

Bismarck Medical District

Traffic Planning Study

City of Bismarck

November 1984

HDR

Henningson, Durham & Richardson

In Association with

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1.0 INTRODUCTION

This report presents the analysis and findings of a traffic planning study which includes the zoned "Medical District" in the City of Bismarck and several adjacent city blocks. The study addresses a variety of transportation planning issues within the district including:

- o future land uses
- o traffic volume projections
- o traffic circulation and street capacity
- o parking requirements
- o pedestrian circulation

Detailed consideration of these topics is contained in the report, which is intended to serve as a guide in maintaining a balanced transportation system in the study area, and in monitoring the transportation impacts of land use development in the years ahead.

1.1 THE STUDY SETTING

The "Medical District" of Bismarck and adjacent areas covered by this study has experienced considerable development activity within the last few years. Expansion projects by both Medcenter One (previously Bismarck Hospital) and St. Alexius Medical Center have recently been completed. Supporting medical offices have been built, and residential properties are undergoing conversion to greater density, other uses, or surface parking lots. Other significant public and private sector projects, some in operation and others pending, have helped to change the visual character of the district and its environs. Development of medical facilities and other commercial projects is expected to continue this pattern.

More importantly, the transition, redevelopment and intensification of land uses in the district may have significant implications on the street system and its ability to service through traffic, provide proper circulation, and safely accommodate pedestrians. This study was prompted in part by the interest of public officials to help assure that the near term and future transportation requirements of the district are preserved.

Henningson, Durham and Richardson, Inc. (HDR) and Galpin-Ciaccio-Klick Associates (GCK) were retained by the City of Bismarck to conduct the study of the transportation needs in the Medical District.

These basic objectives for the study were identified:

- Develop projections of future study area land use conditions, and resulting traffic volumes, parking demands and pedestrian circulation patterns.

- Analyze future transportation system demands and the impact on the existing street, parking and pedestrian facilities.
- Identify capital improvements, operational changes, and policy/regulatory considerations necessary to assure a balanced and functional transportation system in the Medical District for projected land uses.

1.2 STUDY APPROACH

Several specific work activities were undertaken in order to accomplish the study objectives:

- o Inventory existing transportation facilities and usage patterns.
- o Formulate two future land use scenarios representative of alternate land development scenarios. Characterize each in sufficient detail to evaluate their transportation system impacts.
- o Develop projections of future traffic volumes, parking demands, and pedestrian activity.
- o Evaluate future land use impacts with respect to:
 - interrelationship of various land uses
 - street system capacity
 - traffic circulation and operations
 - parking requirements
 - pedestrian access and circulation
- o Formulate recommended actions necessary to address future transportation requirements in the study area:

- circulation patterns	- driveway locations
- street capacity	- pedestrian facilities
- traffic controls	- parking policies
- on-street parking	- land use policy issues
- off-street parking	- neighborhood impacts
- o Prepare a final report summarizing analyses and evaluations, study recommendations and coordination efforts with the public.

1.3 COMMUNITY COORDINATION

The input of the community is an integral element of such a study as it is a useful way to identify study area issues, needs, and solutions from the perspective of major activity centers, residents of the area, businesses, and the interested public at-large. To this end, numerous contacts were made by the consultant team in the early stages of the project. Two public information meetings were conducted at key points during the study, and several presentations were made to interested organizations. The product of these community coordinated efforts was a valuable resource and sounding board for the study.

2.0 EXISTING CONDITIONS

The purpose of this chapter is to describe the general characteristics of the study area as a basis for review of existing conditions and to establish a foundation for projection of future study area land uses.

2.1 LAND USE AND ZONING

The study area for this project is an area lying immediately east of the Central Business District of Bismarck and is defined as the area between Main Avenue, 5th Street, Avenue C, and 12th Street. As indicated in Figure 1, the study area encompasses the Medical District proper as defined within City zoning regulations and selected adjacent areas which relate to or are affected by the Medical District.

2.1.1 Zoning

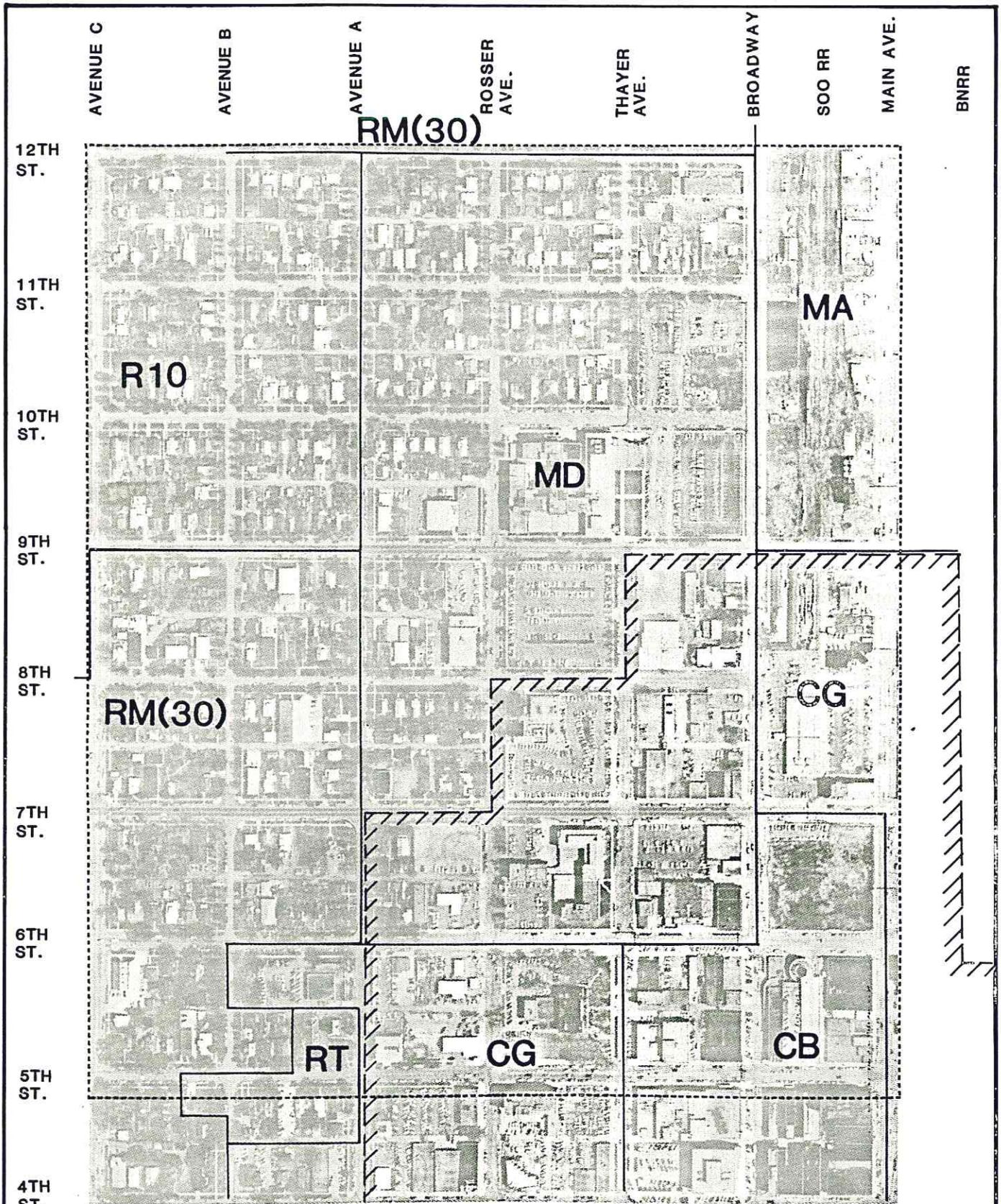
The largest zoning classification in the study area is the Medical District lying between 6th and 12th Streets and Broadway Avenue and Avenue A. This area (Figure 2.1) encompasses both Medcenter One and St. Alexius Medical Center as well as served medical offices and clinics and their parking facilities. Other present uses in the district include mixed retail and service establishments, public uses, and a variety of residential uses. Other zoned uses are:

- CG - Commercial
- CB - Central Business District
- R10 - Residential
- RM(30) - Multi-family
- MA - Industrial, wholesale
- RT - Residential Transition

Residential zones lie roughly in the northern one-third of the study area while the commercial zones lie west and south of the medical district proper.

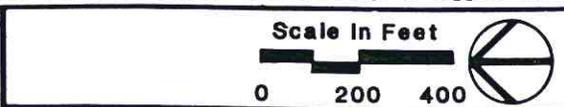
The purpose of the Medical District zone designation was to define a basic zone of influence for the development of medical/health care facilities. However, medical offices and clinics are permitted outside the Medical District. In fact, in recent years two were constructed on the south side of Avenue C within the RM(30) zone.

While not a land use zone, a Central Business District Parking District has been defined within the City zoning ordinance. The pertinent regulation states that within this CBD Parking District any replacement buildings, new buildings built on vacant land, or additions to existing buildings are not subject to otherwise prevailing off-street parking requirements. Such parking will be provided by the City through the legal means available to it (eminent domain, condemnation, assessments). While both Medcenter One and Q&R Clinic fall within this district, they have made efforts to address their parking needs, primarily for clientele convenience.



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MD	Medical District
CG	Commercial
CB	Commercial
R10	Residential
RM(30)	Multi Family
MA	Industrial
RT	Residential Transition
	CBD Parking District



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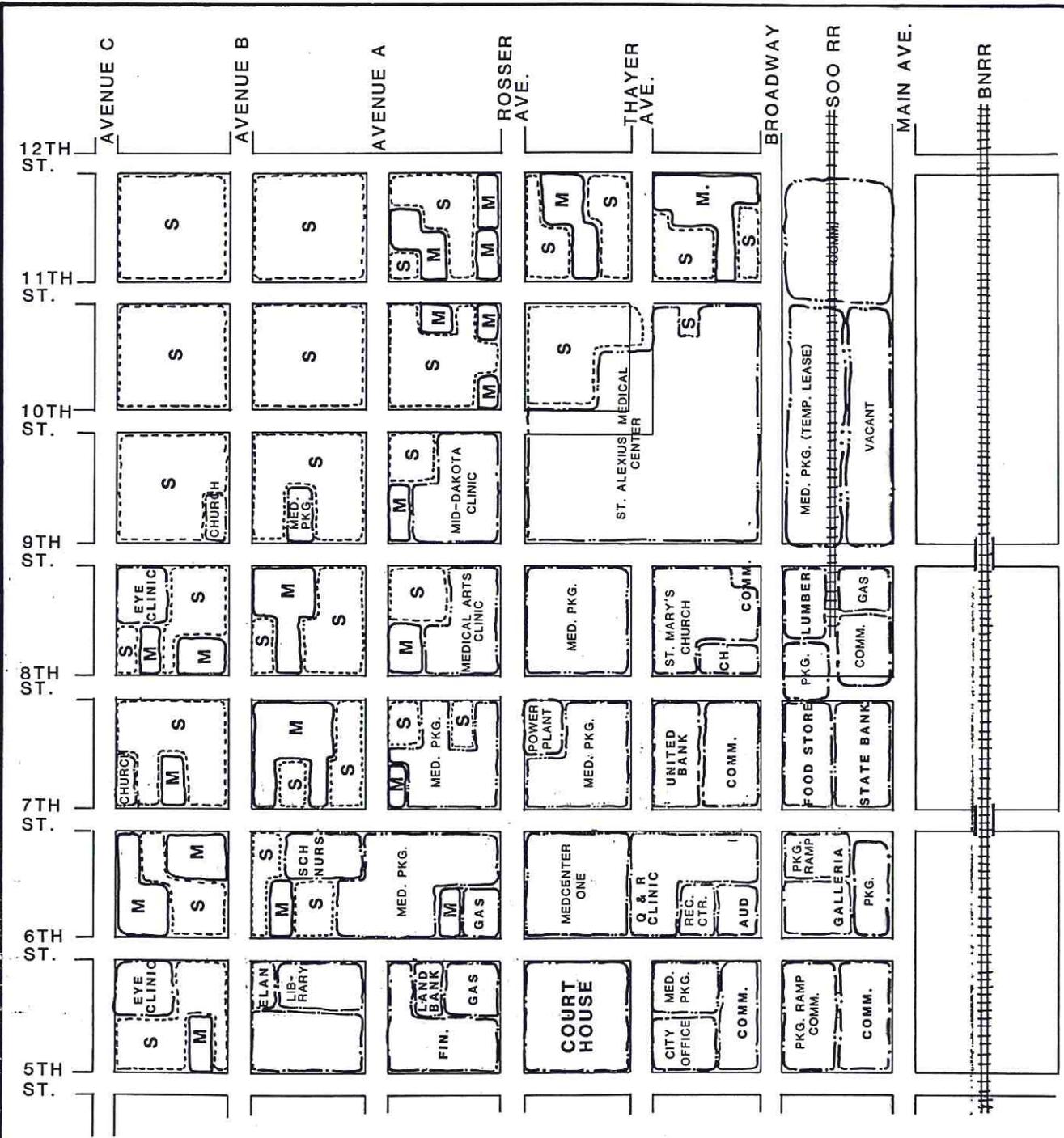
EXISTING ZONING

figure 2.1

2.1.2 Land Uses

A number of important land uses are situated in the study area. These and other uses are shown in Figure 2.2. The major medical-related uses and their current status is as follows:

- o Medcenter One (previously Bismarck Hospital) will complete a major expansion program in 1984 providing a total of 256 inpatient beds and a wide range of medical and surgical services. It will be served by 145 physicians and a support staff of 750 employees. A tunnel under Rosser Avenue was constructed to connect with future expansion.
- o St. Alexius Medical Center recently completed a major expansion project to provide a total of 313 inpatient beds, a similar range of both inpatient and outpatient services. It will be serviced by 165 physicians and a support staff of 1100 employees.
- o Q & R Clinic in 1984 moved to an entirely new facility adjoining Bismarck Hospital. This facility has a staff of 68 physicians and 275 employees, and will serve approximately 300,000 patients per year.
- o Mid Dakota Clinic has a staff of 18 physicians and is located across Rosser Avenue from St. Alexius Medical Center. An underground walkway connects the two facilities.
- o The Heart-Lung Clinic adjoins St. Alexius Hospital and has a staff of approximately 15 physicians specializing in heart and lung diseases.
- o The Medical Arts Building houses about 20 independent physicians or small associations, a variety of medical related services and specialties, and a few non-medical professionals.
- o The School of Nursing affiliated with Med Center One provides an accredited non-degree program in nursing and also houses the Q & R Clinic Medical Library. Mary College located south of Bismarck also provides a degree program in nursing in conjunction with St. Alexius Hospital.
- o Ellingson-Wischmeier Eye Clinic occupies a relatively new facility on Avenue C.
- o The Eye Clinic of North Dakota also resides in a recently developed facility on Avenue C.



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- S SINGLE FAMILY
- M MULTI-FAMILY
- PKG PARKING
- MED MEDICAL
- COMM. COMMERCIAL
- CH CHURCH

Scale in Feet



EXISTING LAND USE

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figure 2.2

- o The University of North Dakota Family Practice Center is located in the public parking ramp facility on Broadway between 5th and 6th Streets.

In addition to these medical facilities, several other projects have recently been completed, are in progress, or are being contemplated:

- o Sheraton Galleria has been in operation for two years and provides 150 rooms as well as restaurant, lounge, meeting and convention facilities.
- o The adjacent Galleria parking ramp provides parking for vehicles associated with the Sheraton as well as other downtown uses.
- o City offices have been relocated into the remodeled building vacated by Q&R Clinic. The offices will house about 100 employees and various city facilities and services.
- o Approximately 200 spaces on two levels have been added to the public parking ramp at the corner of 5th Street and Broadway Avenue.
- o An office building project is in the planning stages on a portion of the Soo Line Railroad property between Front and Broadway Avenues and east of 9th Street.

Other prominent public facilities in the study area include the Burleigh County Courthouse and Jail, and the Bismarck Public Library. Recent public referenda on bond issues to upgrade prisoner facilities at the jail and to construct a new library complex were recently defeated at the polls; however, it is expected that these projects will be resubmitted at a future date for voter approval.

Immediately north of the study area on Avenue C is the Bismarck High School facility. A recent bond issue for expansion of this school was defeated at the polls, but will probably be re-submitted at a future date.

Other existing uses including banking facilities, service stations, a church, offices and a variety of commercial/retail/service shops and businesses.

2.2 STREET SYSTEM CHARACTERISTICS

2.2.1. Functional Classification

The study area is bordered or bisected by several major streets which provide access into and through the district as shown in Figure 3. Major streets include:

- 7th and 9th Street one-way couplet: provides north-south crosstown and downtown access

- 5th Street: two-way collector providing downtown circulation and connections to near CBD areas
- Main Street: major east-west crosstown arterial passing through the CBD
- Rosser Street: east-west arterial emerging as a parallel arterial to Main Street
- Avenue C: east-west collector on north edge of study area
- Broadway Avenue: collector one block north of Main Street

Other streets classed as local provide property access and low to moderate levels of traffic circulation capability. In addition to the 7th/9th couplet, Broadway is one-way eastbound between 4th to 6th Streets, while Thayer is one-way westbound between the same streets. One-block segments of 4th and 6th Streets are one-way between Thayer and Broadway. These latter one-way segments relate to the downtown mall circulation and on-street angle parking concept.

These classifications are consistent with long-range designations except that Thayer Avenue has been vacated between 6th and 7th Streets.

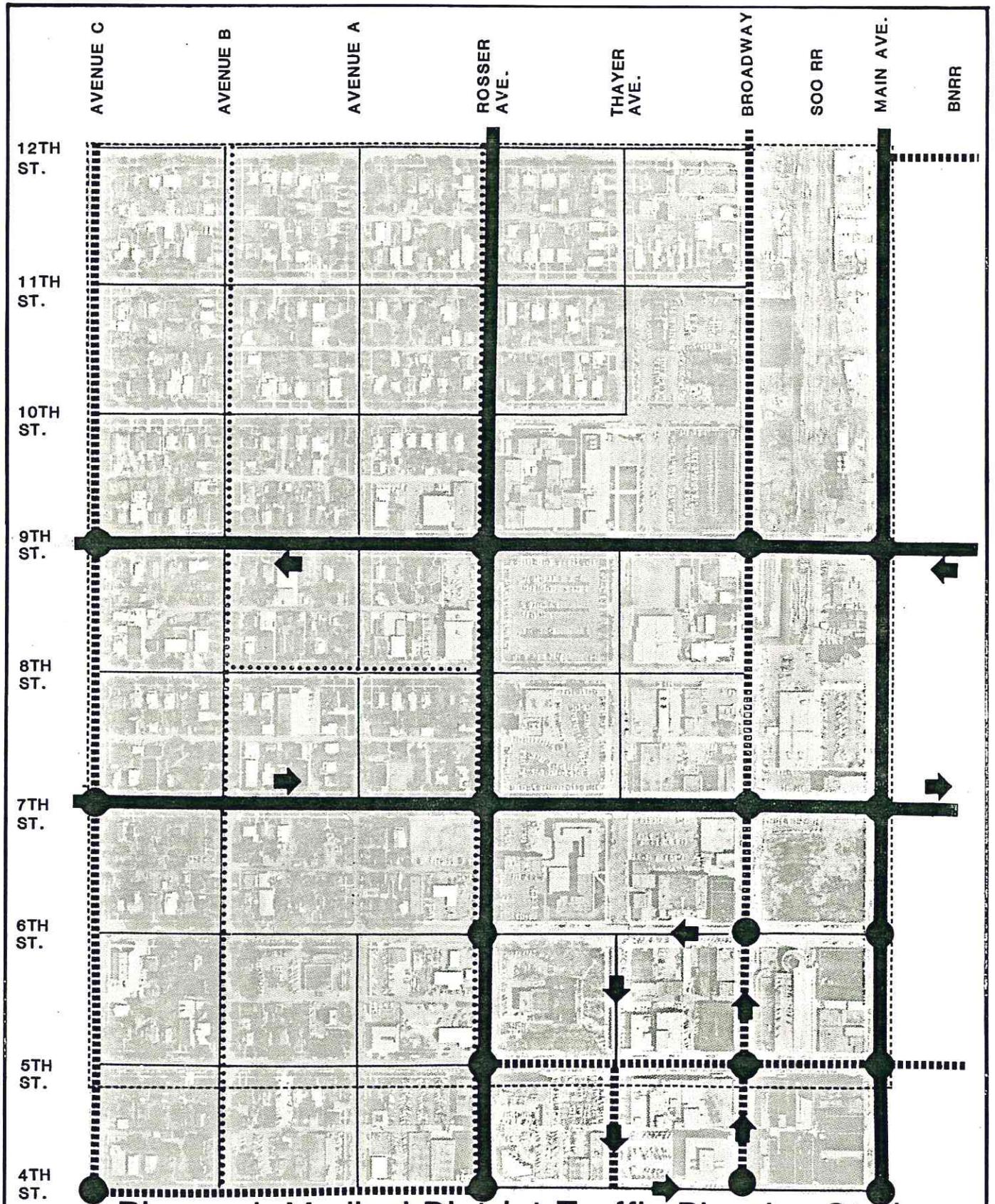
2.2.2. Traffic Volumes

Figure 2.4 illustrates 1984 average annual daily traffic volumes for major street segments in the study area. The 1984 traffic flow map developed by the North Dakota State Highway Department was compared to the previous 1980 State traffic map. Due to the improvement of Rosser Street to the east of the study area and completion of several buildings as already discussed, it was noted that certain shifts in traffic as well as an increase in overall traffic had occurred since 1980.

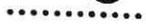
It was determined that traffic had shifted to Rosser Avenue from Broadway Avenue, and to a lesser extent from Avenue C and Main Avenue. Traffic volumes had also increased on 7th and 9th Streets in the interim period.

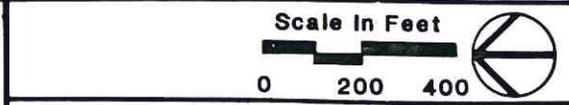
2.2.3 Traffic Controls

Figure 2.3 illustrates the location of traffic signals at study area intersections. Other intersections on functionally classified streets in the study area are generally posted with stop signs while local-local intersections are uncontrolled.



