It underwent grading and drainage of a sector acquired by condemnation (74 acres were acquired by condemnation in 1930). According to the report: "Due to the length of this unit, the necessity of creek relocation and widening, the need for a number of bridges, and the vast amount of road grading required, a large amount of work remains to be done, and will necessarily be extended into the next few years."

Quadrennial Report for 1933-36: The largest improvement at Estabrook Park was a flood control project along the Milwaukee River. It was undertaken to prevent repetition of an August 1924 flood that caused waters of the Milwaukee River and Lincoln Creek to rise so high that rowboats were needed to reach homes in the vicinity. The remedy decided upon was to clear the river channel of about 1,500 feet of a rock ledge, much of it good limestone subsequently used in County construction projects. The work brought in a succession of depression era public works agencies—Civil Works Administration, Federal Emergency Relief Administration, Civilian Conservation Corps, Public Works Administration, and Works Progress Administration. The decade saw the alphabetical agencies taking a prominent part in the County parkway projects. Their initials were sprinkled through the annual reports, and some of the agencies earned praise and thanks from the County as the depression era ended.

Lake Michigan Parkway—North: Preliminary studies were made to continue Lincoln Memorial Drive, opened from Mason Street bridge to Lafayette Place in 1927, from the long existing Lake Park to the County line. It was proposed that the northerly extension of Lincoln Memorial Drive, from Kenwood Boulevard to Doctors Park, could be facilitated by County acquisition of riparian rights and development of the drive across a series of landfill islands out in the lake. This ambitious island plan, in the preliminary study phase released in the 1930's, called for a necklace of islands along the Lake Michigan shoreline within the County's 2,400 foot jurisdiction from shore. The islands would be connected by bridges, some of them movable for the benefit of watercraft. The islands would be joined to the mainland at approximately one-mile intervals. Flanked by a sea wall on their eastern boundaries, the islands and the wall would serve as a breakwater and as an erosion retardant for the lake bluffs even then being worn away by the action of waves. Movable bridges would allow small watercraft easy ingress and egress, and large lagoons formed between the islands and the shoreline would serve for water sports and as mooring basins. The artist's conception of this grand scheme—never realized—showed a curving, foliage shaded drive out in the lake, with clumps of trees marking the island chain.

Lake Michigan Parkway—South: Topographic maps were prepared and tentative plans made for a parkway unit to connect Sheridan Park in Cudahy with Grant Park in the City of South Milwaukee. The plan provides for continuation of the parkway drive south along the top of the Lake Michigan bluff to a connection with the Grant Park drive. Since the latter drive already joined Oak Creek Parkway, the construction of this unit would constitute a substantial link in the County system.

Menomonee River Parkway: In January 1936 the Civilian Conservation Corps (CCC) began improving a section of this parkway south of W. North Avenue. Besides being graded, the river channel was relocated and construction was undertaken on a stone masonry and reinforced concrete bridge at Swan Boulevard.

Oak Creek Parkway: One of the principal improvements to this facility in four years was an "English cottage type" pavilion, a stone building with large overhanging stained timber eaves located at the base of a steep wooded slope. The scenic slope, however, required a booster pump and pressure line to raise the sewage from the building to the City of South Milwaukee sewer located above the bluff.

Root River Parkway: Several sections were under construction, at least one of them by the CCC. Almost 50 acres needed to extend the parkway northwest from W. Forest Home Avenue had been acquired by dedication in the mid-1930's.

Underwood Creek Parkway: The first to be added between 1935 and 1939, Underwood got its original parcel when a strip of land about 1.5 miles long along the creek was transferred from the Milwaukee County Institutions.

THE ERA OF WORLD WAR II AND THE POSTWAR YEARS

During the years 1940 to 1944, no new parkways joined the system, and parkway expansion totaled 246 acres. However, from 1945 to 1949, total county parkway acreage increased by almost 900 acres, and three new parkways were added to the system: the Lincoln Creek, Lake Michigan-South, and Little Menomonee River.

1940: The park system gained only a small acreage that year, leaving it at about 5,000 acres, of which some 3,600 were parks and associated parcels and about 1,400 acres were part of the County's eight parkway units. An appraisal in the 1940 annual report of the Milwaukee County Park Commission evaluated the program as follows:

> Yes, it cost money but it also opened thousands of acres of desirable home districts, with several millions of assessable values created along the parkway, and a future well ordered home environment, in the open country away from congestion—besides, it gave, and is giving, employment to thousands of men who otherwise would be supported in relief, and the Federal Government helps with this relief burden of the county.

