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## **A study into the feasibility of constructing a pedestrian mall in Newark downtown**

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A STUDY INTO THE FEASIBILITY OF CONSTRUCTING A  
PEDESTRIAN MALL IN NEWARK DOWNTOWN

BY

STEPHEN WESLEY WARREN

A THESIS

PRESENTED IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE

OF

MASTER OF SCIENCE IN CIVIL ENGINEERING

AT

NEWARK COLLEGE OF ENGINEERING

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Newark, New Jersey  
1973

## ABSTRACT

Newark's central business district has been suffering steady economic decline for at least a decade. In an attempt to halt this trend, and perhaps even reverse it, a feasibility study has been conducted toward the goal of implementing a pedestrian mall in the area.

This study was accomplished by conducting both field examinations of Halsey Street, the area under consideration, and investigating data from other existing United States pedestrian malls.

The results of this study show that it is feasible to construct a permanent pedestrian mall on Halsey Street and that the benefits of doing so far outweigh the costs of the project.

APPROVAL OF THESIS  
A STUDY INTO THE FEASIBILITY OF CONSTRUCTING A  
PEDESTRIAN MALL IN NEWARK DOWNTOWN

BY

STEPHEN WESLEY WARREN

FOR

DEPARTMENT OF CIVIL ENGINEERING  
NEWARK COLLEGE OF ENGINEERING

BY

FACULTY COMMITTEE

APPROVED: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NEWARK, NEW JERSEY

JUNE, 1973

PREFACE (ACKNOWLEDGMENTS)

I would like to express my sincere gratitude to Professor Ira Kuperstein for his advice and assistance in the formulation of this study. I am also grateful to Doctor Harold Deutschman whose Urban Transportation Studies Program sponsored this research. I also wish to acknowledge the valuable assistance of Jack Boehmer of Newark City Planning for helping to supply a great deal of information used in this study.

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## I. INTRODUCTION

### Pedestrian Malls

"Pedestrian malls represent one of the many devices now being used to revitalize central business districts. The usual reason is to improve the competitive position of the downtown area in relation to suburban shopping centers. Consequently, downtown interests have found it necessary to examine critically what specific features make suburban centers attractive to shoppers."<sup>1</sup>

There are many elements which must be present if a pedestrian mall is to be successfully competitive with the outlying shopping centers. Some of these elements include the following;

1. Vehicular-pedestrian conflict separation
2. Parking accessibility
3. Improved environmental characteristics
4. Adequate traffic circulation and access

The pedestrian mall in the city center is an attempt to replicate all the factors and elements found in the flourishing suburban shopping centers with the goal of reviving the CBD to a viable and competitive downtown area.

<sup>1</sup>Institute of Traffic Engineers Information Report ( Washington, D.C., 1966 ) p.5.

## Problem Statement

Newark's commercial central business district is dying. This study will prove this and provide recommendations as to the feasibility of constructing a pedestrian mall in the CBD to assist in altering this trend.

It is the goal of this investigation to show whether it is feasible to construct this pedestrian mall using the following traffic engineering principals and studies:

1. Vehicular and pedestrian traffic analysis
2. Motor freight and terminal needs
3. Public and private parking
4. Business Economic analysis
5. Maintenance and control
6. Implementation benefit-cost analysis

Recommendations will be provided as to the feasibility of each of the six listed studies in relation to the mall's implementation. The consequences of any alteration of land use, assuming the mall is built, will also be analyzed and recommendations provided to concur with the stated criteria of this study.

## Criteria

1. Adequate parking and accessibility should be supplied

2. There should be adequate traffic circulation and access providing a sufficient capacity volume
3. There should be adequate and convenient public transit available to handle projected travel volumes
4. The recommendations should not seriously increase traffic congestion elsewhere in the CBD
5. The recommendations must take into account motor freight and terminal needs of buildings along the mall
6. The recommendations must meet with legal requirements and limitations
7. The recommendations should be flexible enough to permit modifications if and when conditions change
8. The recommendations should be compatible with the city Master Plan
9. The recommendations should meet with the approval of the community

#### Proposed Alternate Solutions

1. Provide recommendations as to alternate street choice
2. Provide recommendations to build a different design:
  - A. Modified sidewalk
  - B. Transitway
  - C. Plazas or interrupted mall
  - D. Continuous mall
  - E. Concourses
3. Recommend that a mall not be built in the CBD
4. Recommend alternate operation and maintenance possibilities
5. Recommend alternate funding possibilities

#### Survey of Alternate Street Choice

A first level check of alternate street choices for a pedestrian mall site selection has been taken.

The only site in Newark's CBD that has an active business organization working for the implementation of a pedestrian mall is Halsey Street, which was the location for a proposed pedestrian mall in 1963. The mall failed at that time because a business group did not exist to back the mall. It has been found that having a business organization, and its backing, is one of the most important requirements in planning a pedestrian mall. That organization now exists on Halsey Street and is working very hard to get a mall implemented there.