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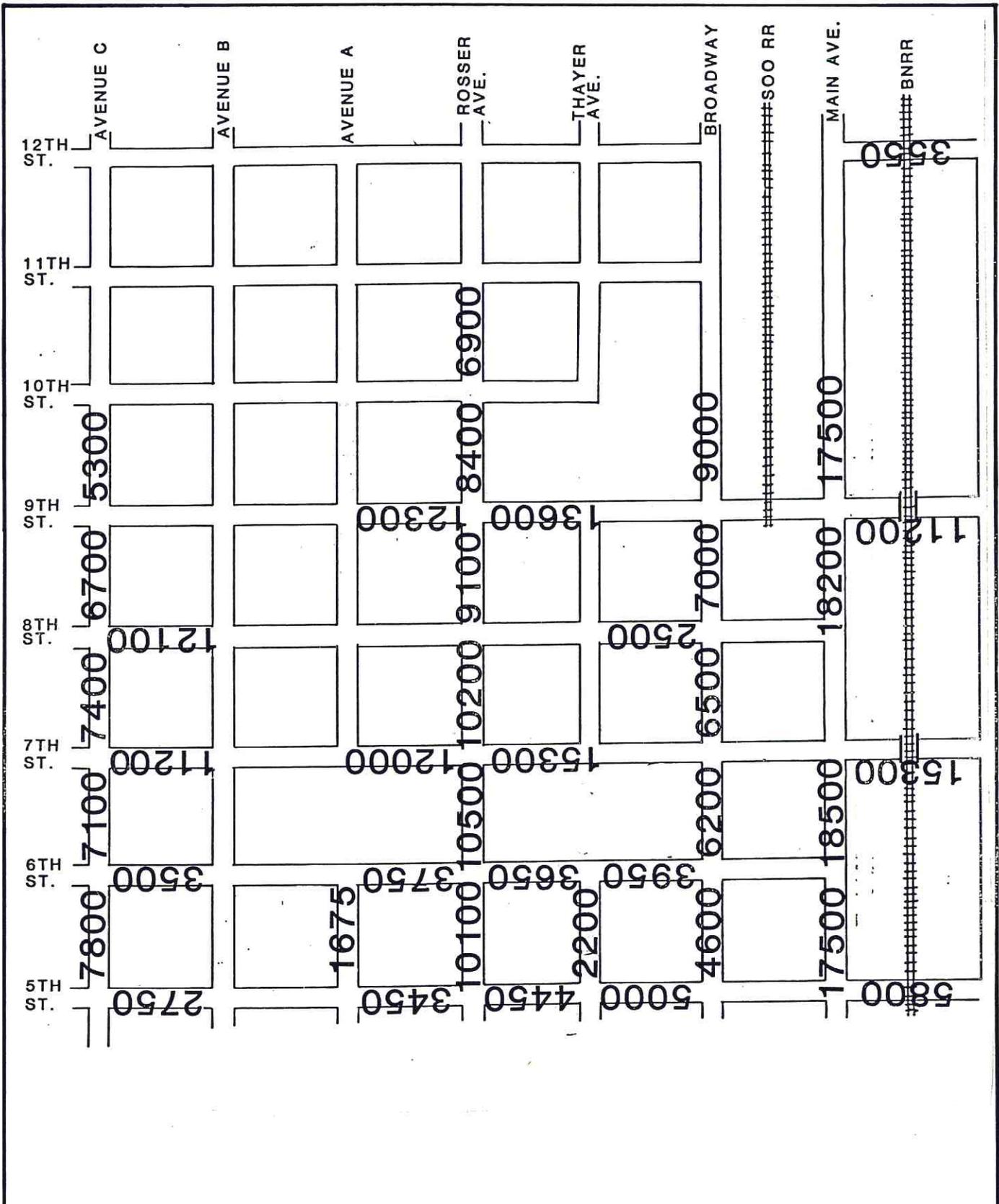
-  Principal Arterial
-  Collector
-  Local
-  One -way
-  Traffic Signal
-  Proposed Bike Route



TRAFFIC CIRCULATION

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figure 2.3



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10600 Average Daily Traffic

Scale In Feet

0 200 400



EXISTING TRAFFIC VOLUMES

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figure 2.4

2.3 PARKING SUPPLY AND DEMAND

2.3.1 Present Inventory

The present supply of parking, both on-street and off-street was inventoried by City staff, and is presented in Figure 2.5. Detailed tabulations may be found in the Appendix. Table 2.1 presents summary statistics:

Table 2.1
PRESENT PARKING SUPPLY CHARACTERISTICS

On Street	10 minutes	18
	1 hour	211
	2 hour	168
	All day	913
	Sub Total	<u>1310</u>
Off-Street	General Public	1715
	Private	1152
	Handicap	45
	Sub Total	<u>2912</u>
Total Spaces		4222

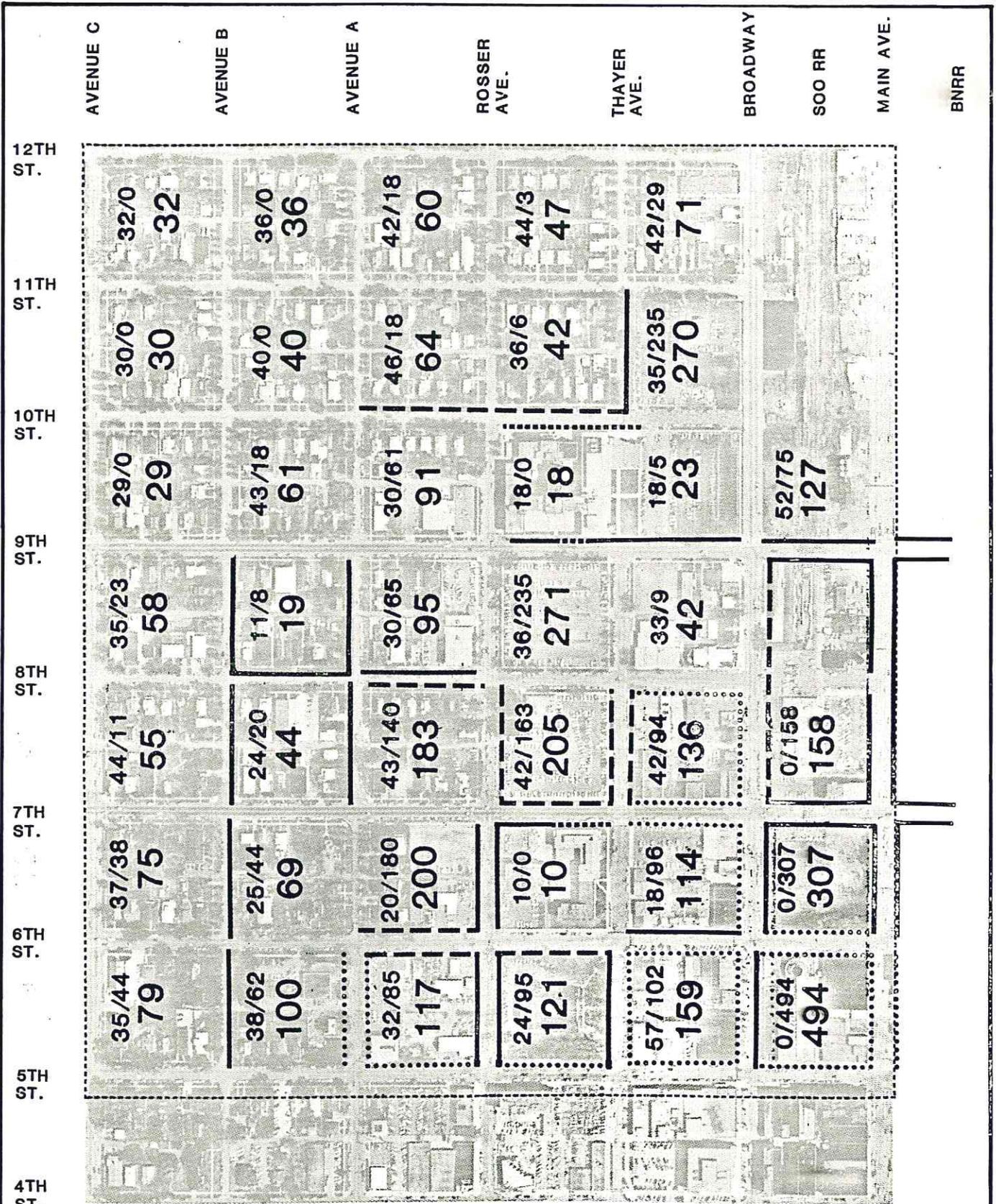
Source: City of Bismarck

As seen in this figure, parking supply is concentrated in the public parking ramp and Galleria ramp on Broadway, and in large surface lots near the two medical centers. On-street parking is more evident in the residential areas where there are fewer curb parking prohibitions, although a moderate amount of on-street parking is available in the CBD area. Similarly, most of the on-street time restrictions are found in the CBD.

About 31% of all parking in the study area is located on-street but this statistic is biased by the residential area parking availability. Parking prohibitions have been initiated on arterial streets to provide adequate intersection capacity and visibility. Removal of on-street parking also has the benefit of reducing side friction and reducing related accidents, but aggravates parking supply deficiencies in the areas affected.

2.3.2 Parking Surplus and Deficiency

An analysis of the demand for parking in relation to the present supply was made to assess the presence of parking surpluses or deficiencies. This analysis is performed on a block-by-block basis; clearly, the complete evaluation of parking for a particular facility must consider the situation for the several blocks surrounding the site, as well as the effect of other land uses competing for parking.



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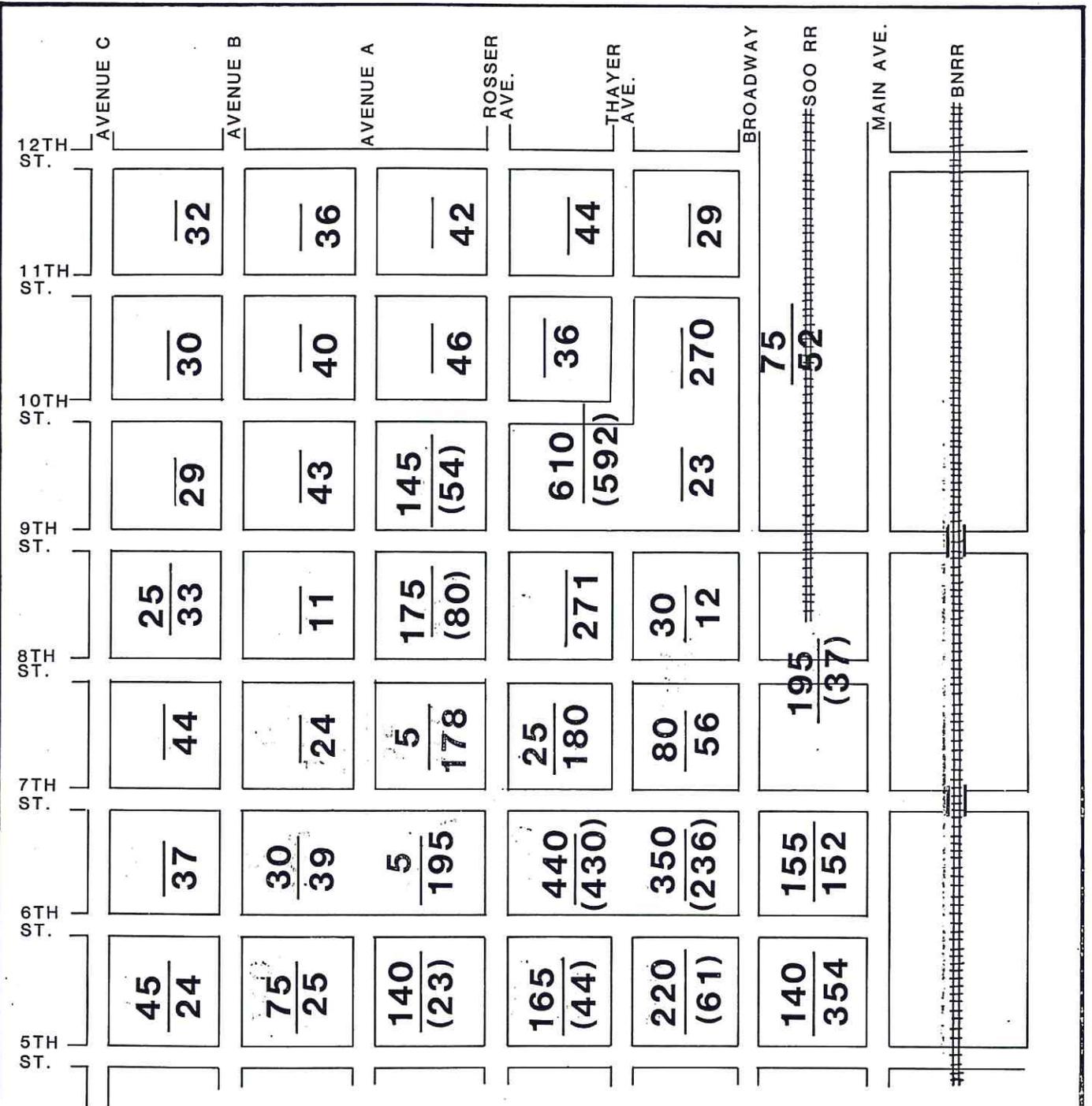
	No Parking	Or
	2Hr. 8-5	
	1Hr. 8-5	
	10Min. Parking	
	Loading Zone	
35/44 79	On/Off Street Total	

Scale In Feet

EXISTING PARKING SUPPLY

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figure 2.5



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140/(23) Demand/Surplus (Deficit)

Scale In Feet



**EXISTING PARKING
DEMAND**

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figure 2.6

Parking demand was estimated for each block based on the size, character, and type of land uses on that block. This determination was checked by use of limited field data and observations. The resulting peak demand levels were then compared to the available parking supply in that block to identify a net surplus or deficiency. The results of this analysis are shown in Figure 2.6, which depicts peak parking demand and the resultant surplus or deficit.

It is seen that the primary deficits are associated with the medical centers and major clinics. Although a large share of their deficits are ostensibly met on adjacent blocks, much of that demand particularly for the hospitals is satisfied by on-street, all-day parking where permitted. Earlier studies and field observation underscore that the greatest share of the deficiency is with respect to long-term employee parking.

There is a gross surplus of 860 spaces relative to the estimated demand of 3030 spaces. However, surpluses on residential streets and from the public ramp and Galleria ramp on Broadway, for which there is strong demand from outside the study area, more than account for the difference.

2.4 Pedestrian Circulation

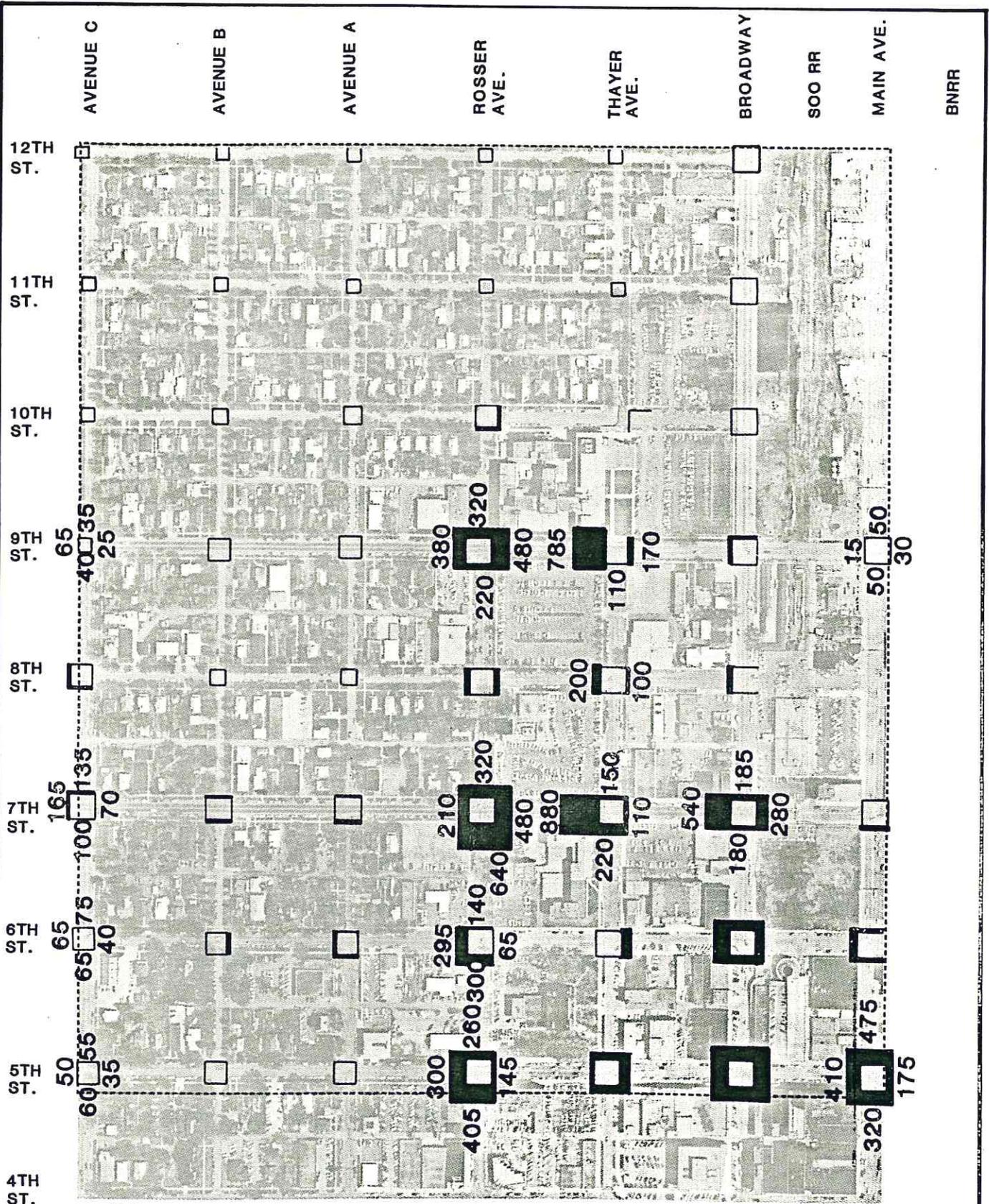
The present pedestrian circulation system is an important complement to the access and parking system, but is often relegated to a secondary role despite the fact that it is an essential link in the total travel process.

Present pedestrian circulation resources in the study area consist of these primary components:

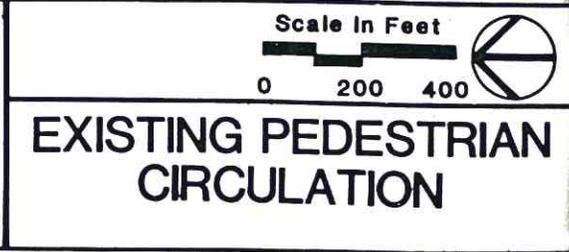
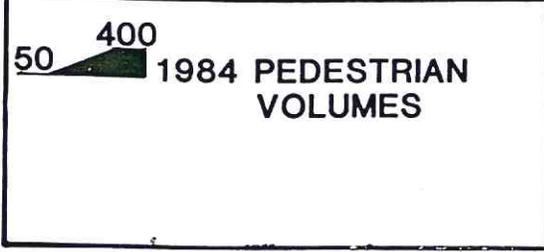
- o extensive and complete sidewalk network
- o pedestrian crossing indications at traffic signals
- o other marked pedestrian crossings
- o a skywalk between the public ramp on Broadway and the Sheraton Galleria
- o a tunnel under Rosser Avenue connecting St. Alexius Medical Center and Mid-Dakota Clinic
- o a tunnel under Rosser Avenue from Medcenter One's present facility to the future building site on the north
- o internal circulation aisles in the two medical centers and Q&R Clinic

A skywalk from Q&R Clinic south to the Galleria Ramp has been considered by the clinic, but is on hold due to the cost associated with its length and a possible structural problem.

Present pedestrian activity can be gauged from traffic counts taken by City staff at key intersections, as presented in Figure 2.7.



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figure 2.7

Data was available for 13 intersections, and the related intensity at other locations was estimated. The areas of highest activity are:

- on 5th and 6th Streets near the retail core of the CBD
- along 7th and 9th Streets in association with travel between medical facilities and parking lots
- across Rosser Avenue for travel between fringe parking to the north and employment centers to the south

Pedestrian movements associated with major uses in the study area are estimated to be mostly terminal trips (from parking to activity center), with some functional trips (between land uses for an activity or service at the destination). These are for medical services as well as for other personal services or shopping. There are very few purely recreational pedestrian trips. The magnitude and orientation of these movements depends upon the relative size of the activities at either end of the trip, the distance involved, and the comfort and convenience of alternate routes as suggested in Figure 2.7.

Major issues related to pedestrian movements in the study area include pedestrian safety at crossings on the 7th and 9th Streets at Thayer Avenue. Mid-block crossings along Rosser Avenue and other sites were a lesser problem.

Significant concern was expressed over pedestrian crossings on 7th and 9th at Thayer, and field observations confirmed that this concern is legitimate. Pedestrians become stranded midstream and have difficulty identifying acceptable crossing gaps. This condition is aggravated by the fact that many drivers in the area are preoccupied looking for parking or Medcenter One and Q&R Clinic driveways and many of the pedestrians are elderly, family groups, and infrequent users of the crossings. The situation at 9th and Thayer is less critical in this regard as most of the pedestrians are employees, but the level of activity is similar in magnitude.

With respect to the capacity of signalized intersections, current peak period pedestrian volumes were reviewed. Available pedestrian crossing data for key locations shows peak crossing volumes of 1 - 3 persons per minute per crosswalk. This level of activity does not seriously impede traffic flow or materially affect capacity of the intersection.

From a systems standpoint, an interest is growing towards the development of a pedestrian circulation system which would afford protection and comfort to pedestrians during the harsh winters while facilitating major pedestrian linkages (e.g. large activity center to a parking garage). Obviously, such a higher grade and higher quality circulation system would have development costs associated with it. However, other redevelopment work downtown has taken a lead in this regard and has made an obvious physical and visual example of the start of such a system. The skywalk contemplated by Q&R Clinic is an example of private sector interest in the concept from the standpoint of clientele convenience. The potential of such a concept will be explored further in Chapter 4.

2.5 STUDY AREA ISSUES

The consultant team reviewed past study reports relating to the Medical District and conducted numerous interviews with key landholders, developers, and City officials and staff with an interest and involvement in the complexion and character of land use development and how that development relates to public and quasi-public facilities. In addition, two public information meetings were held during the project to solicit comments regarding land use and transportation issues in the study area.

These contacts and the consultant teams' insights yielded a range of perspectives and concerns which merit consideration in the development of appropriate improvements and actions to guide the proper and desirable development of study area facilities. A synopsis of these views includes:

2.5.1 The City Perspective

- o The direction of development in the Medical District is somewhat disjointed in that recent land development activity is fragmented, generally low density, multi-directional, and for the most part uncoordinated.
- o No explicit specific planning objectives have been defined for the Medical District. A general framework to encourage aggregation and coordination in the development of medical-care facilities could serve to integrate medical resources as an identifiable activity center. This could be mutually beneficial to medical uses in the district from a regional marketing standpoint, and to the City in fostering a well-defined activity center to complement the downtown business district.
- o The recent flurry of development activity creates a perceived and potentially real concern to assure the ability of the street system to perform adequately.
- o Additional development and greater development intensity, while beneficial from a land use planning viewpoint, must not be permitted to exceed the capacity of the street system to provide facility access and absorb the resulting traffic demands.
- o Off-street parking ordinances address basic parking needs, and many developers/land owners attempt to provide adequate parking for maximum site attractiveness and clientele convenience. However, some uses have "grandfather" exemptions and in addition the study area includes a portion of the CBD Parking District in which the land uses are exempt from off-street parking requirements and for which the City assumes control over parking supply decisions. This complicates development of parking solutions from a Medical District standpoint.
- o The multi-directional nature and uncertainty of development makes planning for pedestrian circulation difficult.

- o Developers sometimes tend to take advantage of public resources or create problems for the public sector to solve in order to reduce their development costs.

2.5.2 The Landowner/Developer Perspective

- o Projects proposed and pursued in the district must satisfy the financial criteria of the parties directly involved and entail significant investments of time and money as well as risk.
- o Such projects while serving private sector investment needs nevertheless serve realizable community needs, provide jobs and services and increase the tax base. Therefore, it is not equitable to place undue restrictions or requirements on development proposals.
- o Development in the district should not be bound by a rigid master plan. A flexible atmosphere should prevail to allow for changing land values, market feasibility, and competitive developments.
- o Developers should not be penalized for traffic problems that result in part from City-wide travel needs.
- o The land use transitions which have occurred within the confines of City zoning provisions, are the result of natural market forces, and are, therefore, not necessarily negative.