With several federal programs already available to the Park Commission, the Commission for several years had recommended a County works program under which persons receiving aid would work out their relief budgets by providing labor for the County. With such an exchange, the 1940 report pointed out, "the maintenance cost could be kept at least at its present status, and in fact a better job could be done of serving the public."

Curb installation, Kinnickinnic Parkway (Mitchell Manor), November 1941.

Photo Courtesy of Milwaukee County Park Commission.

In the depths of the depression the CCC had six camps in County parks. The 1940 report, preceding American entry into the war and the subsequent end of the depression, took special pains to thank the CCC workers for their labors on Milwaukee County parks and parkways. It said:

> Honey Creek and Bluemound Camp improved the Honey Creek Parkway, the Underwood Creek Parkway, and parts of the Menomonee River Parkway. To the people of Milwaukee County, this represents a tremendous project entirely completed. Eight concrete and steel stone-faced bridges, a railroad grade separation, a lannon-stone shelter building, miles of paved roadways and walk trails, thousands of trees, shrubbery and plantings, stand out as a monument to the industry of these boys who worked under able leadership and accomplished a job so well done that they must feel a sense of satisfaction, same as the sense of appreciation that the people of Milwaukee County feel in a project contributing so much of lasting benefit.

Other CCC camps located in County parks had contributed too. Kletzsch Camp had built a replacement dam on the Milwaukee River; Sheridan Camp, two years in operation, had built 13 jetties out into Lake Michigan. Estabrook Camp, four years in operation, that year had completed another Milwaukee River dam. Then the camp went to work on the Milwaukee River Parkway north of Silver Spring Road. Whitnall Camp, which first housed youth and then veterans, had been busy on the large Root River Parkway, consisting of more than 650 acres. The labors had included construction of three bridges, landscaping of almost the entire parkway, the planting of thousands of trees and shrubs, the clearing and enlarging of streambeds, and the establishment of lagoons and occasional camps and picnic places.

In the postwar years came resumption of parkway expansion.

The tenth oldest parkway in the County and the first added between 1945 and 1949 is the Lincoln Creek Parkway. The initial parcel of five acres was purchased in September 1945 from a private party, Friedericke Saltzmann. The parkway nearly reached its present size of 129 acres between 1950 and 1954. Proposed additions of 14.1 acres should bring the ultimate total to approximately 143 acres. The parkway is the eighth largest in the County.

Lake Michigan Parkway--South is composed of five named parks: Bay View, Grant, Sheridan, South Shore and Warnimont. The parkway is considered to have originated in 1948 because that year began the process of acquiring lands connecting two long-existing lakefront parks, South Shore and Grant Parks. South Shore Park was acquired by the City of Milwaukee

in 1909 as a separate park of 14.6 acres, followed by the acquisition of 48.9 acres for Grant Park by the County in 1910. The initial acquisitions in Sheridan Park (1928), Bay View Park (1929), and Warnimont Park (1948) followed. The beginning of the process of connecting the two lakeshore parks, South Shore and Grant, began in 1948 with an initial purchase of 6.0 acres from a private party, Stephen Mueller. The connecting lands were known as the southern extension of Lincoln Memorial Drive, or Lake Michigan Parkway-South. Ultimately the parkway, the second parkway added in the years 1945 to 1949, came to consist of all five named parks, which meantime had come to absorb the connecting lands.

The third parkway to be added from 1945 to 1949 and the second newest of the 13 parkways in Milwaukee County is the Little Menomonee River Parkway. The first parcel of 27.8 acres was purchased from a private party, Walter Laabs, in December 1948. The parkway experienced steady expansion until 1965, when acreage leveled off near its present size of 836.5. Expansion of 16.6 acres is proposed, which will bring the ultimate average to 853.1. Although a relative newcomer among parkways, the Little Menomonee River Parkway is the third largest.