2.5.3 The Neighborhood Perspective

- o Residents of adjacent neighborhoods, especially owner tenants, feel that medical-related developments have created traffic, circulation and parking problems which encroach upon the quality of life in those residential areas.
- o Continued growth in the Medical District is likely to aggravate encroachment, particularly in terms of through traffic on residential streets and on-street parking by employees.
- o Major land use developments appear to be granted nearly every request they pose to the City, while the needs and concerns of the neighborhood are ignored. Additional street closures, for example, could seriously impair future accessibility and circulation.

2.5.4 Summary Observations

It is evident from this synopsis of perspectives that there are some shared viewpoints and others which are in conflict. The views should not be interpreted as absolutes, but represent the types of concerns which may influence the probability of future land use scenarios, and the factors which must be recognized in identifying and meeting transportation system needs -- needs which in large measure are driven or influenced by the land uses which the system serves.

It is evident that the major activity centers in the study area have attempted to be good citizens of the community by their recent efforts to put in place attractive facilities and landscaping, and pursue development of additional parking supplies off-street. As these major facilities develop and related medical and other retail uses are attracted to the study area, greater demands will be placed on public transportation facilities. The findings of this study are intended to serve as a guide to maintaining adequate transportation services.

3.0 ALTERNATIVE LAND USE CONCEPTS

The first step in the analysis process was the projection of future land use conditions. From this basis, projections of traffic volumes, parking requirements and other elements were developed. As a prelude to these tasks, a discussion of planning objectives is first presented.

3.1 PLANNING OBJECTIVES

To guide the development and evaluation of future land use concepts, and to assist in the evaluation of transportation system elements, these general planning objectives were identified by the consultant:

3.1.1 Land Use

- Encourage formation of a distinct, identifiable medical district activity center.
- Promote a compact district with short internal walking distances.
- Provide site opportunities for medical-related, retail, and services uses.
- Encourage intensity of uses to improve connections and strengthen integrity of the district.
- Compliment transportation access and protection of adequate street capacity.
- Promote segregation and separation of pedestrian and vehicular movements.
- Develop a buffer zone between medical and residential uses.

3.1.2 Transportation System

- Maintain efficiency of key access routes to the district and the CBD.
- Provide for convenient and direct, simple yet flexible circulation within the district.
- Separate travel modes and minimize conflicts to the extent possible.
- Provide adequate, strategic parking to reduce access circulation and on-street conflicts.
- Support the potential of a more intensive development pattern for the medical core.
- Provide adequate motorist guidance and direction.

- Reinforce functional hierarchy of street classes.
- Control intrusion of traffic and parking in residential neighborhoods.

3.2 BACKGROUND

One basis for establishing Year 2000 forecast conditions is the "Street and Highway Plan Update" prepared by PRC Voorhees in 1981 for the Bismarck-Mandan area. That update employed a transportation model which utilized population and employment by traffic analysis zone. These statistics were projected by zone to the Year 2000 for two alternative scenarios.

Scenario #1 - Rapid Growth assumed that continuing demands to develop domestic energy resources would lead to the development of coal mining and coal gasification facilities and active oil and gas exploration. This basic employment growth was foreseen to spawn secondary growth in service trades and governmental services. This scenario assumed annual population growth approaching 3.5% through 1990, increasing to 5% through 1995, then dropping to 4%. The projected population in 2000 for Bismarck was 99,800 persons.

Scenario #2 - Moderate Growth envisioned a more conservative employment outlook and diminished growth in population. Growth rates were estimated at 2.7% annually, dropping to 2.3%. Year 2000 population for Bismarck was estimated at 77,250 persons. There were 44,500 persons living in the City in 1980.

Population and employment allocations were made for each traffic analysis zone. Zone 21 of that study includes the more intensive land uses in the study area, but excludes 17 blocks primarily residential in character. It also includes the CBD areas east of 5th Street and so overrepresents employment in the study area. Table 3.1 summarize this data:

Table 3.1
POPULATION AND EMPLOYMENT PROJECTIONS FOR ZONE 21

	1985	Year 2000	
		Moderate Growth	Rapid Growth
Population	700	800 (+14%)	800 (+14%)
Employment	7,850	11,780 (+50%)	15,210 (+94%)

Sources: Street and Highway Plan Update, PRC Voorhees, 1981

Only modest changes are foreseen in terms of population. However, dramatic increases in employment are foreseen for employment under either scenario. It is expected that the Medical District will share proportionately in the employment gains which are representative of overall population growth as well.

3.3 ALTERNATIVE CONCEPTS

3.3.1 Overview

There is a direct and obvious connection between land use patterns and the transportation system. In order to evaluate transportation system requirements, two alternative land use concepts were developed. To establish a basis for identifying future land use conditions, extensive contacts were made with major activity centers in the study area to ascertain available growth and expansion plans. Also, an understanding of local land use dynamics and real estate marketplace economics provided additional insight to land use trends, potentials, constraints, and opportunities.

These factors were considered in the development of both land use concepts:

- future urban area population
- present zoning districts
- relative land values
- recent development and land transition patterns
- land ownerships
- major hospital and clinic master plans
- off-street parking requirements
- existing land uses
- tracts which are vacant or amenable to redevelopment
- interrelationship of land uses

Two land use concepts emerged from the analysis and interpretation of these factors:

- Concept 1 - Present Trend
- Concept 2 - Intensive Development

3.3.2 Concept 1 - Present Trend

This concept represents a continuation of the present pattern, character, and direction of recent land development activity in the district and can be characterized as follows:

- Fragmented, multi-directional growth
- Land-extensive expansion
- Low identifiability of destinations
- Somewhat disorganized layout for occasional visitor
- "Doughnut" pattern of major activity centers

A schematic of this concept is shown in Figure 3.1. Specific features include these elements:

- o continued conversion of single-family residences to multiple-family units.
- o further development of large surface parking lots for major activity centers.

- o expansion of the physical plant for both Medcenter One and St. Alexius Medical Center.
- o expansion of space for some existing clinics and some new medical office space in the district.
- o selective redevelopment of older retail uses along Broadway and Main Avenues.
- o expansion of the courthouse, and redevelopment of the library facility.

The complexion of the study area would be similar in many respects to existing circumstances. Pedestrian travel to parking lots and between uses would occur mostly at-grade, across major arterial streets, and would involve longer distances because of the scattered and expansive nature of the resulting land use patterns.

3.3.3 Concept 2 - Intensive Development

This concept differs from the first in several ways. A major feature is the bridging of the central void between the two medical centers, which would internalize some of the growth and promote the integrity and convenience of the district as a "medical shopping center." Key characteristics include:

- Development of stronger visual identity for the district.
- Integration of interrelated uses.
- Enhance comfort and convenience for district visitors and clientele.
- Provide "critical mass" and opportunities for parking supply and development of support retail and services.
- Creates unique opportunities for a vertically separated pedestrian network.

This land use concept is depicted in Figure 3.2. Specific elements of this concept include:

- o continued expansion of the physical plant for both medical centers.
- o expansion of the courthouse and redevelopment of the library facility.
- o expansion of space for some existing clinics
- o concentration of new office space in the center core of the district
- o development of parking garage facilities in the spine between the two medical centers
- o continued conversion of single family residences to multiple-family units
- o redevelopment of the Soo Railroad tract
- o additional redevelopment in the Main/Broadway corridor including a hotel and office/retail facility

This concept differs from Concept 1 in that it:

- entails a greater overall level of land use intensity (as indicated by the discussion of trip generation in Chapter 4).
- that land use and supporting parking is more concentrated towards the area between the two anchor medical centers

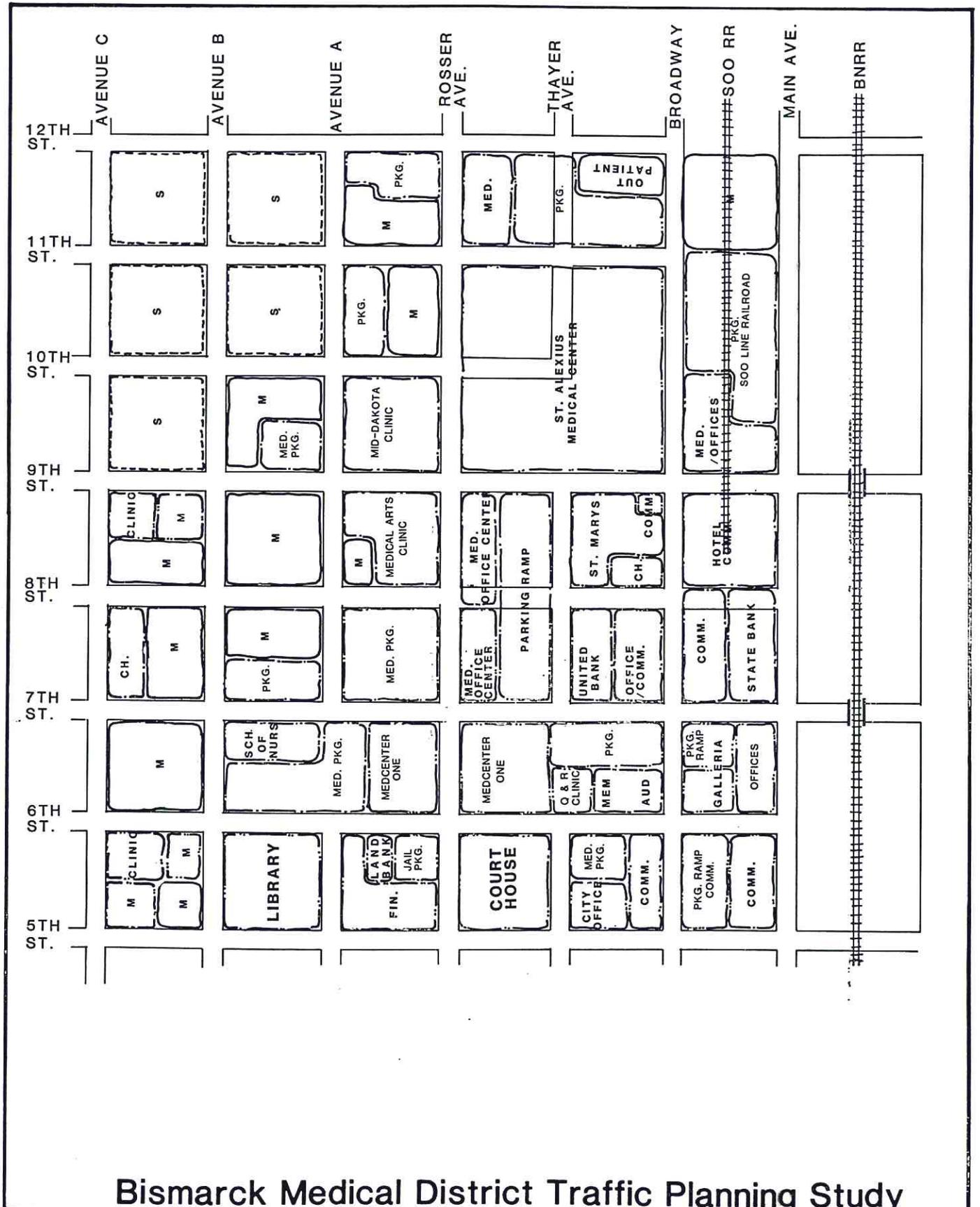
As noted, the development of two-story garage/office facilities provides an opportunity to develop a pedestrian skywalk system and to provide significant parking in strategic locations. These features will affect the configuration of parking supply and land development, the nature of vehicle/pedestrian conflicts, and the pattern of traffic flow in the study area.

3.4 Land Use Recommendations

Section 3.1.1 of this chapter presented several basic land use planning objectives which should be considered in evaluating the future of the Medical District. It was not the specific charge of this project to formulate a detailed land use plan for the district and define a framework for fostering its execution. Rather, this study identifies two alternate scenarios and evaluates the ability of the transportation system to support either concept.

As subsequent discussions in the next chapter will disclose, adequate street capacity will be available under either concept with relatively modest operational and physical improvements. That is, the more intensive level of development envisioned under Land Use Concept 2 does not overburden the ability of the street system to provide acceptable traffic operations.

As a result, the issue of land use concepts can be discussed in terms of other significant features and opportunities represented within each land use concept. Land Use Concept 1 is defined as the



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S	SINGLE FAMILY
M	MULTI-FAMILY
PKG	PARKING
MED	MEDICAL
COMM.	COMMERCIAL
CH	CHURCH

Scale In Feet



LAND USE CONCEPT 2

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figure 3.2

evolution of present land development trends. As such, it does not aggressively address some of the land use objectives suggested earlier for the district.

In contrast, Land Use Concept 2 anticipates that several identified development opportunities will be realized. If these potentials can be capitalized upon, they will constitute realization of certain land use objectives. They will in turn create opportunities for pursuit of other functional elements which will address other land use and transportation objectives and needs.

Concentration of land development and parking in the corridor between the two medical centers is the most important element of the intensive development concept. Implementation of these potentials will achieve these accomplishments:

- * Create a second-level of development which makes an above-grade pedestrian/skywalk more feasible.
- * Offers opportunities to create or strengthen linkages:
 - Major medical activity centers.
 - The medical core and retail/public service core to the west.
 - Major activity centers and related support and other activities.
- * Develop a stronger identity for the district as a health care resource center for Bismarck and the surrounding region.
- * Provide a critical "mass" for sufficient utilization of garage facilities.
- * Enhance comfort and convenience in the pedestrian circulation network. Encourage activity between various land uses, and reducing pedestrian-vehicular conflicts.

Clearly, the shape of land development patterns is pivotal to the parking and pedestrian solutions which can be implemented within the district. It is evident that Land Use Concept 2 allows many of the developmental and transportation system objectives to be achieved. The end result will be of benefit to medical district activity centers, their clientele, and the community.

It should be noted that Concept 2 in one sense does not necessarily entail a dramatic departure from other representative projects in the area in terms of size and scale. Rather, it emphasizes the strategic locational aspects of that expected development to create situations where other opportunities can be realized. Accordingly, concentration of attention on key development targets can set the stage for capitalizing on other far-reaching opportunities which would otherwise go unrealized.

Accordingly, the following informal recommendations are made regarding land use and development activities in the district:

1. Concept 2 will lead to a stronger medical activity center which can compliment and strengthen the City Center.
2. The City should consider policies and decisions which support the development of Concept 2.
3. The City in cooperation with the private sector should capitalize on opportunities to develop parking facilities to help steer land development.
4. Consider formation of a Medical District Coordinating Committee to provide dialogue, continuity, and direction to medical district development.

The purpose of considering two land use scenarios for the study area is two-fold:

- to provide a contrast between a trend-line pattern of land development and one which capitalizes on latent opportunities
- to test the impacts of both concepts on the street system, parking supply, and pedestrian network and allow greater flexibility and range in considering future land uses.

Both concepts will be evaluated in terms of their transportation system impacts. This analysis coupled with the knowledge of the inherent features of each concept can help serve as a framework for the future.

4.0 TRANSPORTATION PROJECTIONS AND SYSTEM ANALYSIS

4.1 OVERVIEW

It is critical that the street system accommodate travel demands effectively from the standpoints of traffic oriented to the Medical District study area as well as through traffic making cross-city trips. The evaluation of the ability of the street system to serve traffic demand is a function of the interrelated effects of:

- existing or projected traffic loadings and turning movements
- relation of land use access and off-street parking access
- on-street parking
- street geometry
- traffic controls
- pedestrian crossing activity

This chapter develops projections of future transportation travel volumes, parking demands, and pedestrian movements based on the two future land use scenarios. An evaluation of these system demands is then made to evaluate street capacity conditions, parking facility requirements, pedestrian circulation features, and other related elements. This analysis forms the basis for the system recommendations which are presented.

4.2 TRAVEL PROJECTIONS

4.2.1 Procedures

This section summarizes the procedure used for developing Year 2000 traffic volume forecasts for the two projected land use scenarios. The major tasks in this process were:

- o Projection of land use traffic generation characteristics
- o Generation of daily vehicle trips
- o Distribution of trips into and out of study area
- o Assignment of distributed trips to the street system

These tasks are further described below:

Projection of Land Use Characteristics

1. Develop Year 2000 land use scenarios for the study area
2. Quantity trip generation variables (gross floor area, beds, etc.) for each significant land use component

Generation of Weekday Vehicle Trips

1. Identify appropriate daily traffic generation rates from studies of similar land uses.
2. Apply traffic generation rates to land use variables to generate Year 2000 daily trips by block for each scenario.
3. Compare study area totals with Street and Highway Plan Update statistics for the comparable area for reasonableness.

Distribution of Vehicle Trips

1. Distribute trips from each zone to quadrants of the remainder of the urban area based on an analysis of trip distribution tables from the Street and Highway Plan Update.
2. Based on a review of the Street and Highway Plan Update, and a check analysis of existing traffic counts and study area trip generation, develop level of trip movements between external stations of the study area.
3. Allocate study area trips to appropriate parking supply sites based on size, usage, and proximity to represent vehicle trip ends.
4. Summarize zonal trip movements in a daily trip table.

Assignment of Distributed Trips

1. Describe study area street system to functionally classified and other significant street segments, and identify external stations.
2. Assign each zonal trip interchange to the street system network based on probable path.
3. Where multiple routings are obvious, proportion trips between the routes.
4. For large volume movements, assign trips to multiple routes to avoid over assignment.
5. Load trips to the network in such a manner to account for around-the-block circulation.
6. Review and check assignments for reasonableness. Adjust as required for "fringe effects," capacity constraints, and other factors.

4.2.2 Trip Generation, Distribution and Assignment

The initial attempt to utilize Street and Highway Plan Update modelling data as a basis for study area travel modelling activities was abandoned for several reasons. Traffic analysis zones for the transportation plan were larger than the study area and had boundaries which were different. It was not possible to disaggregate trip generation characteristics to a consistent base.

While trip distribution tables were available, the inability to subdivide the traffic analysis zones was a limitation. In addition, the traffic assignment process was performed manually. As a result of this procedure, link loadings could not be tracked, the relationship to zonal centroid connectors could not be determined, and no turning movements were available at individual intersections. It was also presumed that intrazonal trips, those beginning and ending within a zone, were probably not assigned to the street system.

For these reasons, traffic projections for study area land uses were generated independently for both land use scenarios, based on traffic generation variables identified for each land use element in each land use alternative, using the Institute of Transportation Engineers Trip Generation Handbook as modified and supplemented by consultant data.

The resulting weekday trip estimates were assigned to particular blocks based on the projected availability of on and off-street parking.

The study area was subdivided to 10 internal analysis zones and eight external stations where major streets intersected the study boundary. Previously developed trip tables from the transportation plan update were reviewed to develop the distribution of Zone 21 trips to other urban area zones grouped into quadrants. Subarea shares were assigned to approach routes to the study area.

These shares were also compared to quadrant shares developed in the 1978 CBD Parking Study by Barton-Aschman Associates for downtown parkers. A trip table of internal to external trips was developed using external stations as assignment terminals. Trips were assigned from these points to internal analysis zones based on parking supply allocation, competitive routings, and probable paths.

It was determined that the Street and Highway Plan Update traffic projections for the Rapid Growth Scenario would be utilized as a baseline reference traffic projection, since it was not possible within this study to develop estimates of traffic passing through the study area defined for this project, and the data was not readily available from the transportation plan update study. This baseline assignment was adjusted to reflect the shifts in traffic which were identified relative to existing traffic volumes in Chapter 2.

Since the Street and Highway Plan Update was completed, local staff have concluded that while Rapid Growth population levels will probably not be realized by the Year 2000, the long range per capita trip rate of 2.5 trips per person is probably low and should be closer to the present rate of 2.8 trips per capita, perhaps even greater. For the purposes of this study, these two factors were assumed to be offsetting, such that the original Rapid Growth traffic projections would still serve as an acceptable baseline reference. It was further assumed that Land Use Concept 1 (Present Trend) developed for this study was a land development scenario representative of the overall traffic growth embodied in the set of traffic projections just accepted as background data. Accordingly, the additional traffic level and any traffic redistribution effects of Land Use Concept 1 relative to Land Use Concept 2 were added to this background traffic level.

The purpose of this exercise was to develop future traffic projections which would serve as a reasonable and accurate test of the reserve capacity of the street system. As a complement to this study's objective, this task was performed for two land use concepts indicative of alternative development scenarios for the Medical District.

This analysis builds on the previous Rapid Growth scenario of the Street and Highway Plan Update, and considers a second more intense and concentrated study area traffic generation scenario. As was discussed earlier in Chapter 2, adjustments were made to existing traffic volumes on Rosser Avenue and other streets based on observed shifts, study area development, and long-term traffic forecast trends.

4.2.3 Projected Study Area Traffic

As a first step in developing future traffic estimates for the Year 2000, weekday trip generation was estimated by block per the procedures previously described. The results of this step are illustrated in Figures 4.1 and 4.2 for the two land use concepts considered. Summary tabulations are presented in Table 4.1 below.

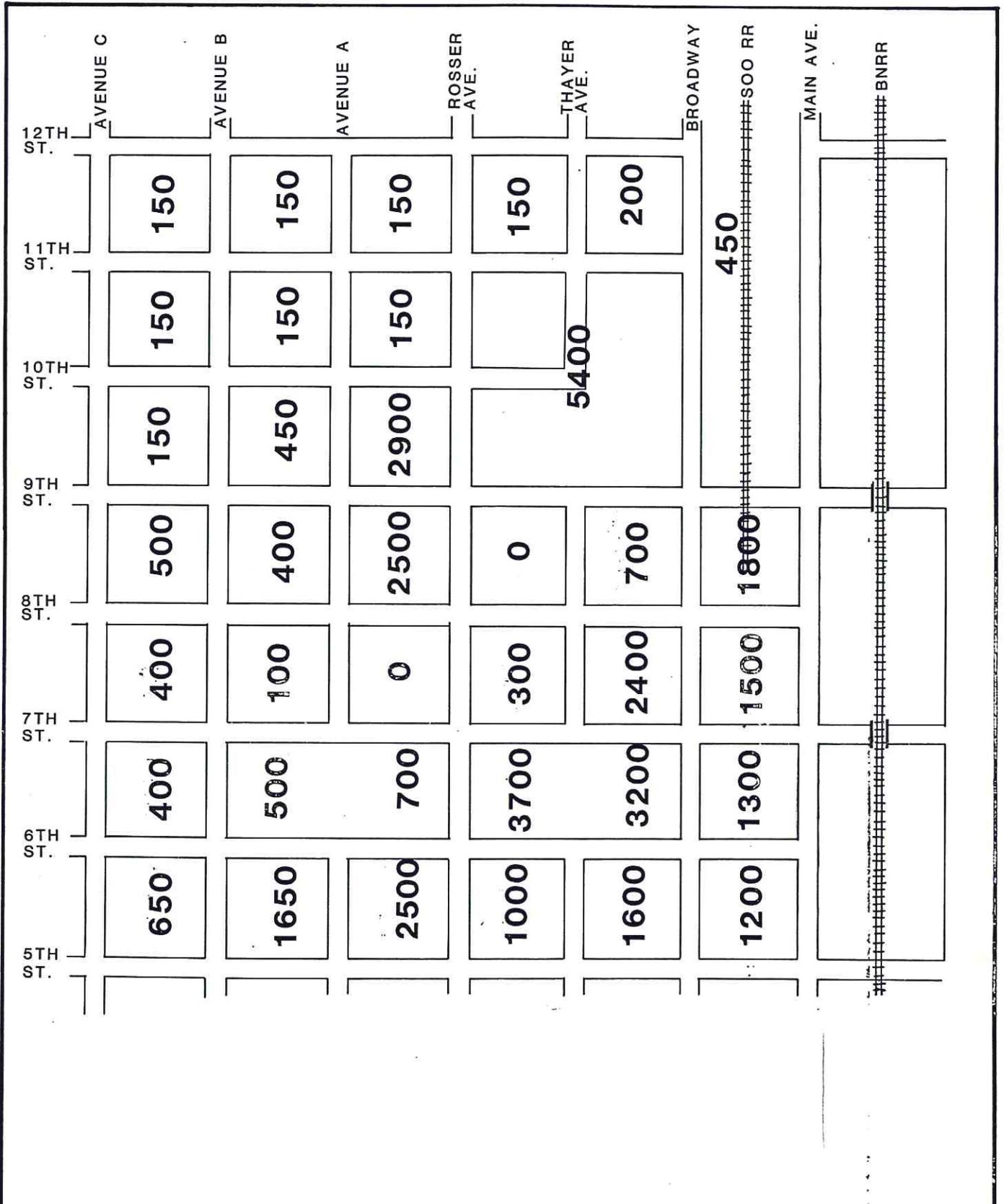
Table 4.1
TRAFFIC GENERATION ESTIMATES

Time Frame	Daily Traffic		
	Zone 21 (CBD)*	Study Area**	Percent
1985	45,000	30,500	67%
2000:			
- Moderate Growth/ Present Trend	57,840	39,600	68%
- Rapid Growth/ Intensive Development	74,560	48,400	65%

Notes: *From Street and Highway Plan Update report and trip tables for Year 2000. 1985 data prorated based on employment per Table 3.1 and ratio of 2.8 to 2.5 trips per capita factor.
**Based on trip generation estimates prepared in this study.