THE 1950's TO THE 1970's

Although no new parkways were added to the system during the next three five-year periods—1950-1954, 1955-1959, and 1960-1964—County parkway expansion was extensive. During the period 1950 to 1954, approximately 1,240 acres were added to the system; during 1955 to 1959, 1,300 acres; and during 1960 to 1964, almost 1,500 acres. In the period 1965 to 1969, total parkway expansion decreased to approximately 750 acres and one new parkway, Dale Creek, was added. Dale Creek is thus the youngest parkway in the County. These lands were acquired, along with other lands in the Root River Parkway, in 1952 from the federal government. No expansion is proposed. Dale Creek Parkway is the second smallest parkway in the system at 45.3 acres.

The County system of 13 parkways serves neighborhood, community, and regional needs. Total parkway acreage was 10,837 as of September 1, 1975. An additional 1,930 acres are proposed to be added to the system, bringing the proposed ultimate parkway system acreage to 12,767, or about 8.2 percent of the total area of the County. This acreage is strung out along almost 85 lineal miles of parkway land. About 30 miles of parkway pleasure drive, not including connecting streets, have been developed through the parkway system. The first of these drives was in the Menomonee River Parkway from North Avenue to Burleigh Street built in 1927. The most recent addition was about a mile of drive through the Underwood Creek Parkway, built in 1968.

The parkland acquisition program that continues in Milwaukee County still relies strongly for its directions on some of the criteria that prevailed in Whitnall's time, although his generation may not have spelled out the standards so precisely as does today's generation. As already stated, in defining environmental corridors, the SEWRPC requires three or more of the following seven natural resource elements to be present: lakes and streams and their undeveloped shorelands and flood-

Table 2

PARKWAYS RANKED BY YEAR OF INITIAL ACQUISITION (INCLUDING AND EXCLUDING EARLY NAMED PARK AREAS): SELECTED YEARS 1872-1952

Parkways Ranked by Year of Initial Acquisition (Including Early Named Park Areas): 1872-1952

Year	Parkway	Named Area
1872	Lake Michigan–North	Juneau Park
1905	Milwaukee River	Riverside Park
1909	Lake Michigan–South	South Shore Park
1910	Menomonee River	Jacobus Park
1911	Honey Creek	--
1915	Kinnickinnic River	Jackson Park
1921	Root River	Greenfield Park
1924	Grantosa Creek	--
1930	Oak Creek	--
1935	Underwood Creek	--
1945	Lincoln Creek	--
1948	Little Menomonee River	--
1952	Dale Creek	--

Parkways Ranked by Year of Initial Acquisition (Excluding Early Named Park Areas): 1911-1952

Year	Parkway
1911	Honey Creek
1924	Grantosa Creek
1927	Menomonee River
1930	Root River
1930	Oak Creek
1934	Milwaukee River
1935	Underwood Creek
1937	Lake Michigan–North
1937	Kinnickinnic River
1945	Lincoln Creek
1948	Lake Michigan–South
1948	Little Menomonee River
1952	Dale Creek

Source: Milwaukee County Park Commission.

A stretch of the scenic Menomonee River Parkway, bordered by residences, between W. Burleigh Street and W. Keefe Avenue in the City of Wauwatosa. 1976.

SEWRPC Photo.

Near the confluence of Lincoln Creek and the Milwaukee River in Lincoln Park. 1976.

SEWRPC Photo.

lands; soils exhibiting limitations for urban development; wetlands; woodlands; wildlife habitat areas; areas of rugged terrain and large relief; and significant geological formations and physiographic features. Additional resource-related elements also are considered.

Floodlands: Acquisition of floodlands has been a leading motivation of the parkway program since it began in 1911 and continues to be a motivation. Some floodlands exist in all the County's parklands. It is far easier to cope with and adjust to floodwaters on open publicly owned land than on developed private land, therefore County ownership of potential floodlands is highly desirable. Where water can spread out over a broad floodplain rather than be confined in a narrow manmade channel, less damage to property and people is likely to result. But urban development has forced much channelization of floodwaters, with the result that concrete lined channels built to handle the torrents can be both dangerous and aesthetically unappealing.

Soils Unsuitable for Urban Development: Soils have not been a formal criterion for parkland acquisition, but the park system has acquired areas covered by soils unsuited or poorly suited to urban development and it is continuing to do so. Presently it is seeking to acquire a parcel of at least 10 acres on old Ryan Road in the vicinity of the Oak Creek Parkway where the soil is unsuitable for a road and the road is being relocated. Old quarries are an important example of this type of acquisition. Recently the park system acquired a stone quarry on the Menomonee River that had been used as a municipal dump site by the City of Milwaukee. Plans call for acquiring other quarries on the Root River and the Menomonee River.