As indicated in the table, data for Zone 21 (CBD) in the Street and Highway Plan Update project a 30 to 65% increase in CBD area trip generation over 1985 levels for its two growth scenarios. The final projections for the study area project a comparable level of traffic growth over 1985 for the two land use concepts developed in this study. It should be noted again that a portion of the study area lies outside traffic analysis Zone 21 and vice versa.

These two land use concepts -- Present Trend and Intensive Growth -- depict a broad range in increased traffic generation over the next 15 years, representing from 9,100 to 17,900 additional trips generated by study area land uses.



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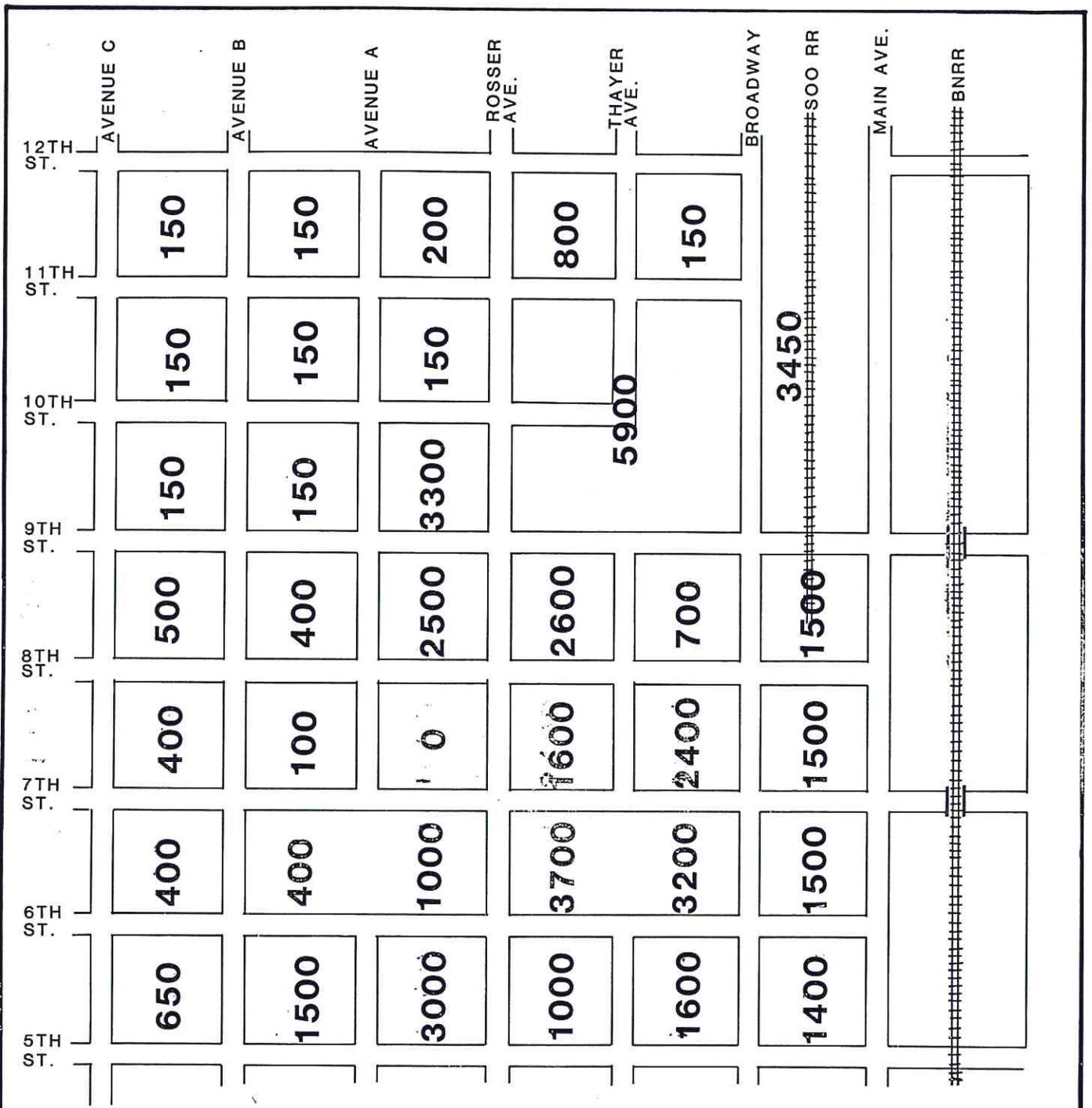
1650 Daily Vehicular Trips

Scale In Feet

**TRIP GENERATION
CONCEPT 1**

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KLICK
ASSOCIATES**

figure 4.1



Bismarck Medical District Traffic Planning Study

1500 Daily Vehicular Trips

Scale In Feet
 0 200 400

TRIP GENERATION
 CONCEPT 2

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 CIACCIO
 KLICK
 ASSOCIATES

figure 4.2

These two sets of data were assigned to the street system using the procedures already described in order to develop updated projections of Year 2000 daily traffic. The results are presented in Figures 4.2 and 4.3.

Under Concept 1 -- Present Trend, the highest link volumes are estimated to occur on Main Avenue the 7th-9th couplet, and Rosser Avenue because of their role as major arterials. In comparison, Concept 2 -- Intensive Development depicts somewhat higher traffic volumes as would be expected.

The increases are due to the higher overall level of traffic activity associated with Concept 2, as well as with concentration of a good portion of this growth in the core of the district between the two medical centers. Increases from Concept 1 to Concept 2 are on the order of 1,800 to 2,300 vehicles on 7th and 9th from Rosser to Main, and on Rosser between 7th and 11th Streets.

Increases range from 1,000 to 1,500 daily vehicles on 7th and 9th north of Rosser Avenue and south of Main Avenue, Main Avenue east of 11th and on Rosser east of 11th. Increases on other segments of major arterials increase from 600 to 1,000 vehicles daily. Percentage increases for Concept 2 relative to Concept 1 are in the range of 5-25% for various segments of Rosser Main, 7th and 9th. The percentage, of course, is a function of the absolute increase and the level of non-study area traffic already using that segment.

A comparison of traffic volumes generated by study area land uses only for the two concepts shows a narrower range of increase, suggesting that the network tends to load more evenly despite the central concentration of some land uses in Concept 2. This is because:

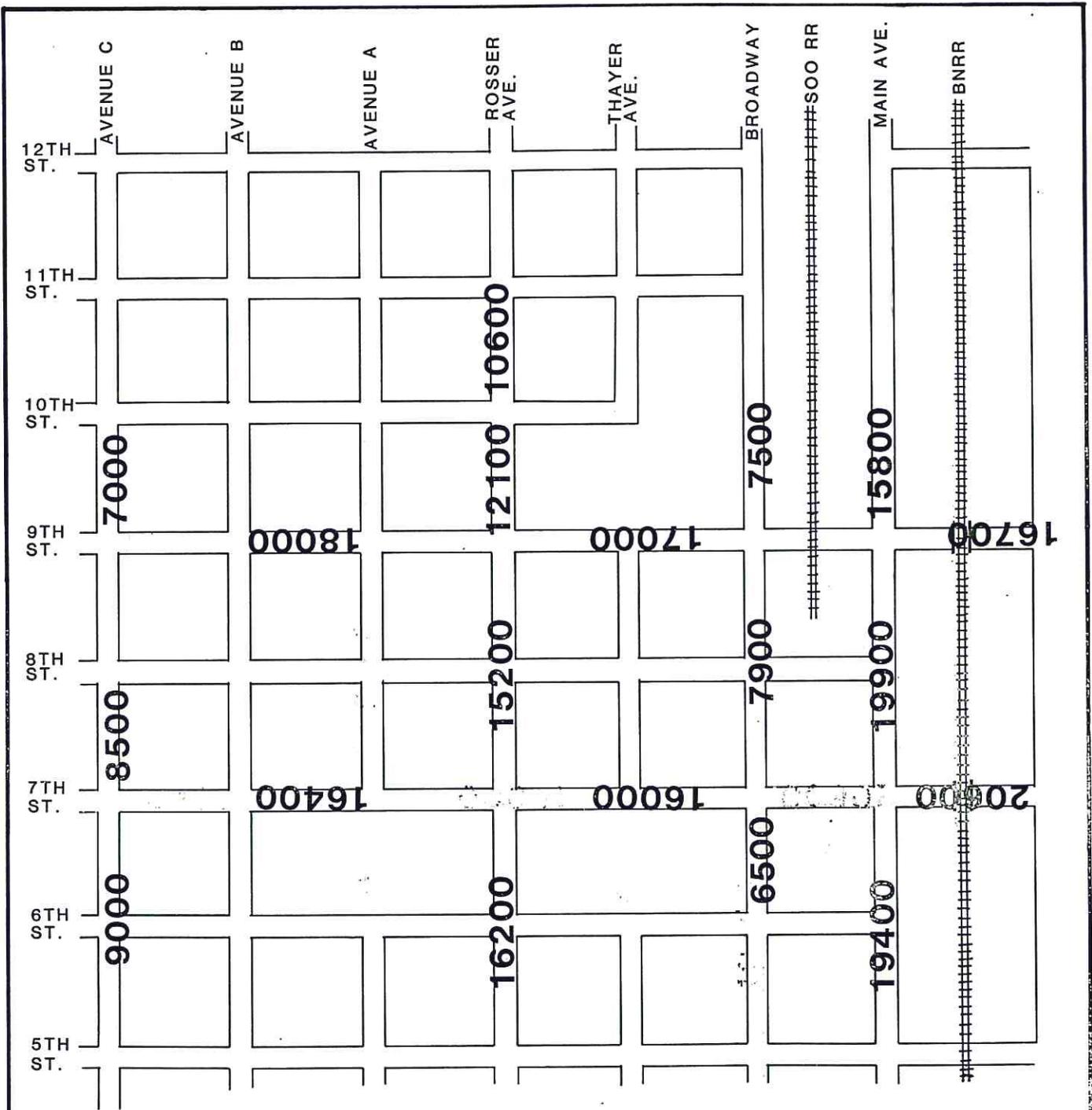
- o the 7th-9th one-way couplet forces study area-bound traffic to artificially distribute over a larger area
- o a portion of the growth in Concept 2 occurs around center of the study
- o study area traffic is reasonably well-distributed to all approach routes

4.3 TRAFFIC CIRCULATION AND CAPACITY

4.3.1 Evaluation

Traffic Capacity and Operations

Field inventories were made of existing street widths, number of lanes, and lane assignments (left turn only, through, right or through, parking onstreet, etc.). Using data supplied by the City for intersection turning movements and traffic peaking characteristics, intersection capacity analyses were performed for existing street geometry at several key intersections in the study area. The Circular 212 Critical Lane Volume methodology in microcomputer format was used for these calculations. Where existing conditions did not provide adequate traffic capacity for projected traffic, various improvements were identified to provide adequate capacity.



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16200 Average Daily Traffic

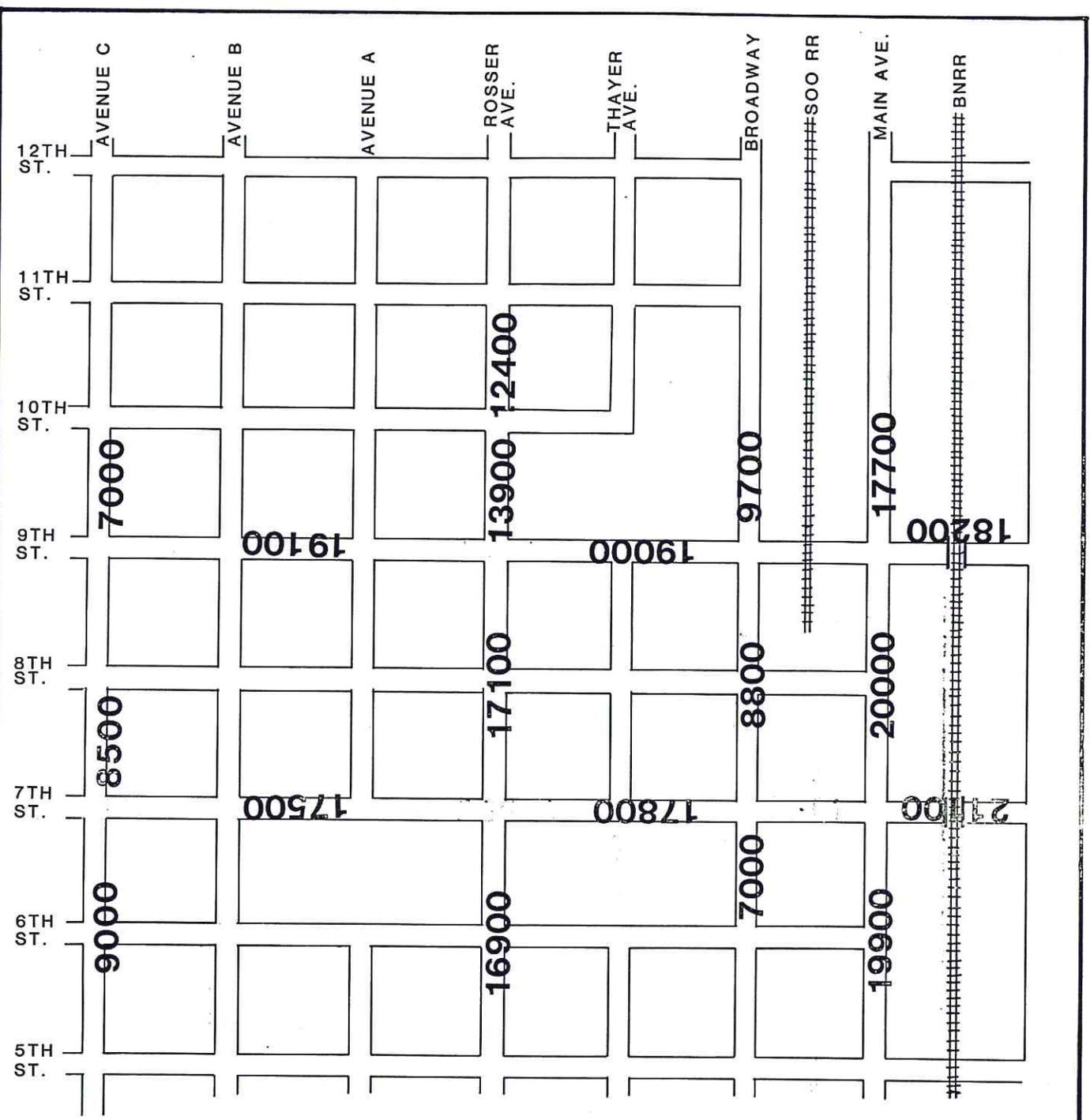
Scale In Feet

 0 200 400

YEAR 2000 TRAFFIC
 CONCEPT 1

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figure 4.3



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16700 Average Daily Traffic



YEAR 2000 TRAFFIC CONCEPT 2

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figure 4.4

Existing intersection operations and levels of traffic service for the evening peak hour were found to be generally good. Some approaches experience some delay and congestion due to very pronounced peaking patterns, which were observed to persist for 15 to 25 minutes for the most part. However, conditions for the peak hour as a whole were found to be satisfactory with a few exceptions. These short-term recommendations are proposed to address existing problems:

- * Southbound 7th at Rosser: prohibit parking on the west curb on the north approach for approximately 150 feet.
- * Southbound 7th at Broadway: prohibit parking on the west curb from Thayer to Broadway in the p.m. peak hour.
- * Westbound Broadway at 7th: prohibit parking on the north curb in the p.m. peak hour to provide a two lane approach to the intersection.

A similar analysis was made of future traffic loadings and resulting traffic service. In general it was determined that:

- The basic street system can accommodate both land use Concepts 1 and 2 with acceptable levels of traffic services. This is because of available existing street width, multiplicity of routes due to the grid layout, and the level of traffic demand is not excessive.
- Intersections on the corners of the "high accessibility boxes" (7th and 9th at Main, Rosser, and Broadway) will be potential points of congestion due to through and circulating traffic. These locations should be periodically monitored so as to preserve their traffic capacity at acceptable levels.
- The role of 7th, 9th, Rosser, and Main as principal arterials whose primary role is to carry traffic will become more evident as traffic volumes grow. This fact will be particularly true for Rosser. Parking and property access will become secondary roles in the long term for these particular streets.

Based on traffic evaluations performed at these key intersections, these future operational improvements were identified:

- * 7th & Rosser: 3-phase signal control will become appropriate as west-to-south left turns and opposing through volumes increase.
- * 7th & Broadway: prohibition of parking on both curbs of the north approach from Thayer to Broadway
- * 9th & Rosser: 3-phase signal control will become appropriate as east-to-north left turns and opposing through volumes increase.
- * 9th & Avenue C: provide two lanes on the east approach and remove parking on the west approach

- * Broadway: monitor from 6th to 10th street for opportunities to prohibit on street parking
- * Rosser Ave: - remove parking on the north curb between 7th and 9th Streets in the near term
 - remove parking on the south curb between 7th and 9th Streets in the long term
 - monitor traffic service on the east approach at 9th Street with respect to prohibition of parking on the north curb.
- * 7th Street: - near term: prohibit parking in the p.m. peak hour on the east curb Thayer to Broadway
 - long term: all-day prohibition of parking on the east and west curbs from Broadway to Thayer
 - long term: prohibition of parking on the east curb from Rosser to Thayer

With these improvements implemented according to the time frames indicated, satisfactory traffic service is provided at all key intersections. The resulting system traffic service is summarized in Table 4.2.

It is seen that peak hour traffic service will be diminished from generally very high levels to lower, but still acceptable levels, with either land use concept. If land use development and hence traffic growth, are commensurate with a Concept 1 rather than a Concept 2 rate of growth, the effect will be to delay the absolute need for certain recommendations. This situation will require periodic monitoring of actual traffic operations. However, as opportunities to easily implement recommendations present themselves, they should be taken to insure the long term servicability of the prime arterials in the study area.

Overall Circulation

While not a primary focus of this study, a review of overall circulation in the study area and how it relates to the CBD to the west was performed. Evaluation of these alternate medical district circulation schemes reflected the transportation and land use objectives are presented in Section 3.1.

A description of each circulation concept which was considered is presented in the following section. For each concept key features and impacts are identified as well.

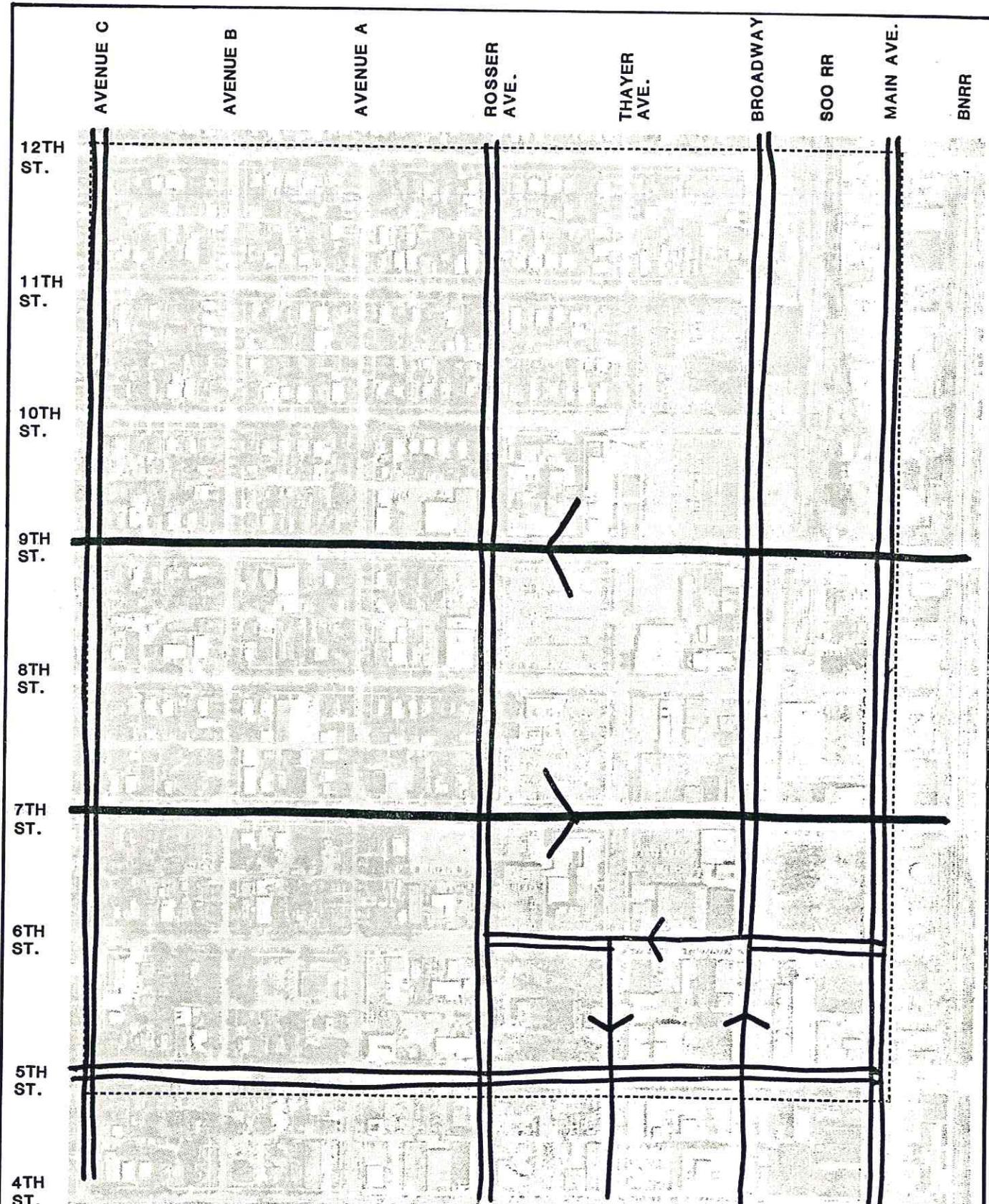
Table 4.2
INTERSECTION TRAFFIC SERVICE

<u>Location</u>	<u>1984</u>	<u>Level of Traffic Service</u>	
		<u>20000-Concept 1</u>	<u>2000-Concept 2</u>
7th Street/Avenue C	A	B	B-
7th Street/Rosser Avenue	A	C+	C
7th Street/Broadway	A	C+	C-
7th Street/Main Avenue	A	B-	B-
9th Street/Avenue C	A	C	C-
9th Street/Rosser Avenue	A	B	C+
9th Street/Broadway	A	A	A
9th Street/Main Avenue	A	A	A

Traffic Service Levels

<u>Level of Service</u>	<u>Volume to Capacity Ratio</u>	<u>Delay Range (secs. per veh.)</u>	<u>Description</u>
A	0.00-0.60	0.0-16.0	Free flow, minimal delay
B	0.61-0.70	16.1-22.0	Free flow, occasional delays
C	0.71-0.80	22.1-28.0	Stable flow, periodic delays, vehicles clear in one cycle
D	0.81-0.90	28.1-35.0	Restricted flow, regular delay, vehicles clear in first or second cycle
E	0.91-1.00	35.1-40.0	Maximum capacity, extended delays, vehicles clear in several cycles

- * Existing Pattern (Figure 4.5)
 - no changes would be required.
 - Chancellor Square circulation causes discontinuities.
 - capacity analyses indicate that the system can handle forecasted traffic
- * Rosser/Broadway One-Way Pair: one-way operation east of 7th, two-way east of 7th (Figure 4.6).
 - requires no reversal of Broadway.
 - could cause shift of traffic to Main Avenue westbound.
 - two blocks between the streets.
 - two-way flow required between 7th and 9th.
 - one-way operation could be extended to the east of the study area to eliminate the two-way flow requirement (Figure 4.7).
 - would significantly complicate circulation around the two medical centers.
 - this option is available to City indefinitely.
 - Broadway penetrates the retail core and may be disruptive
- * Rosser/Avenue A One-Way Pair: Rosser eastbound from west of 7th and Avenue A westbound from 9th (Figure 4.8).
 - adverse transition for traffic from the east and west.
 - some widening required on Avenue A.
 - requires re-opening of Avenue A from 6th to 7th.
 - Avenue C is only two blocks away to the north.
 - one-way pair could be extended east to 12th, simplifying 7th/9th connections but with some neighborhood intrusion.
- * Broadway/Main One-Way Pair: Broadway and Main One-Way west of 7th Street (Figure 4.9).
 - requires reversal of Broadway from 4th to 6th and complicates public garage access.



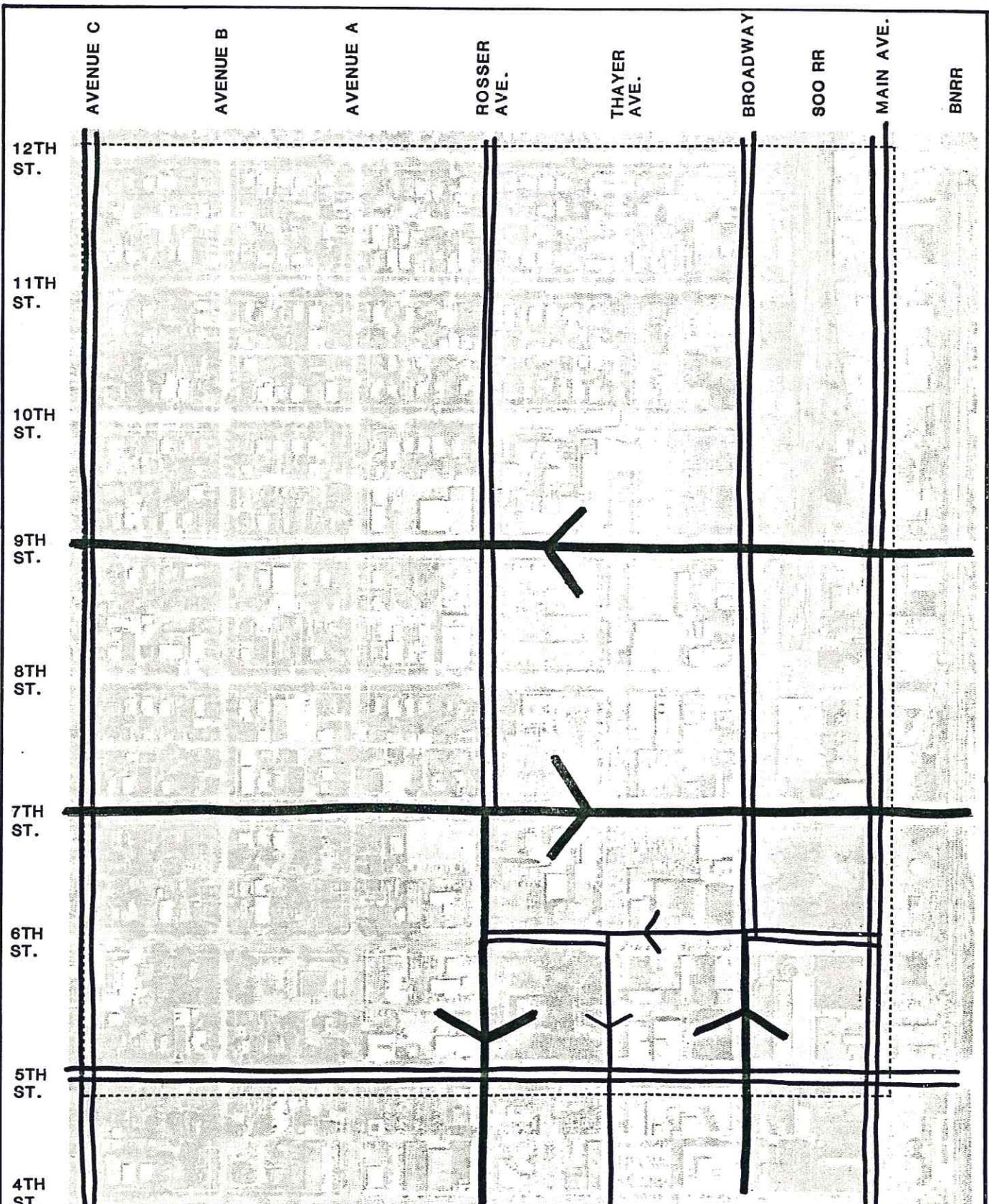
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EXISTING
CIRCULATION

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figure 4.5



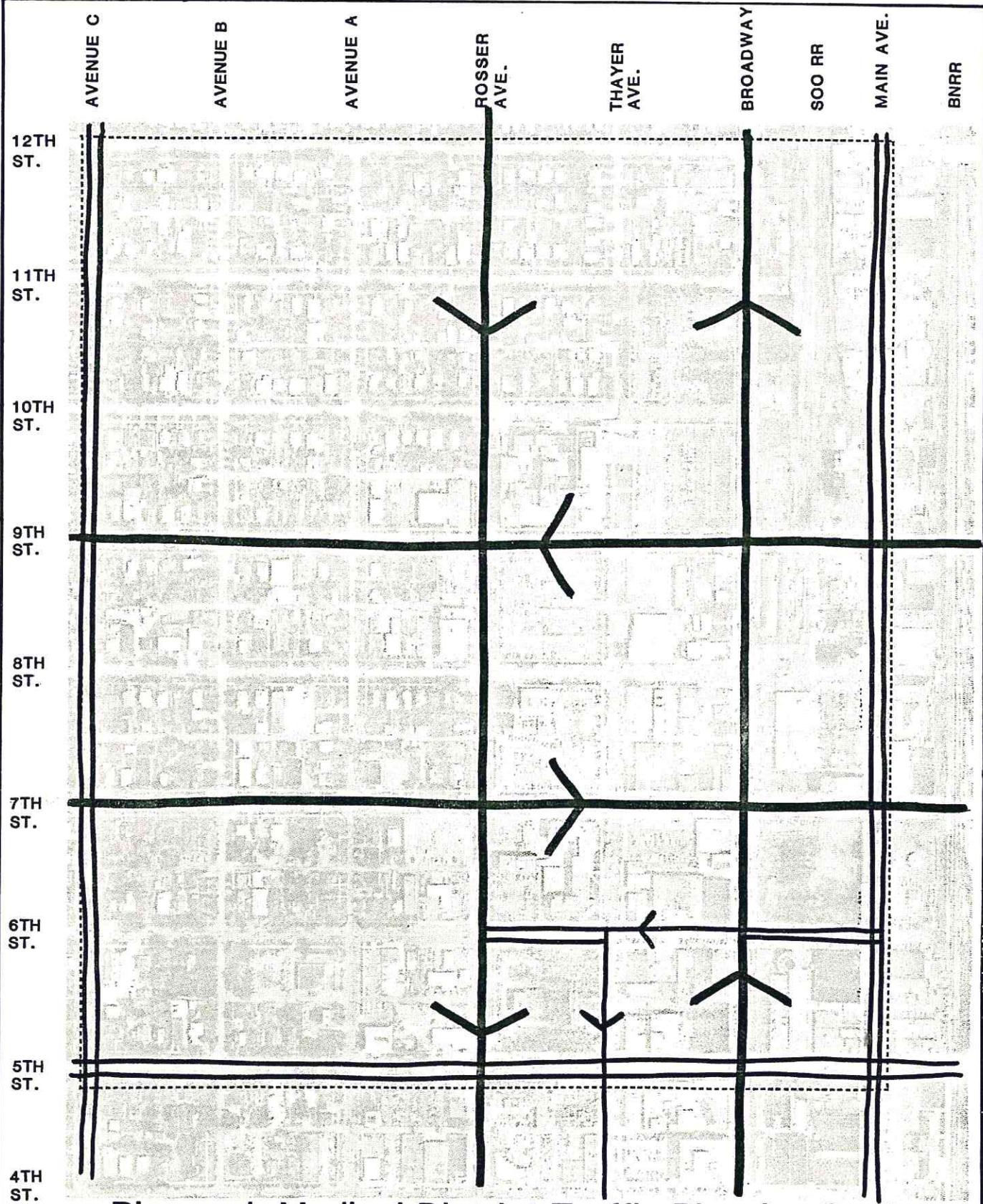
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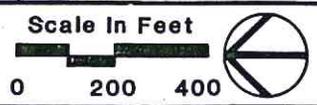
**ROSSER-BROADWAY
ONE-WAY PAIR
(CONCEPT A)**

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CIACCIO
KLICK
ASSOCIATES**

figure 4.6



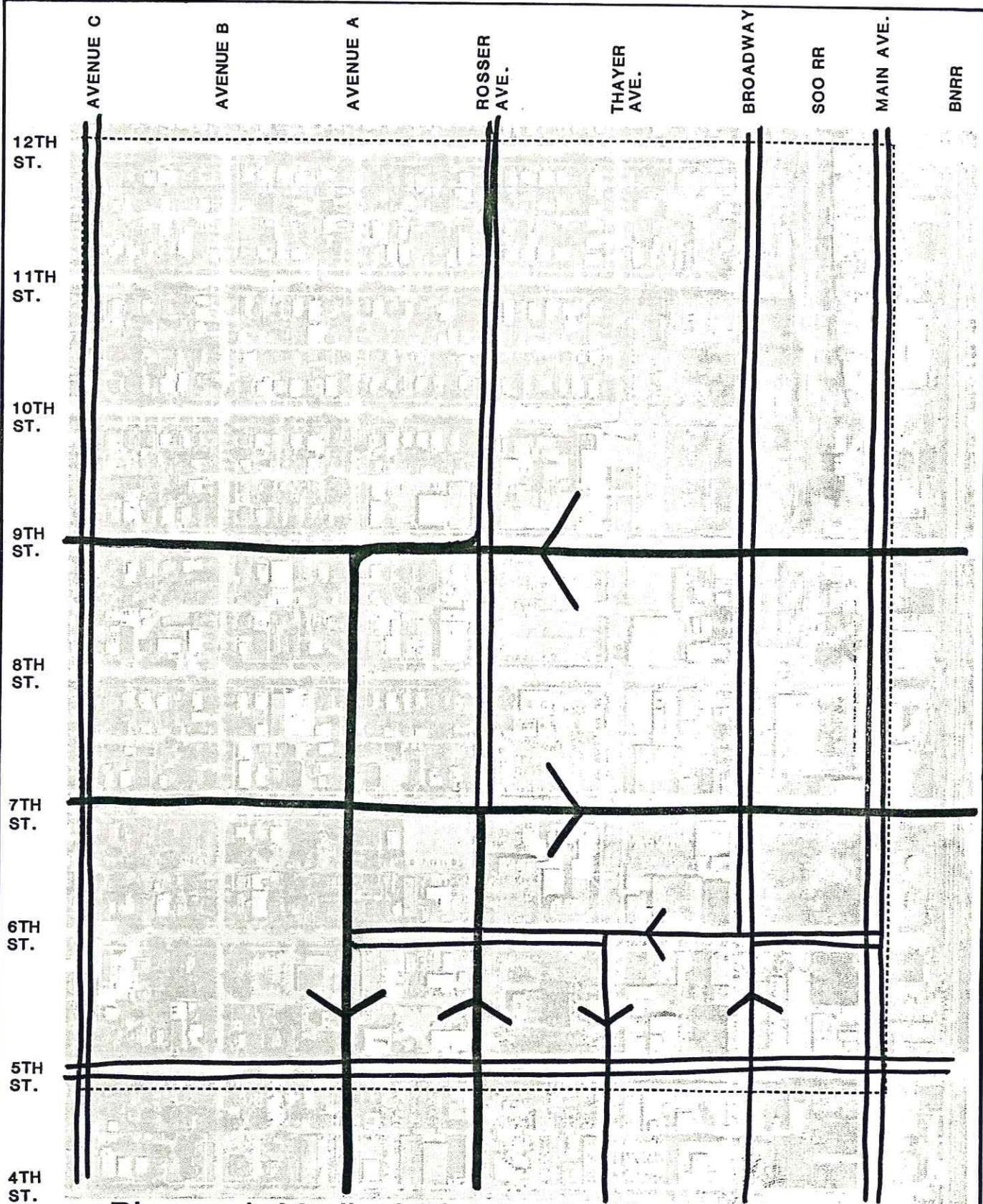
Bismarck Medical District Traffic Planning Study



**ROSSER-BROADWAY
ONE-WAY PAIR
(CONCEPT B)**

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KLICK
ASSOCIATES**

figure 4.7



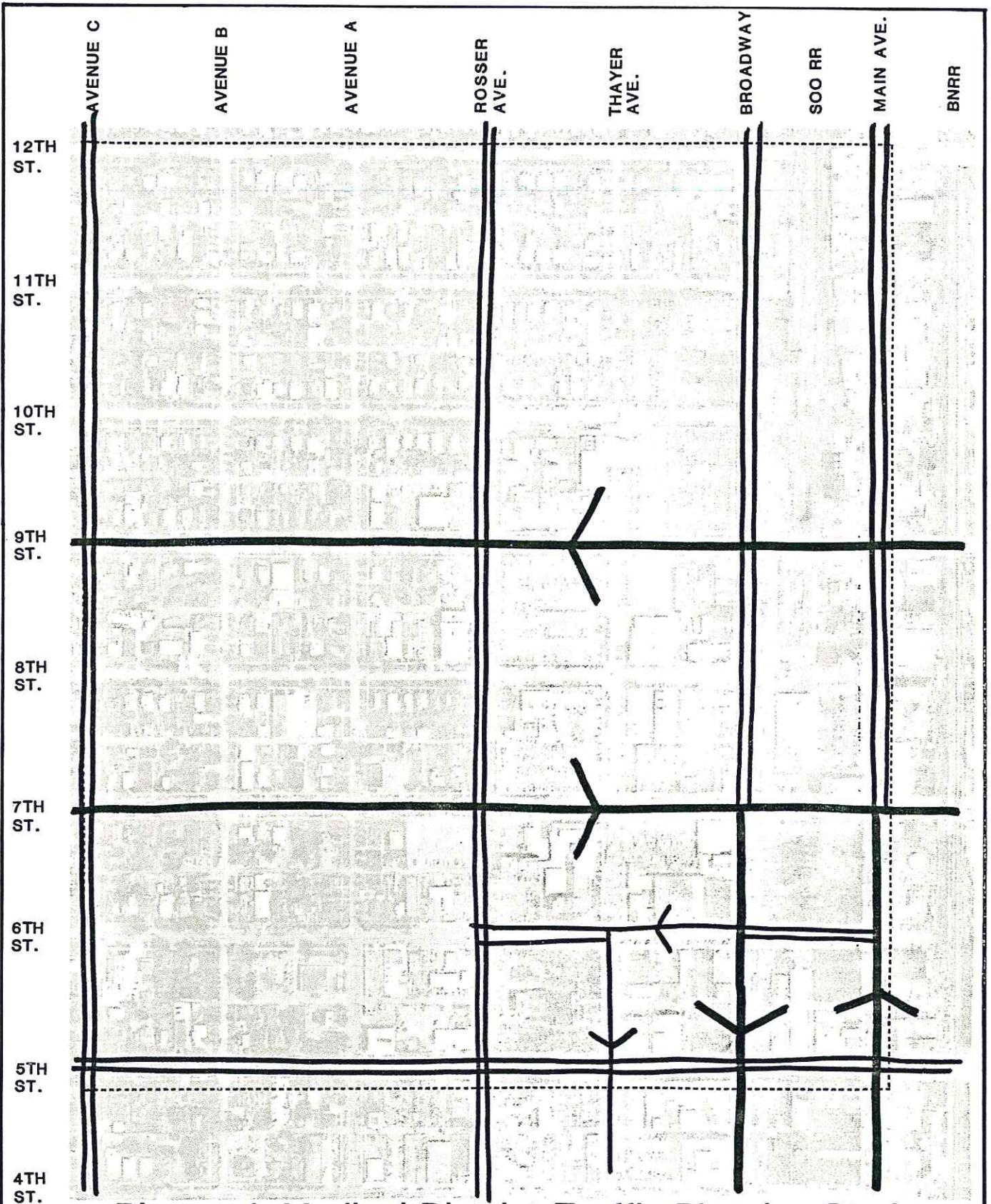
Bismarck Medical District Traffic Planning Study



**ROSSER-AVENUE A
ONE-WAY PAIR**

HDR
In Association with
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CIACCIO
KLICK
ASSOCIATES**

figure 4.8



Bismarck Medical District Traffic Planning Study



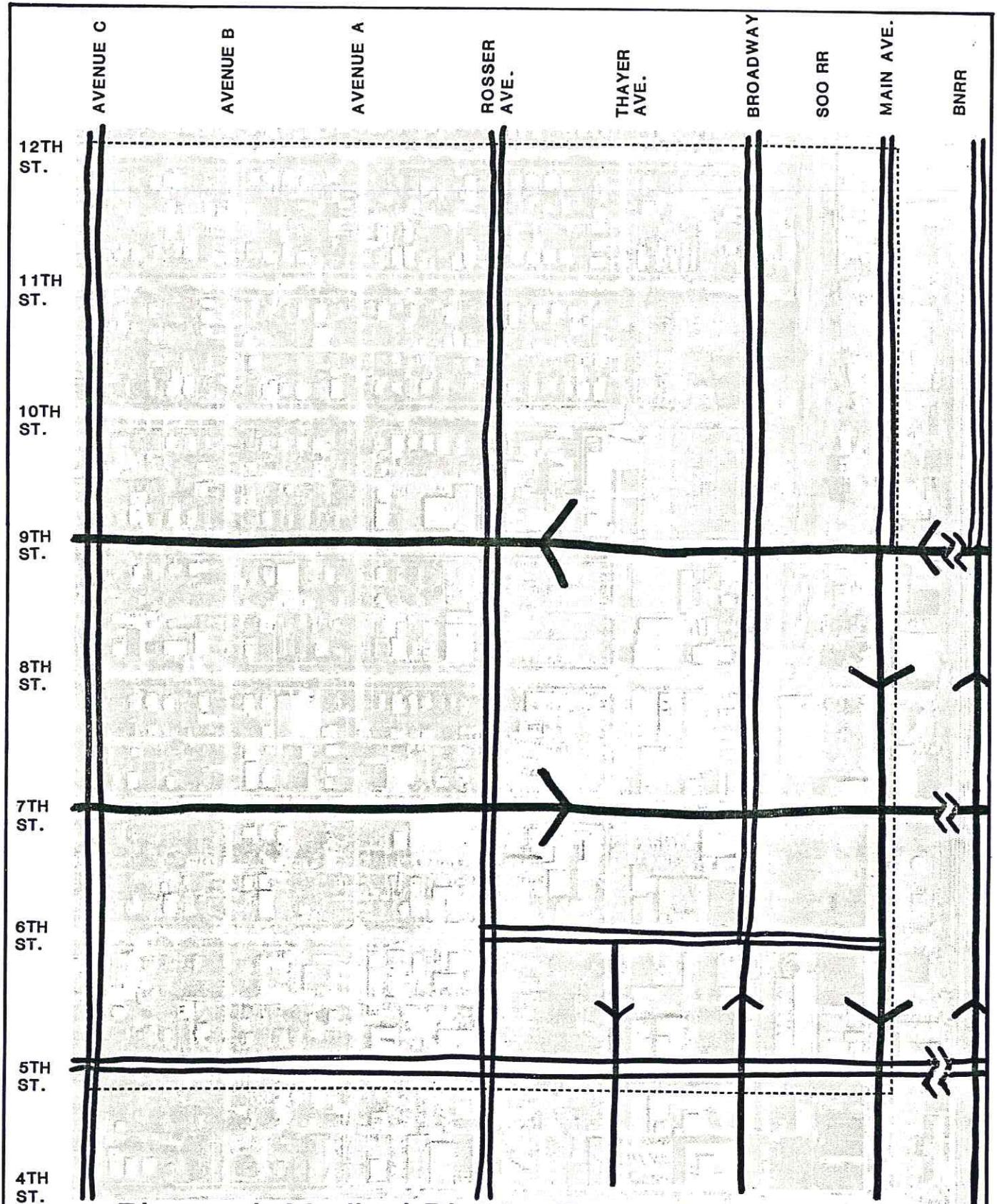
**BROADWAY-MAIN
ONE-WAY PAIR**

HDR
In Association with
**GALDIN
CIACCIO
KLICK
ASSOCIATES**

figure 4.9

- segment of one-way flow on Thayer between 4th and 6th would be a problem.
 - would complicate St. Alexius Medical Center access somewhat.
 - requires a transition west of the CBD and another if the pair is extended east of 7th.
- * Main/Front One-Way Pair: Main Avenue westbound and Front Avenue eastbound to the west of 9th Street (Figure 4.10).
- location and possible cost of two-way to one-way transitions relative to Burlington Northern Railroad.
 - complements existing two-block Broadway/Thayer couplet in the CBD.
 - some connecting streets would involve at-grade crossings on the Burlington Northern Railroad.
 - remains available in future
- * East-West One-Way Pairs in the CBD: Broadway/Main couplet and Rosser/Thayer couplet west of 6th Street (Figure 4.11).
- requires costly reversal of Thayer and Broadway in Chancellor Square.
 - not compatible with access to the public parking ramp on Broadway.
 - little direct impact on Medical District proper except Medical Center One emergency room access.
- * North-South One-Way Pairs: 4th, 5th, and 6th Streets as alternating one-way streets between Main Avenue and Avenue C to complement the 7th/9th couplet (Figure 4.12).
- requires transitions at Main for 3rd to 3rd/4th one-way pair and for 5th to 5th/6th one-way pair.
 - good linkage to 3rd and 4th Streets at the Boulevard.
 - east-west streets remain two-way as rungs on a ladder.
 - requires reversal of flow on 4th from Thayer to Broadway.
 - complements existing 7th/9th one-way pair.
 - permit better signal timing on Rosser Avenue.