Wetlands: Many of these lands are part of the parkway system, but they were chosen more for their floodland qualities than their wetland resource values. Wetlands are superior wildlife habitats; they also are under pressure of urban development, so that competing forces are playing on their preservation. Portions of the large wetland areas that lie in the southern part of the County are protected in the Oak Creek and Root River Parkways.

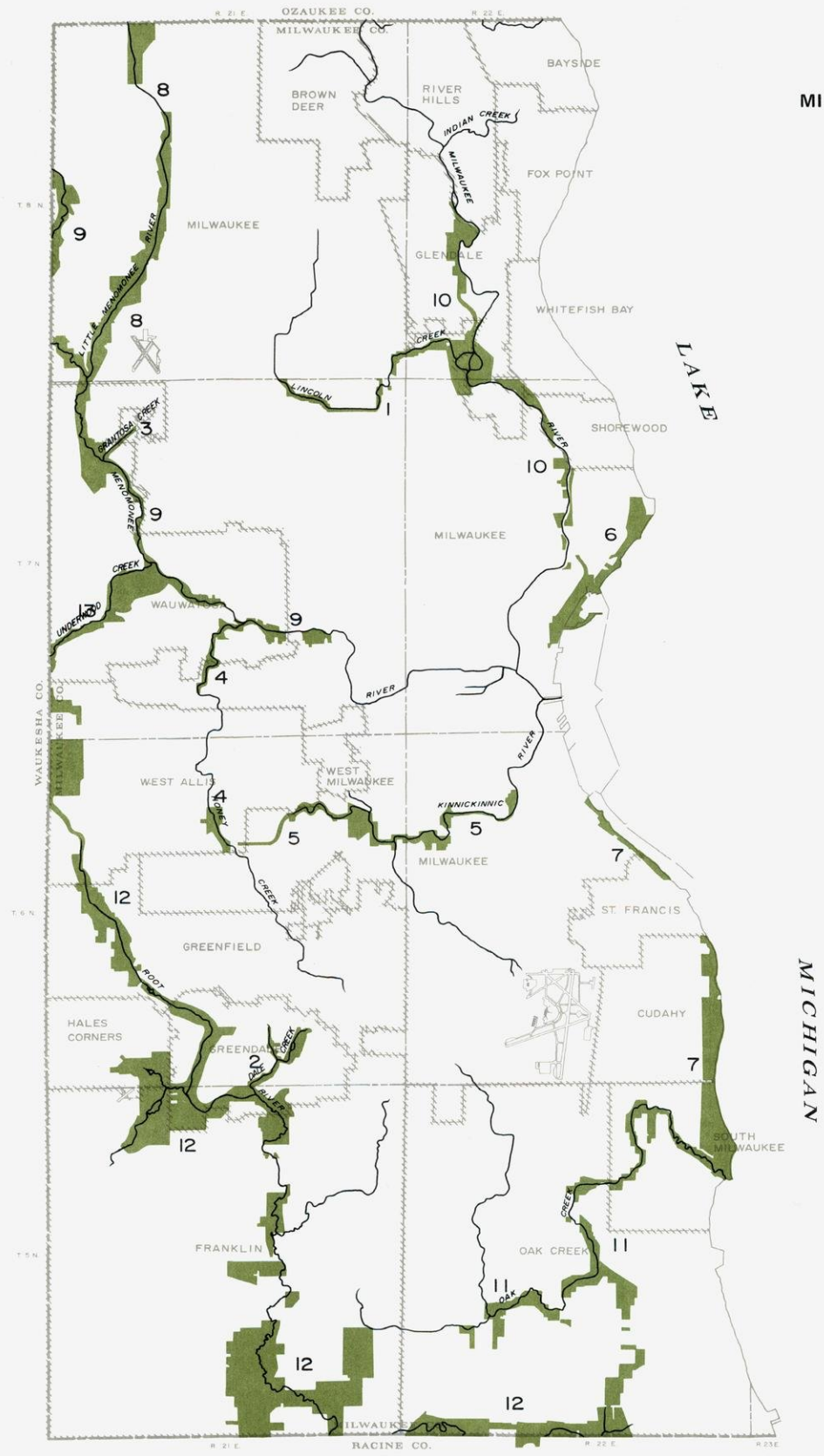
Woodlands: These are another prime resource that has won some protection by being included in parkways. The County park system is attempting to acquire at least three woodland areas: one of about 10 acres adjacent to the Wehr Nature Center at Whitnall Park and two of about 40 acres each in the northern and southern parts of the County. The first is sought by purchase from private ownership, the other two by donation from a foundation.