The scope of this study did not entail an analysis of CBD traffic circulation. However, these comments and conclusions are offered as they may relate to medical district circulation:



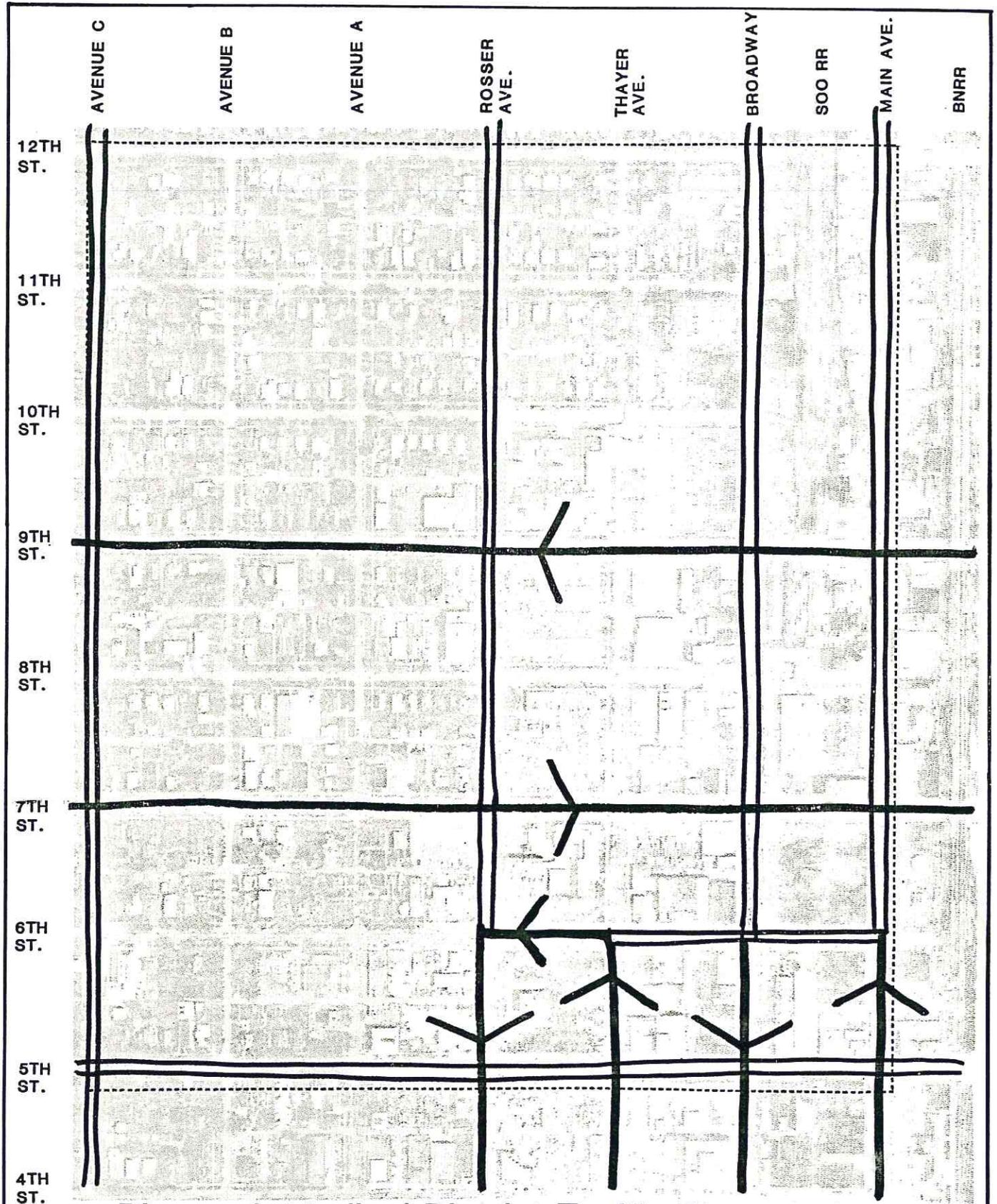
Bismarck Medical District Traffic Planning Study



**MAIN-FRONT
ONE-WAY PAIR**

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KLICK
ASSOCIATES

figure 4.10



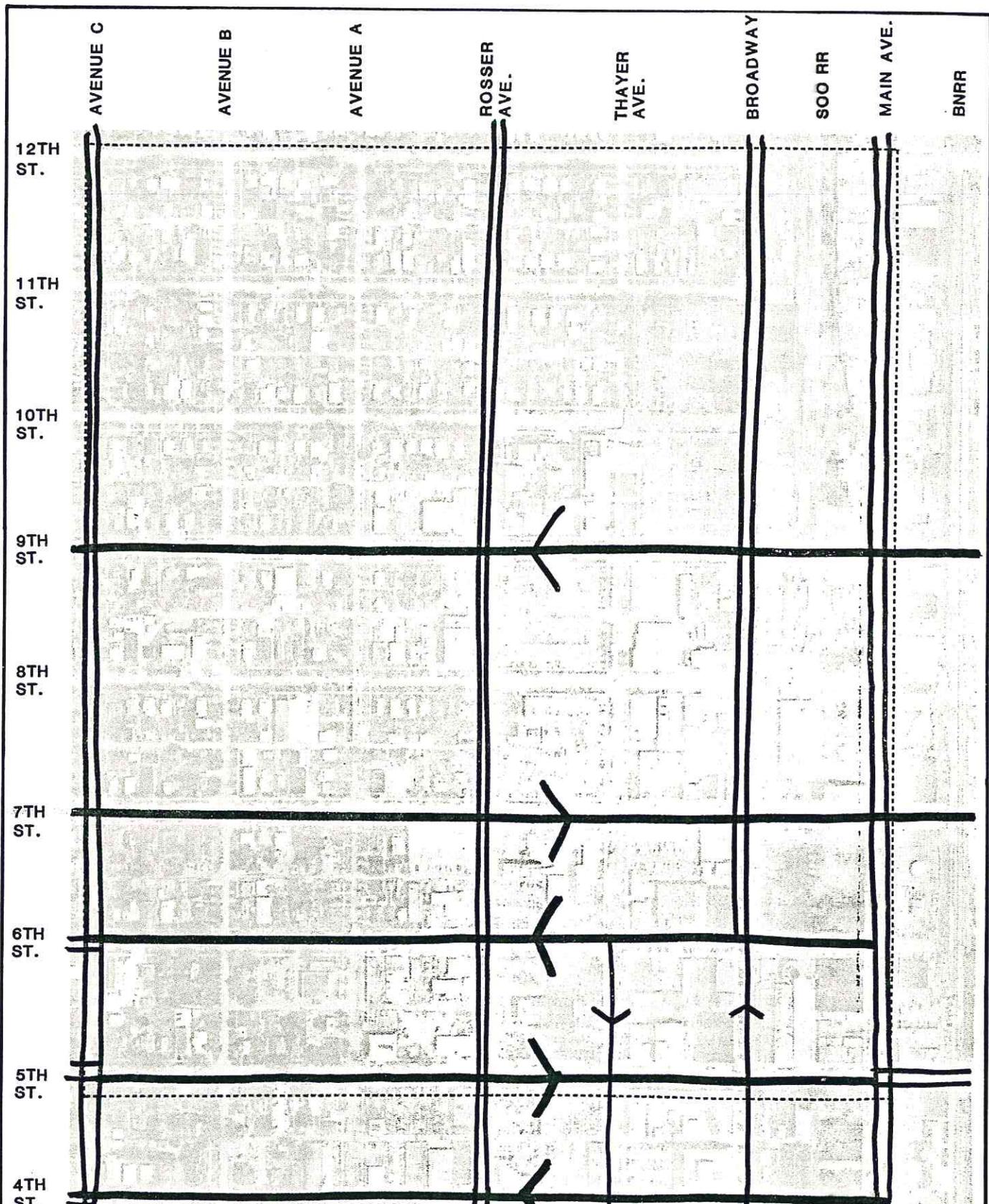
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**EAST-WEST
 ONE-WAY PAIRS**

figure 4.11



Bismarck Medical District Traffic Planning Study



**NORTH-SOUTH
ONE-WAY PAIRS**

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KLICK
ASSOCIATES**

figure 4.12

- Development of one-way couplets in the CBD does not appear necessary in the near future.
- East-west one-way couplets create some transition problems between 6th and 9th Streets, or require extension to the east of 9th Street where other concerns arise.
- North-south couplets require Main Street transitions but would complement the 7th/9th couplet.
- The City may want to consider developing a long-range CBD circulation master plan to guide future decision-making with respect to land development planning, property access, and street closures.
- Future traffic flow reversals, street closures, and one-way pair concepts should be carefully reviewed by the City in the context of overall circulation and the master plan.
- On the basis of Year 2000 traffic forecasts, east-west one-way pairs in the Rosser-Main corridor through the study area do not appear to be mandatory.

A lesser issue is bicycle circulation in the study area. The City has identified proposed bicycle routes in the study area per Figure 2.3. In view of the emerging role of Rosser as an arterial street, the City should for planning purposes consider deletion of the planned bike route segment on Rosser Avenue and either identify spur routes from Avenue B, or relocate the segment from Rosser South to Front Avenue.

Major Generator Access

A review of circulation and access was made for the two medical centers with respect to visitor, drop-off, and emergency traffic. Proper circulation of these traffic streams is important to each medical center. It also relates to overall traffic circulation as many motorists traveling to the hospitals do so infrequently, and desirably should be able to reach their desired destination with a minimum of circulation and confusion. In this regard, the following conclusions are reached:

- Medcenter One should carefully review access and egress routes for its employees, visitors, drop-offs, and emergency access for its existing and future physical plant. The "campus" for this facility is permanently fragmented by major streets, as opposed to a perimeter circulation system emerging at the St. Alexius Medical Center. The location of various access points are on the east (employee/walk-in, emergency), on the north (special drop-off bay), and on the east opposite Thayer Street (main entrance). This was felt to create some confusion in terms of site identity clear definition of circulation patterns. This effect may be compounded as the hospital expands north of Thayer.

The hospital should carefully incorporate vehicular circulation concepts for drop-offs, visitor parking, and other streams into future facility improvements. It should also consider developing guide signing to reinforce circulation patterns and clearly identify hospital access points.

The City should carefully review the circulation implications of future Medcenter One facility proposals to assure that these objectives are addressed with minimum disruption and maximum compatibility with on-street traffic operation.

- As noted, St. Alexis Medical Center is better situated with regard to circulation and access. This facility should continue to assume proper signing to site entrances and parking, and preserve desirable traffic flow patterns.
- Guide signing to the two medical centers from Main Avenue, and also from the 7th/9th couplet should be reviewed in conjunction with on-site signing for equitable and adequate guidance of emergency and infrequent visitors to the two hospitals.
- Comments were fielded during the study regarding the need for guide signing to the CBD. It is understood that the City is presently pursuing this topic. Care must be taken to avoid over-signing, but many cities have implemented directional signing for their CBD's (see p. 46, Public Works, December, 1983).

Arterial Access Control

A review was made of existing access patterns on the arterial streets in the study area. In general, property access and drives were not found to be a major concern with regard to traffic operations with a few exceptions. From this examination these recommendations were developed:

- Limit access to 7th and 9th Street between Avenue A and Main Avenue to residential uses, and very limited (existing) commercial access points.
- Limit access to Rosser Avenue from 10th Street west to a minimum.
- The City should carefully review driveway access for new development, redevelopment, and renovation projects to protect and enhance traffic operations. Access for tracts assembled from smaller parcels should likewise be examined closely.
- The mid-block driveway to the Q & R Clinic parking lot should be removed because of traffic conflicts and safety concerns, especially for pedestrians.
- Passenger loading zones are permissible at clinics and other selected locations, provided they are recessed from through traffic, do not cause operation problems, and function in a "right-turn-in, right-turn-out" fashion.

- The City should act to restrict large truck deliveries to the Medcenter One loading dock off 7th street to non-peak periods if truck deliveries begin disrupting traffic operations on 7th Street. The dock requires a backing-in maneuver from a highly travelled street, and consequently is undesirable in its location and configuration. In its future facility planning, the hospital should consider dock options to improve the situation, or perhaps relocate the dock.
- Future parking garages can be allowed well-designed entry or exits on one-way streets. Two-way access points should be carefully located to avoid conflicts and congestion.

Neighborhood Traffic Control

Concern was expressed at public information meetings that medical, clinic, and hospital traffic created traffic impacts in neighborhood areas to the north. This perceived intrusion is attributed to:

- Traffic "short-cutting" through the area.
- Traffic circulating searching for on-street parking.
- Utilization of curb space for employee parking.
- Narrow width of most streets.

The issue of parking is addressed later, but any reduction in on-street parking activity will reduce traffic in the area. Available traffic data suggest that the problem is not serious, but existing on-street conditions probably heighten the perception.

There are a number of traffic control measures which could be instituted to reduce or eliminate traffic intrusion. By preventing pass-through traffic or providing only circuitous connections, this traffic can be reduced. Techniques to accomplish this range from traffic controls (one-ways, turn restrictions) to physical devices (barriers, diverters, islands). These techniques are effective and relatively inexpensive, but do make access into and out of the area which is so protected less direct as well.

This "quiet street" approach could also help create an obvious buffer or edge to the medical district. One difficulty in this is that the north edge of medical uses is very irregular at present and is expected to change. However, since Avenue A is the north limit of the zoned Medical District, it could serve a break point. Another difficulty is the possible lack of interest on the part of absentee ownership in the area.

A detailed "quiet street" plan should necessarily include neighborhood input. If the concept is pursued, a neighborhood task force should be established within an identified boundary to work with City staff in developing proposed treatments and gaining a consensus. If 12th Street is extended across the Soo Line property, traffic diversion north of

Avenue A should be strongly considered. The effect of such systematic neighborhood traffic planning is to return the neighborhood to residential traffic by selectively reducing the complete grid street pattern. The result is internal circulation not unlike that of newer subdivisions with curvilinear streets. Selected illustrations of such concepts are included in the Appendix.

4.3.2 Special Analyses

12th Street Connection/Main to Broadway

This concept entails the connection of 12th Street from Main to Broadway and would allow 12th Street to extend to Rosser Avenue. These conclusions were reached in review of this concept:

- An estimated 2,000 - 2,500 daily vehicles would use the connection initially, increasing to 3,000 - 4,000 long term.
- Will facilitate circulation around Soo Line site and
- Modest traffic relief to the 7th/9th Street one-way pair.
- Should not increase 12th Street traffic south of Main substantially.
- Will require a traffic signal at Main Street
- Will complete a defined circulation loop around the St. Alexius site.
- Will complement overall Medical District circulation capabilities.
- Relief to left turn delays at 16th and Broadway
- Soo Line track abandonment and removal may be a factor.
- Presently would require acquisition of an active business, or construction of replacement space behind the west end of that business.

Based on the on-going start of development on the Soo Line property, projected traffic on 9th Street and separation of street connections between Main and Broadway, it is recommended that:

1. This project has merit, but is not an urgently needed project and could be deferred until the present building tenant relocates. The question of construction cost responsibility is also unanswered at present.
2. If it is decided to include this link in the City street plan, then the informal commitment of St. Alexius Medical Center to widen 11th Street from Broadway to Thayer should be shifted to 12th Street.

3. Serious consideration should be given to deterring through traffic on 12th Street north of Rosser Avenue.

6th Street/Broadway to Rosser

This one block one-way segment was reviewed to evaluate whether a change is justified. The Chancellor Square one-way circulation concept is appreciated for its relation to the CBD retail core. It provides on-street parking and provides good traffic exposure to businesses in the area. However, the implications of its one-way flow patterns traffic on overall downtown circulation options were either taken as negligible or not considered at all in its planning and development. Desirably, the concept would have been implemented in the context of overall downtown circulation requirements. In the course of evaluating a change to 6th Street traffic flow, these evaluation points were identified:

- Any change in the direction of traffic flow is dependent on other plans for CBD area one-way couplets.
- Present flow is compatible with the more promising CBD one-way concepts previously discussed.
- One-way flow southbound is ruled out since 7th Street is southbound.
- If reverted to two-way operation, costly adjustments would be required in angle parking, signals, and signing.
- Present "around the block" circulation is satisfactory for Medcenter One, Q & R Clinic, Memorial Building, and City Auditorium.
- Traffic operations appear satisfactory.

A reversal to two-way operation does not appear necessary or justified at present and under no circumstances should it be made prior to confirmation that no CBD circulation changes would occur within the next 10 to 15 years. A change to two-way flow would be relatively expensive for the gain, would cause a loss of parking and would amount to a diminishing of the Chancellor Square concept. Again, this decision should be made only in the context of other CBD circulation system planning.

Avenue A/6th to 7th Street

Discussions in the course of the study identified the closure of this block as a circulation concern to both businesses and residences in the area. Traffic patterns in this area were examined and led to these observations:

- The closure does inconvenience certain circulation movements, but these are relatively small in magnitude.

- Before the closure, the traffic volume on this block was about half of that one block to the west
- Should encourage use of Avenue C to 5th or 6th Street, or vice versa.
- There is not a demonstrated long-range need for a Rosser/Avenue A one-way couplet.
- The closure does not inhibit any other proposed CBD one-way schemes.
- Consistent with development and planning activity within the medical district zone.

While circulation might be more convenient for certain connections in terms of overall traffic circulation, it is not essential that this street segment be reopened in the consultant's judgment.

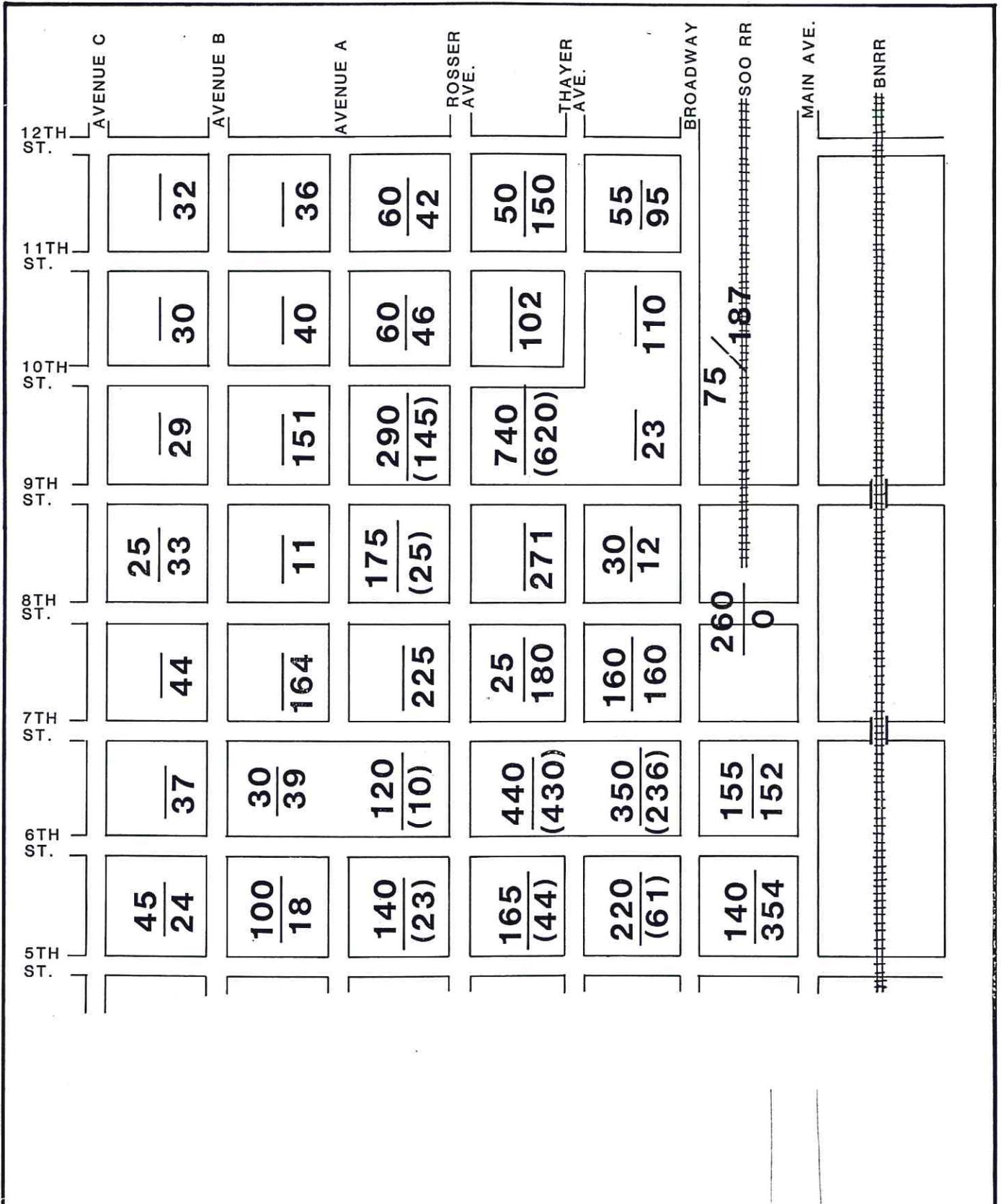
4.4 PARKING

4.4.1 Supply and Demand

A detailed analysis was made of existing parking supply in the study area in comparison to estimated parking demand for present land uses and both Concepts 1 and 2 for projected uses. A detailed analysis was made of peak parking demand for both proposed land use concepts. In conducting this analysis, it was assumed that off-street parking requirements would be satisfied for each per City ordinance. The future land use concepts recognize and include the land requirements for this parking off-street. Estimate of parking demand were made for each block considering the type of use and appropriate floor space or an alternate indicator of parking demand. The results of this analysis are presented in Figures 4.5 and 4.6, and summarized in Table 4.3 below:

**Table 4.3
PARKING DEMAND ANALYSIS**

<u>Condition</u>	<u>Space Demand</u>	<u>Surplus (Deficiency)</u>
1984 Existing	3130	840
2000 - Concept 1 (Present Trend)	3907	1203
2000 - Concept 2 (Intensive Development)	5117	1262



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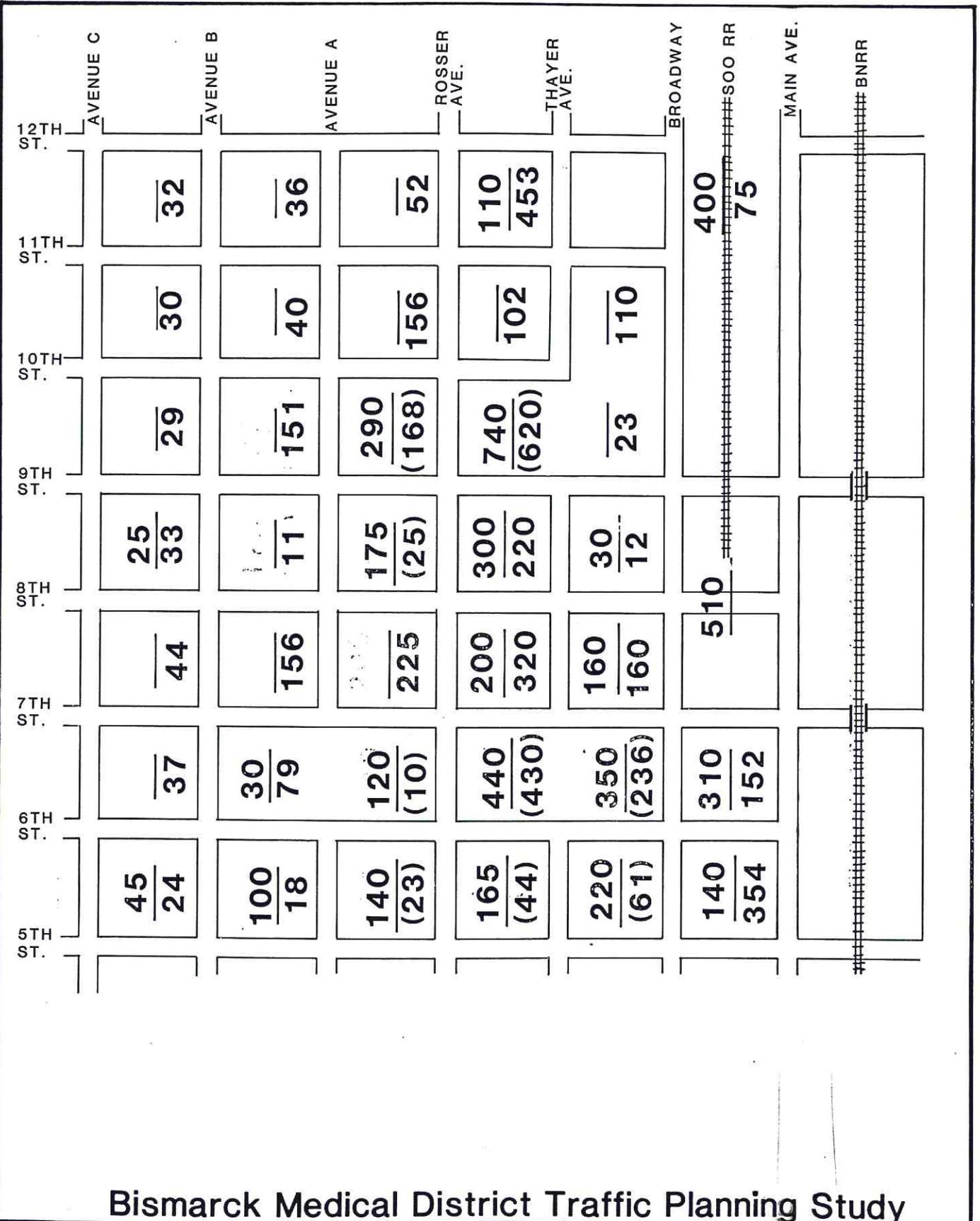
160/236 Demand/Surplus (Deficit)



PARKING DEMAND
CONCEPT 1

HDR
In Association with
GALDIN
CIACCIO
KLICK
ASSOCIATES

figure 4.13



Bismarck Medical District Traffic Planning Study

160/236 Demand/Surplus (Deficit)



PARKING DEMAND CONCEPT 2

HDR
In Association with
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CIACCIO
KLICK
ASSOCIATES

figure 4.14

Based on that analysis, these conclusions were drawn:

- About 31% of all existing parking spaces in the study area (4122) are on-street, but most of the latter are in residential areas north and east of medial uses or in the CBD diagonal parking.
- The three largest medical parking demand activity centers are St. Alexius Medical Center, Medcenter One, and Q & R Clinic.
- These same three sites have the largest parking deficits and along with other generators, contribute to on-street parking concerns in adjacent residential areas.
- Most of the parking deficiency in the core of the district is long term/employee parking because health care facilities have catered primarily to clientele/visitor parking needs.
- Off-street parking standards appear adequate. Deficiencies arise because of land uses with "grandfather" privileges, and distribution of parking supply within the CBD parking district which included Medcenter One and Q & R Clinic.

Related issues which will aggravate the supply deficiency are the possible control of parking in the residential areas and the eventual removal of on-street parking on arterial and collector streets. In the long term, if all suggested on-street parking prohibition for street capacity were executed, about 135 spaces would be lost. This is equal to a parking lot one-half of a city block in size.

It is also seen that parking demand is expected to increase over time as development in the district occurs, and is substantially greater for Land Use Concept 2. The net surplus is also seen to increase over time, but this is due in large measure to additional off-street parking which will make St. Alexius Medical Center self-sufficient in terms of parking supply. This milestone should also provide lasting relief to the adjacent neighborhood where on-street parking presently occurs.

4.4.2 Findings

The need for parking in the study area goes hand-in-hand with the development of additional floor space for medical and other activities. Consequently, recommendations with respect to parking are a function of the development activities which are embodied in Land Use Concepts 1 and 2.

Since a portion of the study area lies within the CBD Parking District, the City will have a role to play in responding to parking solutions. Elsewhere in the City, the zoning ordinance requires provision of on-site parking. In the CBD area, this is not the case and parking must be provided by private enterprise

for the public sector. Consequently, the future parking supply system will be the product of these elements in varying proportion:

- land development activity
- private sector parking development
- City participation to address deficiencies
- development opportunities created by a blend of public leadership, financial incentive, and development potential

Should Land Use Concept 1 evolve in the years ahead, both hospitals and other uses are expected to satisfy their parking needs by development of additional at-grade, off-street parking. City involvement would be limited to enforcement of parking ordinances, with little probable involvement in developing parking near the Medcenter One and Q & R Clinic vicinity.

On the other hand, Concept 2 may see the City actively involved in stimulating or leading development of a parking garage east of Medcenter One, possibly in conjunction with office/retail development. Such a public posture could serve as a catalyst to realization of other potentials in the Medical District.

These parking actions have been identified:

- * The City should continue to strictly enforce off-street parking requirements outside the CBD Parking District.
- * St. Alexius Medical Center should continue to develop off-street areas, such as its recently leased spaces on the Soo Line property. The hospital's goal of two spaces per bed matches the zoning code and should handle its basic parking demand for employees, doctors, and visitors.
- * Initiate coordination and planning to develop a parking garage on the south half of the Medcenter One lot on Thayer; in conjunction, explore office development on the north part of the block. Examine developer incentives and tax increment financing strategies.
- * Incorporate consideration of skywalk/pedestrian circulation concepts into all major land use and parking facility planning in the district.
- * Consider initiation of residential parking controls to limit parking intrusion (e.g. increase parking prohibitions, institute time limitation). If initiated prior to supply improvements, consideration should be given to possible relocation of the problem. On-street parking should be removed as discussed in Section 4.3 to assure satisfactory traffic safety and operations.

- * Long-term loss of up to 135 on-street spaces (mostly short-term) will affect parking supply needs in the 7th - Rosser, 9th - Broadway area and should be considered in garage development in this area.
- * Development of a second garage on the St. Alexius lot on Thayer west of 9th could serve users north of Rosser and discourage additional problems of expensive land acquisition and surface lot development.

4.5 PEDESTRIAN CIRCULATION

4.5.1 Existing Conditions

Present pedestrian circulation was reviewed with respect to its interface with vehicular conflict using the information presented in Section 2.4 as a basis. These specific concerns were identified:

- Significant concern was expressed over pedestrian crossings on 7th and 9th at Thayer, and field observations confirmed that this concern is legitimate. Pedestrians become stranded midstream and have difficulty identifying acceptable crossing gaps as discussed earlier in Chapter 2.
- Pedestrian traffic associated with parking on the east curb of 7th Street between Rosser and Thayer Avenues also create some conflict with vehicular traffic. This arises as pedestrians enter and leave their parked vehicles on the street side, and cross the street midblock.
- A similar concern arises on Rosser Avenue between 7th and 9th Streets from on-street parking.
- Potential conflicts may arise from mid-block crossings of Broadway Avenue between St. Alexius Medical Center and leased parking to the south. This is a transient potential dependent upon continued leasing of the property.

Pedestrian activity at major intersections was also reviewed. Available pedestrian crossing data for key locations shows peak crossing volumes of 1 - 3 persons per minute per crosswalk. This level of activity does not seriously impede traffic flow at present.

The following short-term recommendations are made with respect to pedestrian circulation:

- * Actions to control and steer pedestrian activity to designated crossings should be encouraged. In fact, both hospitals and Q & R Clinic have taken steps to accomplish this while beautifying and visually integrating their sites

with fencing, walls, and landscaping. These treatments funnel pedestrians to the corners of parking lots where crosswalks are available.

- * Little can be done about pedestrian traffic associated with on-street parking, short of parking prohibition. This parking is prohibited overtime, the conflicts will also be removed.
- * The pedestrian safety concerns at 7th and Thayer are very real, yet are difficult to address. Present pedestrian crossing levels do not satisfy standard pedestrian volume warrants for a traffic signal. However, field observation and file data permit these observations:
 - through traffic on 7th Street travels at moderate speeds
 - some motorists travelling to Medcenter One and Q & R Clinic are preoccupied with their next turn
 - gaps in traffic are difficult to gauge because of varying speeds of travel and traffic turning from Rosser
 - pedestrians must cross three lanes of traffic. When parking on the east curb is removed, a typical pedestrian would require 12 seconds to cross the street. Crossing time is slower in cold winter weather.
 - elderly person and family groups are frequent users of the crosswalk and present a special concern

Based on these field conditions, and the expectation that traffic and pedestrian activity will persist and probably increase, it is recommended that the City consider the installation of traffic signals at this location. This action should be coordinated with signal progression on 7th Street, with pedestrian actuation and cross street vehicle actuation as optional features. This signal will also reduce the confusion exhibited by motorists on Thayer and the site drive as they move between the offstreet drop-off area next to the hospital and clinic and the surface lot across 7th Street. Lesser solutions such as signing or beacons were judged as ineffective treatments based on the consultant's experience in similar situations.

While the pedestrian crossing situation at 9th and Thayer is less severe in some respects, it is recommended that a traffic signal be considered at this location. Vehicular and pedestrian activity levels are comparable to the location 2 blocks west, and the installation would be relatively simple due to T-intersection. Sketch concepts are located in the Appendix.

4.5.2 Future Conditions

Future traffic conditions for the two land use concepts were related to pedestrian linkages which would occur under each land use scenario in order to identify the location and relative impact of future pedestrian-vehicular conflicts. In this process, these conclusions were determined:

- * With substantial increases expected in traffic volumes, pedestrian conflicts will increase even if pedestrian activity levels remain constant. While vehicular delay will begin to mount as pedestrian traffic increases, the level of delay is dependent upon the relative level of each element.
- * Land Use Concept 1 tends to encourage the level of such conflicts except that the Medcenter One tunnel under Rosser should reduce the corresponding surface movement from the north.
- * Land Use Concept 2 addresses the worst of the conflict points on the 7th/9th couplet by intensifying the magnitude of those pedestrian movements and increasing the "critical" mass which will encourage the future construction of pedestrian overpasses.
- * A skywalk system connecting medical uses requires two story facilities for feasible linkages.

As discussed previously, considerable interest has been expressed in the development of a pedestrian circulation system within the Medical District and CBD area for these various reasons:

- convenience, comfort, and security of clientele and patrons of activity centers
- strengthening of ties between similar and complementary land use activities
- possible reduction of vehicular and pedestrian conflicts at-grade
- image-enhancement for the city core
- integral element in achieving desirable land use and transportation objectives

Such a system would, of course, build off existing circulation elements including the sidewalk system, but would incorporate these elements:

1. Activity nodes - major destination locations and also points of intersection in system links.

2. Skywalks - pedestrian bridges which span public streets
3. Tunnels - below grade connections under streets
4. Interior corridors - passageways within buildings which serve pedestrian movements between nodes.
5. Vertical connections - stairs, elevators, and escalators which connect various levels
6. Sidewalks - basic public pedestrian walks, possibly widened with amenities such as benches.

As discussed in Chapter 2, some scattered elements of such a system are in place. Further development of this pedestrian system would be an integral component to a stronger and more vital Medical Center environment. This prospect, however, is closely tied to the shape and form of future land use. It can be concluded that Land Use Concept 1 affords only limited opportunity to develop an extensive, unified network because it shows future development in a more settled, less intense fashion.

Concept 2 proposes multi-level development between the two medical centers. This notion creates the opportunity to develop a second-level circulation concept for pedestrian flows which would link the medical centers, future offices buildings, existing clinics, and parking garages. The system would promote flexible use of parking resources and provide direct, convenient, protected connections between key activity centers, adding a new dimension to the character of the district.

In response to these potentials, a potential pedestrian circulation system which is integrated with the land use components of Concept 2 (See Figure 3.2) is presented in Figure 4.7. In addition, these recommendations are also offered:

- * Recognize that separation of vehicular and pedestrian traffic in the medical district is contingent on clustering and intensifying future pedestrian movements.
- * Incorporate consideration of pedestrian circulation facilities in medical district project review and land use development
- * Investigate feasibility of serving the City Auditorium and Memorial Building from proposed skywalk from Q & R Clinic to the Galleria Ramp to improve justification. Evaluate City financial participation in the project.
- * Encourage development of multi-story facilities to serve as skywalk terminals, and promote skywalks by strategic parking supply development in the corridor between the two major medical centers.

TRAFFIC PLANNING STUDY
for the
BISMARCK MEDICAL DISTRICT

Bismarck, North Dakota

November 1984

Prepared by:

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and

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Bismarck, North Dakota

5.0 STUDY FINDINGS

5.1 Overview

The Medical District of Bismarck is a unique and important community resource. Because significant growth beyond that which has been seen in the last few years may occur, this study was commissioned. Its purpose was to assess the ability of various elements of the transportation system to meet future travel demands imposed by land development potentials in the Medical District.

Consequently, the integral relationship between traffic circulation and land use concepts was of primary importance in the course of the study. To this end, two land development scenarios were identified to represent alternative futures for the intensity, character, and interrelationship of study area land uses. The implications of these two concepts with respect to traffic service, parking, and pedestrians were examined to determine what future improvements will be necessary to accommodate future travel needs, or desirable to attain other land use planning objectives.

As a result, a number of general conclusions and specific recommendations were reached. A pivotal aspect in this process was the definition of two alternative futures for the study area, and identification of key projects which capitalize on latent opportunities in the present land use complexion of the district and in future development potentials.

The land use alternatives identified in this study:

- Concept 1 - Present Trend
- Concept 2 - Intensive Development

represent two possible futures for the district. The two concepts are not totally interchangeable because they are the product in part of external demand for medical and related services in terms of population growth and vitality of the regional economy. Nevertheless, the specific pattern of land development in the district can be shaped to a large degree by a coordinated public and private sector initiative and concerted effort to provide the appropriate policy/regulation climate and development incentives.

Such leadership, foresight, and decision making will clearly play a role in the character of the Medical District by the year 2000, and in the degree to which important land use and transportation system planning objectives are achieved.

As a result of study analyses, the following principal conclusions were made:

Land Use

- * Land Use Concept 2 - Intensive Development embodies certain elements which it is felt will create a stronger identity for the medical district as a health care resource center for Bismarck and the surrounding region.
- * It will also provide a critical demand for parking garages, which in turn will help generate opportunities to further develop a second-level pedestrian circulation system.
- * Development of multi-level offices and parking ramps between the two medical centers is the most critical ingredient in capitalizing on the opportunities in Land Use Concept 2.

Street System

- * The street system should be able to accommodate presently anticipated traffic volume increases with relatively modest modifications in traffic controls and on-street parking.
- * The implementation of east-west one-way pairs through the study area using Rosser, Main, Broadway and other Avenues is not warranted.
- * Traffic service at the intersection of all principal arterials should be monitored to insure that their capacity is maintained.
- * The role of these arterials -- 7th, 9th, Main, and especially Rosser -- to carry through traffic will become more evident as volumes increase. Parking on-street and property access will necessarily be a lower priority.
- * The 12th Street Connection would be a worthwhile addition to the street system and should be pursued as funds and right-of-way are available. A change in flow on 6th Street between Broadway and Thayer does not appear necessary at present. The closure of Avenue A between 6th and 7th Streets creates some localized circuity, but does not compromise overall circulation.
- * Future street system modifications should be carefully considered before implementation, so as not to compromise long-range needs and preclude circulation alternatives prematurely.

Parking

- * Parking problems in the Medical District stem primarily from unmet long-term employee parking demands, but will involve clientele/customer demands as land uses developments in the district occur.
- * The City should assume a role in fostering development of a parking garage on the Medcenter One lot, because the site lies within the CBD parking district, there is a parking deficiency in

the area, and the garage and proposed adjacent office would serve as a catalyst to accomplishing other key objectives.

Pedestrian Circulation

- * Pedestrian activity at present does not constitute a significant cause of delay to motorists at signalized intersections.
- * Pedestrian activity under Land Use Concept 1 will be greater than present and may cause some additional vehicular delay in peak hours, but is not anticipated to be severe. Concept 2 envisions skywalks which will reduce conflicts and enhance the quality of the pedestrian environment.

5.2 RECOMMENDED PROGRAM

Findings and recommendations developed in the previous chapter are summarized in this section and arranged in order of implementation. Recommendations are predicated on the pursuit of Land Use Concept 2. Concept 1 will generally require the same street-related improvement, but on a deferred schedule because of lower overall traffic assignments.

Time frames utilized are short-term, intermediate and long-term. Specific study recommendations are summarized as follows:

SHORT-RANGE (1984-1986)

Land Use

- Consider foundation of a Medical District Coordinating Committee to provide dialogue, continuity, and direction to medical district development.
- The City should consider policies and decisions which support the development of a Concept 2 pattern of development.
- The City should identify tools and strategies whereby it can provide guidance and incentive to a more favorable land development course.
- Explore development potentials on the north part of the Medcenter One lot for an office building, in conjunction with a parking garage.

Street System

- Prohibit parking on the west curb of 7th Street for 150 feet north of Rosser.
- Prohibit parking on the west curb of 7th Street from Thayer to Broadway in the p.m. peak hour.
- Prohibit parking on the north curb of Broadway for 150 feet east of 7th Street in the p.m. peak hour.

- Monitor land use changes for opportunities to prohibit curb parking along Broadway from 6th to 10th, and along 7th from Rosser to Thayer.
- Review hospital guide signing in conjunction with the ongoing downtown guide signing project.
- Continue to limit and reduce access to the principal arterials.
- Monitor availability of right-of-way for a 12th Street connection.
- Consider working with a defined neighborhood area to develop elements of a "quiet streets" concept in response to concerns expressed by neighborhood residents.
- Remove the Q & R Clinic driveway to 7th Street south of Thayer Avenue.

Parking

- Continue to strictly enforce off-street parking requirements outside the CBD Parking District.
- St. Alexius Medical Center should continue developing off-street parking towards the goal of 2 spaces per bed.
- Initiate coordination and feasibility planning for a parking garage on the south half of the Medcenter One lot on Thayer. Examine developer incentives and tax increment financing strategies. Coordinate with a potential office site on the north of the block.
- Consider institution of on-street parking time limitations or increased all-day prohibition to reduce neighborhood impacts arising from long-term employee parking.
- Implement on-street parking reductions as discussed under the "Street System" section.

Pedestrian Circulation

- Control pedestrian traffic associated with medical facility parking to designated crossings through walls, fences, and plantings, as both hospitals have done.
- Design and construct traffic signals on Thayer Street at 7th and 9th Streets to afford a safer pedestrian crossing environment.
- Promote land development concepts which permit development of a pedestrian circulation system. Consider City involvement through parking garage development.
- Re-examine feasibility of a skywalk from Q & R Clinic south to the Galleria parking ramp. Determine feasibility of connections to the City facilities on the west half of the same block.

- Recognize that separation of vehicular and pedestrian traffic is largely contingent on clustering and intensifying future pedestrian movements.
- Incorporate consideration of special pedestrian circulation facilities in medical district land development and project review.

INTERMEDIATE (1987-1992)

Land Use

- Pursue development of the office building/parking ramp project on the Medcenter One lot on Thayer Street.
- Evaluate feasibility and concepts for a similar pair of projects on the St. Alexis Thayer Street parking lot.

Street System

- Prohibit parking in the p.m. peak hour on the east curb of 7th Street between Thayer and Broadway.
- Prohibit parking on the north curb of Rosser between 7th and 9th Streets.
- Extend p.m. peak parking prohibitions in the Short Term period to all-day prohibitions.
- Monitor traffic service on the east approach of Rosser at 9th for possible parking prohibition on the north curb.
- Install 3-phase traffic control at Rosser Avenue signals on 7th and 9th Streets to accommodate left turns from Rosser.
- Provide a two-lane approach from the east at 9th Street and Avenue C, and remove parking on the west approach.
- Develop a long-range CBD master plan for circulation as a guide to decisions on land development, garage and property access, and street closures.
- Monitor the Medcenter One loading dock, and restrict activity to off-peak periods if necessary.
- Evaluate circulation flow patterns for major activity centers carefully to minimize impact on public streets and maximize clarity and efficiency of site access.

Parking

- Pursue development of the Thayer Avenue parking ramp on the Medcenter One lot.
- Implement on-street parking prohibitions as discussed in the "Street System" section.
- Continue to enforce off-street parking standards.

Pedestrian Circulation

- Develop a skywalk from Medcenter One to the Thayer Avenue parking ramp.
- Develop a skywalk from Q & R Clinic to the Galleria parking ramp.

LONG-RANGE (1993-2000)

Land Use

- Continue to encourage new development patterns and configurations which reinforce the proposed parking ramp feasibility and strengthen options to extend the pedestrian circulation system.

Street System

- Prohibit parking on the south curb of Rosser Avenue between 7th and 9th Streets.
- Prohibit parking on the east curb of 7th Street between Rosser and Thayer Avenues.
- Prohibit parking on the south curbs of 7th Street between Thayer and Broadway Avenues.
- Prohibit parking on Broadway from 6th to 9th Streets.

Parking

- Develop a second parking ramp on Thayer Avenue adjacent to St. Alexius Medical Center.

Pedestrian Circulation

- Explore additional skywalk links as multi-level garage and office projects are defined and designed.

5.3 PERIODIC MONITORING

In order to assure the continued validity of this study, the City may desire to periodically monitor key base data. With this information, it would be possible to determine trends and changes and determine if the level is significant. Given the level of land development contemplated in Land Use Concept 2 - Intensive Development, it appears

that the street system has the feasibility to absorb a substantial amount of growth and still provide adequate traffic service.

Several conditions conceivably could alter this:

1. A dramatically greater level of land use development.
2. A sizable redistribution of travel through the district.
3. A change in the level of externally generated traffic travelling through the district.
4. A single, large development in a strategically critical location.
5. Possibly, combinations of the above.

Several specific parameters may warrant periodic monitoring. These can be summarized as follows:

Land Use

- Hospital and other health care facility improvements (beds, square feet, etc.).
- Other development projects by type, size, and floor area ratio (FAR).

Travel Demand/Traffic Operations

- Link volumes on key arterial street segments.
- Turning movement patterns at key intersections.
- Level of traffic service.
- Traffic safety.

Parking

- Parking supply (on-street, off-street)
- Deficiencies.

Pedestrians

- Crossing volumes.
- Effect on intersection operations.