Rugged Terrain: Quarries and Lake Michigan shoreline are examples of this type of land category, and both of these features are sought-after additions to the parkway preserves.

Significant Formations: Presently sought by the park system as an example of this kind of parkway attraction is an area near the south County line on the Root River Parkway where the park system hopes to establish a 660 acre excavated lake on an extensive floodplain. About 90 percent of the land has been acquired from private interests, but financial problems remain because of excavation and development costs.

Map 3

EXISTING PARKWAYS IN MILWAUKEE COUNTY PARKWAY SYSTEM



LEGEND

EXISTING PARKS

1. LINCOLN CREEK
2. DALE CREEK
3. GRANTOSA CREEK
4. HONEY CREEK
5. KINNICKINNIC RIVER
6. LAKE MICHIGAN, NORTH
7. LAKE MICHIGAN, SOUTH
8. LITTLE MENOMONEE RIVER
9. MENOMONEE RIVER
10. MILWAUKEE RIVER
11. OAK CREEK
12. ROOT RIVER
13. UNDERWOOD CREEK

GRAPHIC SCALE

0 1/2 1 2 3 MILES

0 4000 8000 12000 16000 20000 FEET

Source: Milwaukee County Park Commission.

CONCLUSION

Charles B. Whitnall make his first tentative study for a county parkway system in Milwaukee County more than a half-century ago. His original plans have not been entirely realized, a fact understandable when it is considered that in some cases land acquisition was not possible and, in others, land not originally intended for acquisition was acquired. Moreover, as parks were acquired along parkway routes or as parkway units were acquired adjacent to named parks, the line between the two became indistinct and the two facilities inseparable. As the years passed, too, urbanization and population growth somewhat altered the park system's emphasis on recreational facilities toward more attention to developed facilities.

Despite deviations from Whitnall's original plans for parkway development, which generally involve only small parts of the larger parkways or relatively large portions of the smaller ones, his original ring concept is still viable. This concept, in which parkways serve as connecting links between major County parks, is still easily perceived in the existing and proposed parkway system of Milwaukee County. The extent to which Whitnall's original dreams for a County parkway system have been realized is truly remarkable.

Overall, acquisition of parkway lands has conformed remarkably well to Whitnall's original proposals. Both the Kinnickinnic River Parkway and Lake Michigan Parkway-North correspond almost precisely to original plans. The existing and proposed western and southwestern portions of the Root River Parkway, the existing and proposed portion of the Oak Creek Parkway north of E. Puetz Road, most of the Menomonee River Parkway except the northern and easternmost portions, and most of the proposed and acquired Milwaukee River Parkway except the portion between Kletzsch Park and N. 27th Street correspond quite closely to original plans.

On the other hand, Lincoln Creek Parkway has never been nor is it proposed to be extended across the entire County to meet the Little Menomonee River Parkway as proposed by Whitnall, and Honey Creek Parkway has never been nor is it intended to be extended south of State Fair Park. In addition, the Little Menomonee River Parkway has experienced much more extensive development than originally planned; the configuration of the Oak Creek and Root River Parkways in the southeastern part of the County has been considerably altered from the original plans; the Root River Parkway extends farther east than originally planned; the southwestern fork of the Oak Creek Parkway has never been nor is it proposed to be extended to meet the Root River Parkway; and the eastern branch of the Oak Creek Parkway, which was not proposed for acquisition in the original plans, is proposed to juncture with the easternmost portion of the Root River Parkway.

Whatever the modifications to Whitnall's concept, his vision more than one-half century ago has resulted in protection of invaluable natural resources for the people of Milwaukee County and in the simultaneous achievement of flood control advances and property valuation increases.

Acknowledgements

The generous assistance of the Milwaukee County Park Commission and particularly of Robert G. Hensler, a landscape architect who heads the planning section of the Park Commission Division of Development, was indispensable to the preparation of this paper.

OLD COURT HOUSE
P.O. BOX 769
WAUKESHA, WISCONSIN
53186
PHONE 547-6721