In order to evaluate the impacts of additional travel on study area links, the process outlined in Section 4.2 would be followed, using project documentation supplied to the City. This process could be automated on a microcomputer by establishing a trip table for internal-to-external and external-to-external trips. As significant

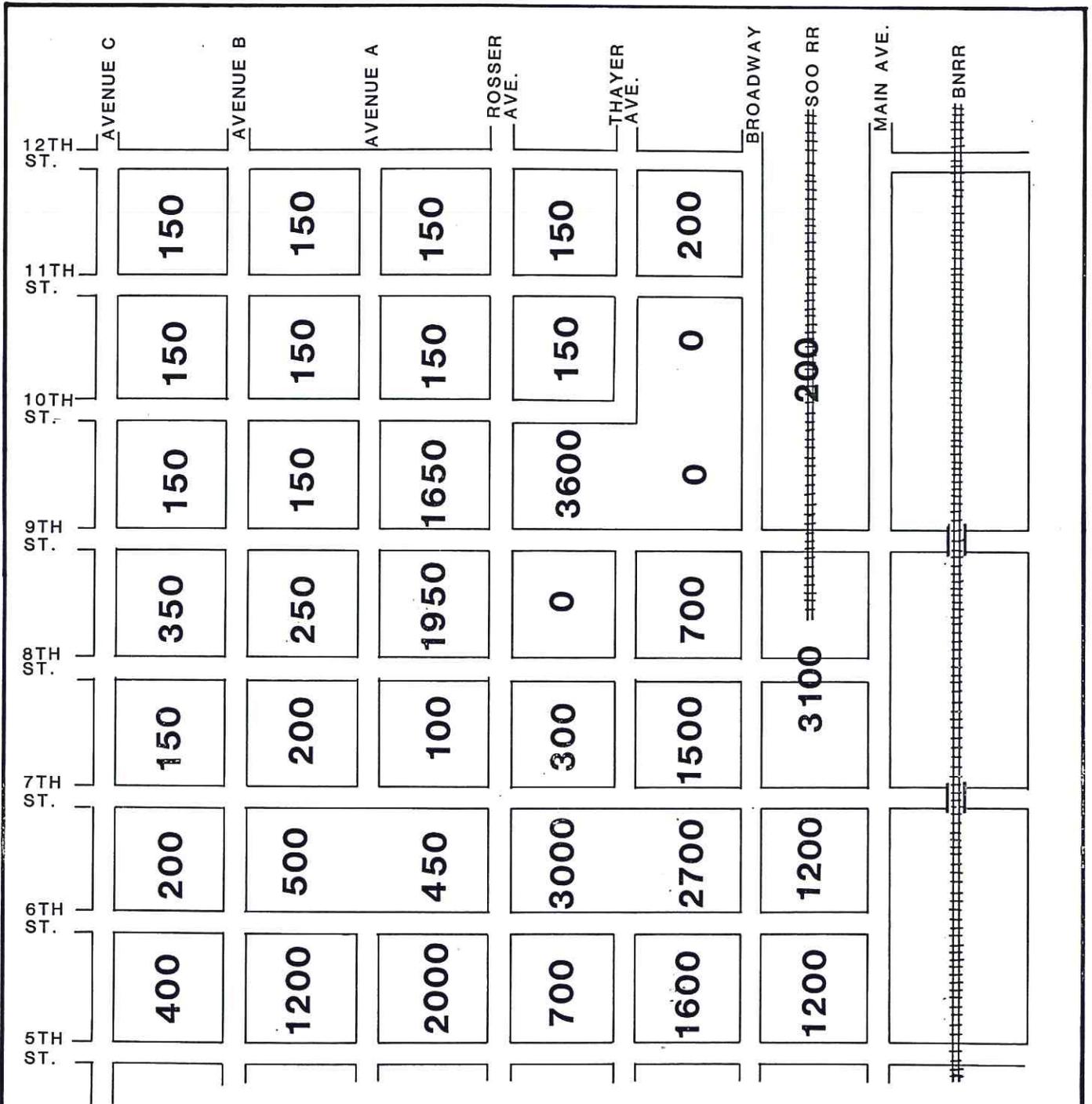
changes occur in either, adjustments would be made and system loadings reevaluated to permit the level of traffic service to be reviewed at key signalized intersections.

5.4 SUMMARY

The future growth of the Medical District is inevitable, and offers the opportunity to capitalize on several key development projects which could have a synergistic effect on the character and quality of the Medical Center as key regional activity center.

This study has sought to identify alternative futures for the Medical District, and evaluate their interrelationship to the transportation system. It is hoped that the study findings will serve to guide future public policy and actions, working in tandem with the private sector, to maximize the potentials of the Medical District as a major community resource and asset.

APPENDIX



Bismarck Medical District Traffic Planning Study

1200 Daily Vehicular Trips

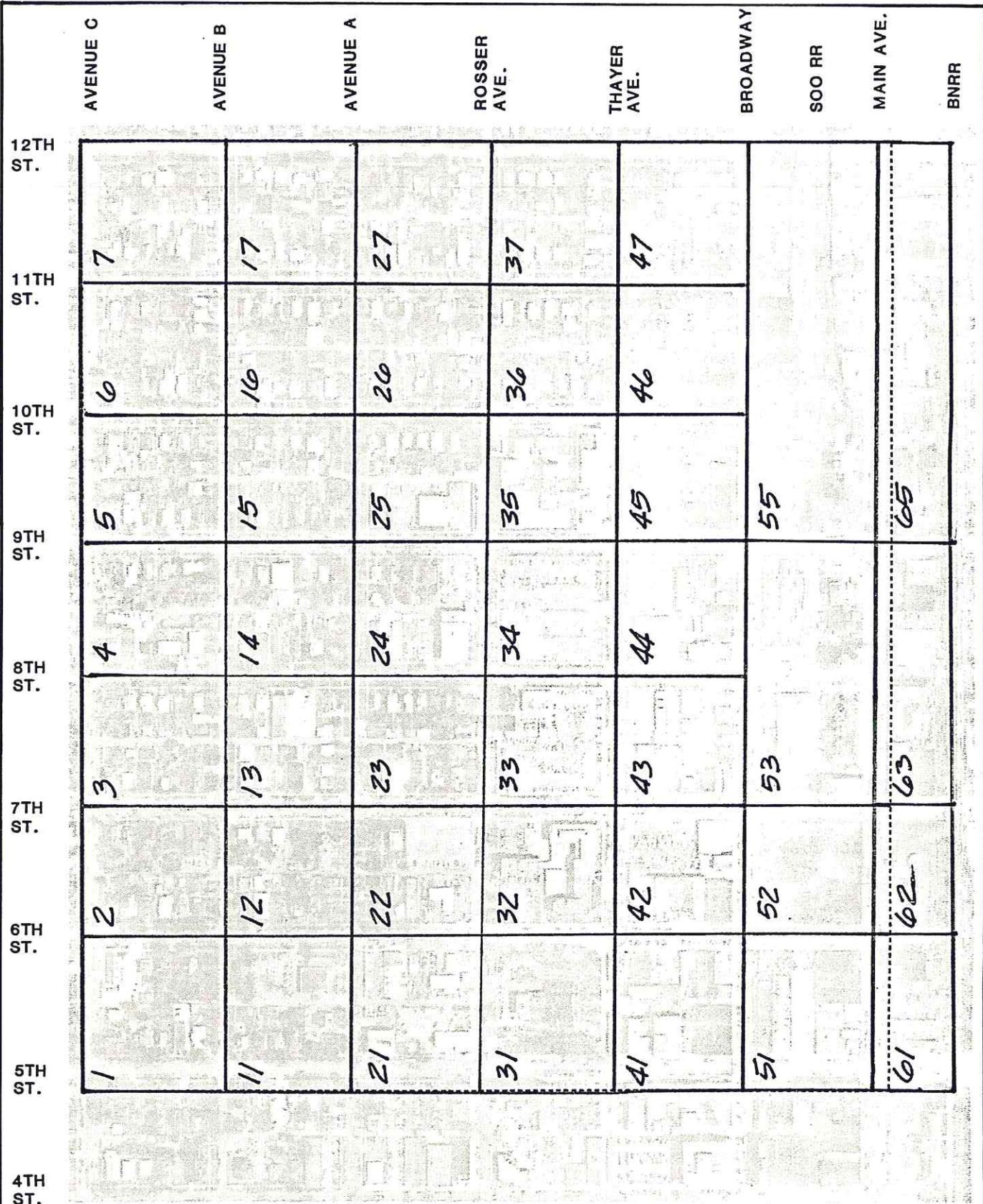
Scale in Feet



EXISTING
TRIP GENERATION

HDR
In Association with
GALDIN
CIACCIO
KLICK
ASSOCIATES

figure A.1



Bismarck Medical District Traffic Planning Study

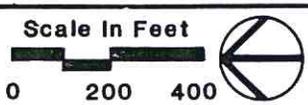
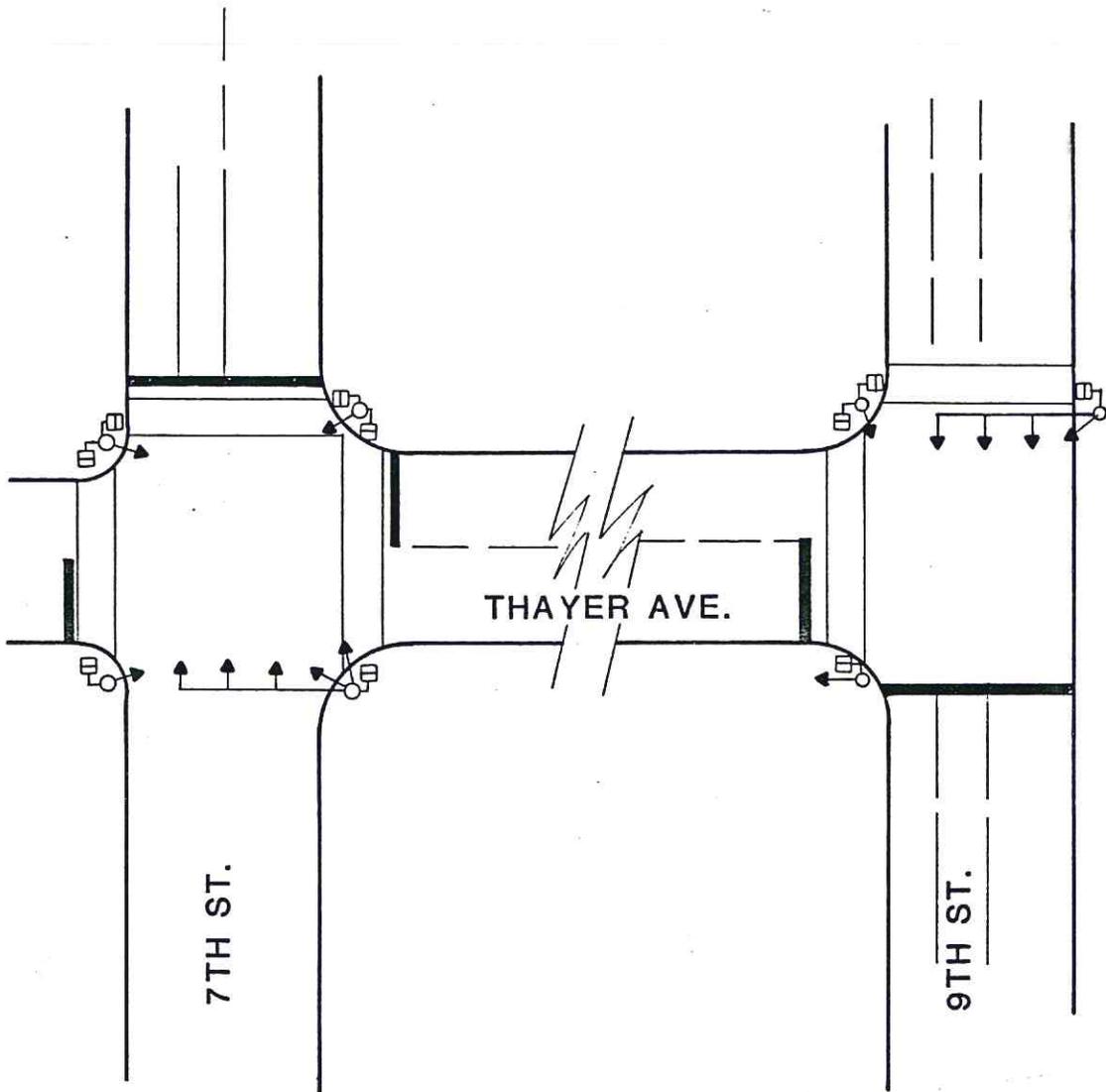


figure A.2

PARKING ANALYSIS
Block Numbers

Table A.1
PARKING SUPPLY TABULATION

BLOCK NUMBER	OFF-STREET				ON-STREET					
	GENERAL PUBLIC	PRIVATE	HANDICAP	TOTAL	ALL DAY	10 MIN	1 HR	2 HR	TOTAL	TOTAL
1	37	5	2	44	35				35	79
2		38		38	37				37	75
3		11		11	44				44	55
4	17	4	2	23	35				35	58
5				0	29				29	29
6				0	30				30	30
7				0	32				32	32
11	37	1	24	62	27		11		38	100
12		43	1	44	25				25	69
13		20		20	24				24	44
14		8		8	11				11	19
15		18		18	43				43	61
16				0	40				40	40
17				0	36				36	36
21	39	46		85			17	5	32	117
22		180		180	13			7	20	200
23		140		140	31			12	43	183
24	65			65	24			6	30	95
25	41	18	2	61	30				30	91
26		18		18	34			12	46	64
27		18		18	42				42	60
31	58	35	2	95			12	12	24	121
32				0	8	2			10	10
33	145	19		163	10			32	42	205
34	115	120		235	23			13	36	271
35				0	10	8			18	18
36		6		6	24			12	36	42
37		3		3	44				44	47
41	9	89	4	102			57		57	159
42		96					18		18	114
43	50	22	2	94			31	11	42	136
44		9		9	10		12	11	33	42
45			5	5	10	8			18	23
46	97	138		235	35				35	270
47		29		29	42				42	71
51	492	2		494					0	494
52	307			307					0	307
53	141	16	1	158					0	158
55	75			75	52				52	127
61				0			9		9	9
65				0	21				21	21
TOTAL	1715	1152	45	2912	913	18	211	168	1310	4202



Bismarck Medical District Traffic Planning Study

Scale In Feet



HDR

In Association with
**GALDIN
 CIACCIO
 KLICK
 ASSOCIATES**

PROPOSED THAYER AVENUE
 SIGNAL INSTALLATIONS

figure A.3

figure A.4

1. Report No. FHWA/RD-81/031		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle IMPROVING THE RESIDENTIAL STREET ENVIRONMENT - FINAL REPORT				5. Report Date May 1981	
				6. Performing Organization Code	
7. Author(s) Daniel T. Smith, Jr. and Donald Appleyard				8. Performing Organization Report No.	
9. Performing Organization Name and Address DeLeuw, Cather & Company P.O. Box 7991, San Francisco, CA with: Donald Appleyard, Berkeley Planning Associates and DKS Associates				10. Work Unit No. (TRAIS) FCP 31A1-724	
				11. Contract or Grant No. DOT-FH-11-9309	
12. Sponsoring Agency Name and Address Office of Research Federal Highway Administration U.S. Department of Transportation Washington, D.C. 20590				13. Type of Report and Period Covered Final Report	
				14. Sponsoring Agency Code	
15. Supplementary Notes Contract Manager: John Fegan (HRS-41)					
16. Abstract This final report summarizes state of the art research on a broad range of techniques for Residential Street Traffic Control or Traffic Management and specific case study research on applications of the TRRL-developed "road hump" on U.S. residential streets. It also summarizes findings of original research on resident preferences regarding traffic speed and volume on residential streets, on factors which affect drivers' speed choice on residential streets and reviews legal considerations in neighborhood traffic management.					
17. Key Words Residential Street Traffic Control Neighborhood Traffic Management Road Humps, Speed Bumps, Diverters Traffic Restraint			18. Distribution Statement No Restrictions. This document is available to the public through the National Technical Information Service, Springfield, VA 22161.		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 149	22. Price

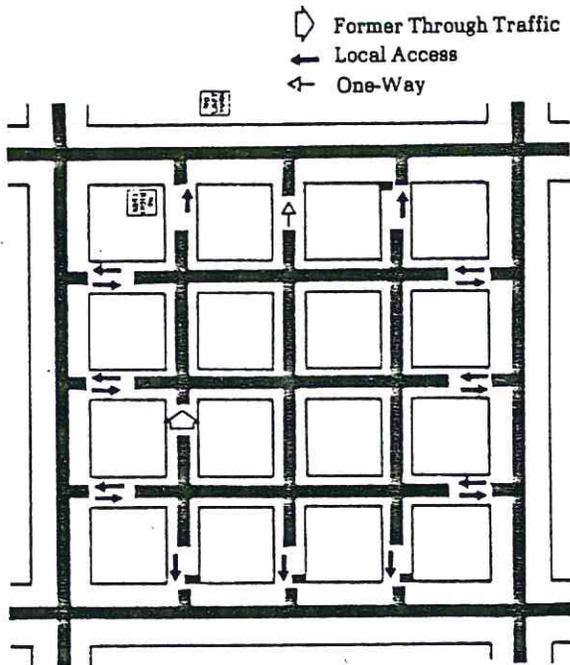


Figure 10. PERIPHERAL BARRIER
DOMINANT DIRECTION

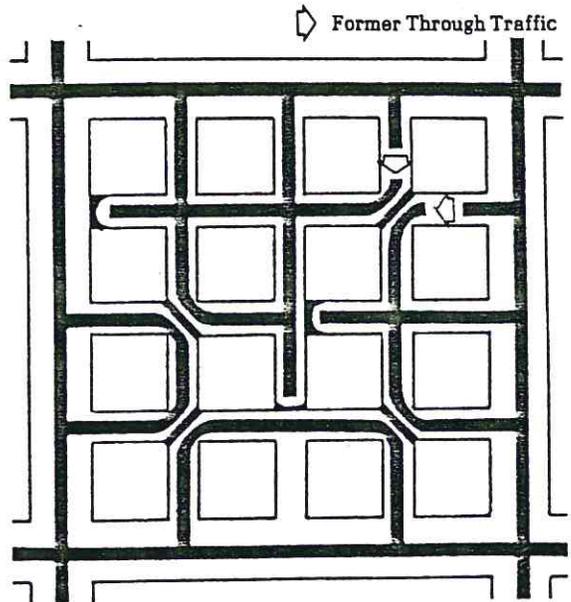


Figure 12. RETURN LOOPS
MOTORISTS FORCED TO RETURN
TO BOUNDARY STREET OF ENTRY

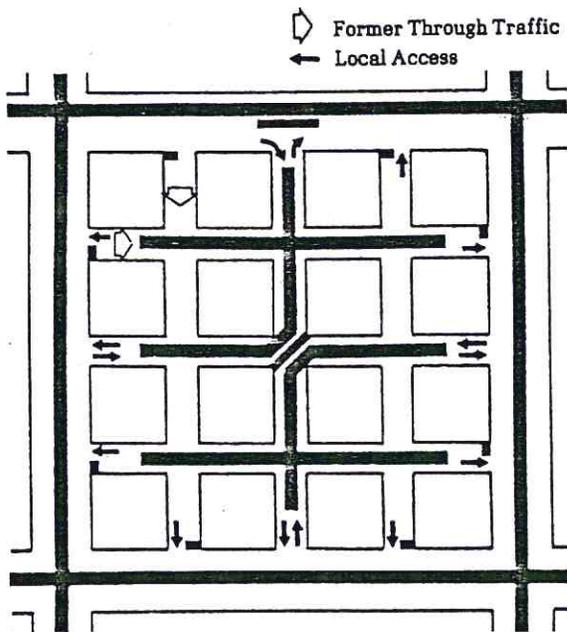


Figure 11. PERIPHERAL BARRIER
MULTI DIRECTION

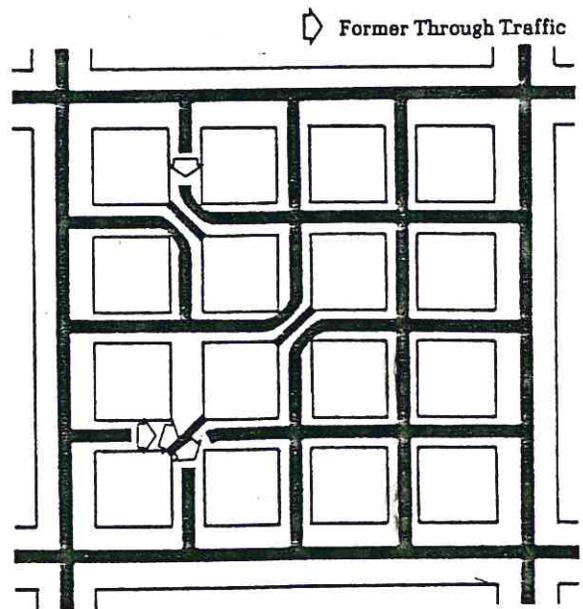


Figure 13. ANTI-THROUGH SYSTEM
TRAVEL COMPLETELY ACROSS
NEIGHBORHOOD IMPOSSIBLE

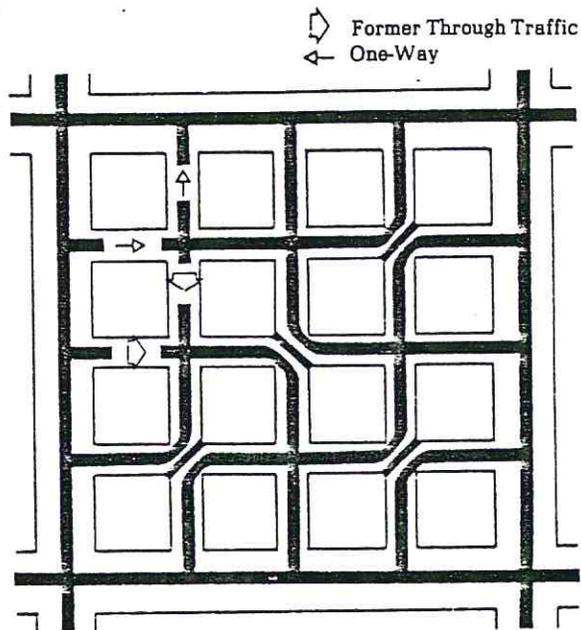


Figure 14. MAZE - NO DIRECT PATH
 ACROSS NEIGHBORHOOD BUT
 THROUGH TRAVEL IS POSSIBLE

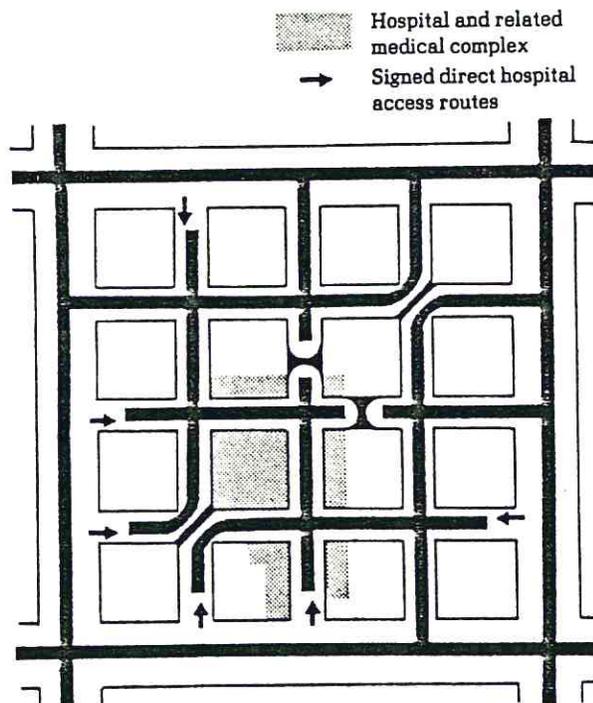


Figure 15. MAZE SYSTEM WITH INTERNAL
 SPECIAL GENERATOR
 (HOSPITAL)