Figure 1. Newark aerial photo

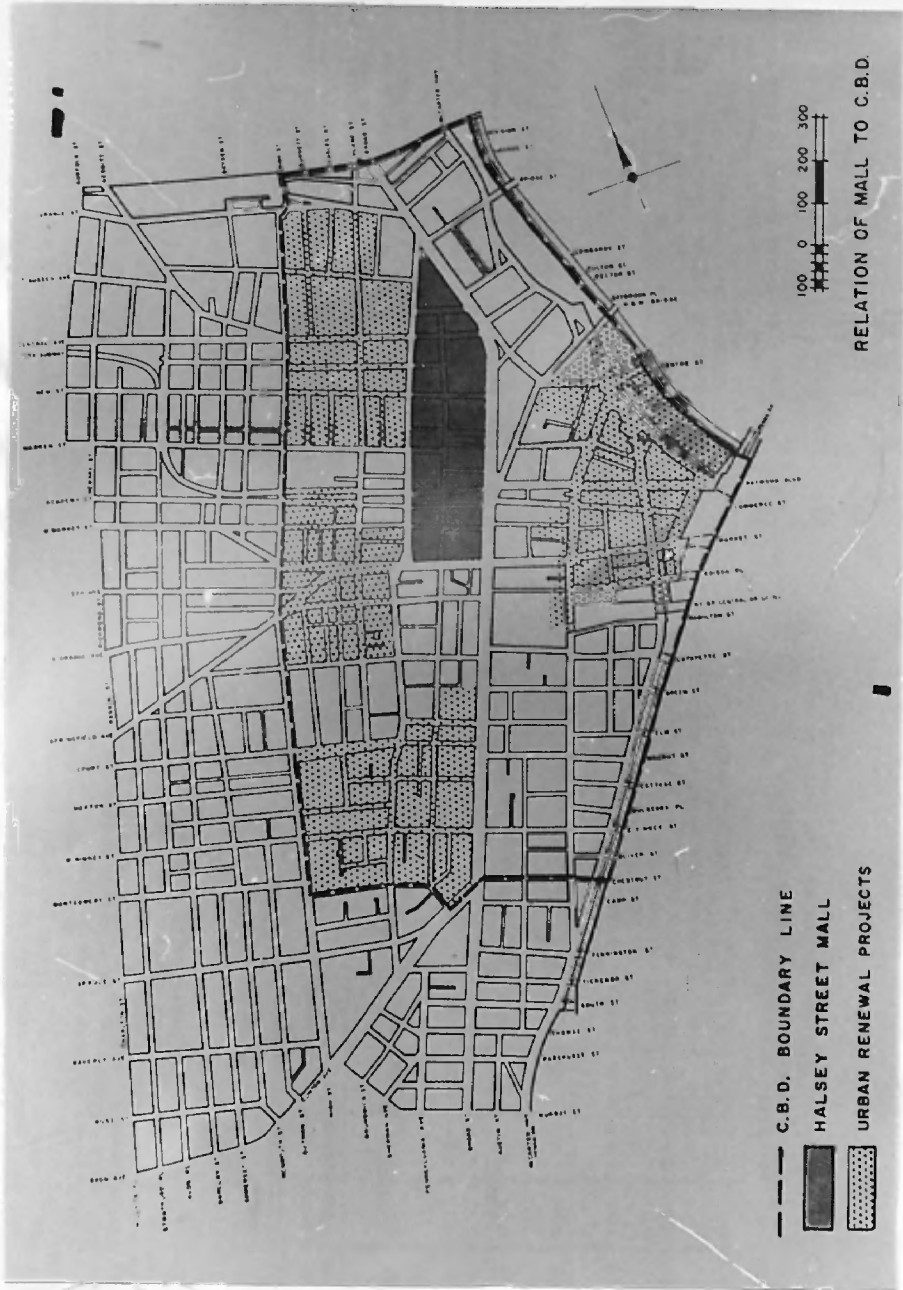


Figure 2. Relation of mall to CBD  
Source: Newark City Planning

As can be seen in Figure 2., the relation of a Halsey Street Mall would be centrally located in Newark's CBD and surrounded by urban renewal projects.

The area contains a multiplicity of store types serving a variety of customers as can be seen in Figures 3a., 3b., and 3c.. The shopping facilities are at least as extensive as those of the largest regional shopping centers.



Figure 3a. Photo of Halsey Street



A vital point in favor of implementing a pedestrian mall on Halsey Street is that the area lends itself to new traffic and parking patterns. It will be shown later in this study that adjacent streets can accommodate the low traffic volume that might be placed on them with the closing of Halsey Street to vehicular traffic. Also, the area features various public and private parking all along Halsey Street which has been developed during the last ten years. It will also be shown later in this study that these parking facilities, with but a few modifications in fare structure, be able to handle the demand of a Halsey Street Pedestrian Mall.



Figure 3b. Photo of Halsey Street

A preliminary pedestrian volume survey was taken and can be seen in Table 1.. This survey is important in showing the high pedestrian volumes present in the area, and also is necessary data for a before and after study to show what the impact a pedestrian mall had on the area if implemented.

Because of the existance of a business organization on Halsey Street working toward the goal of a

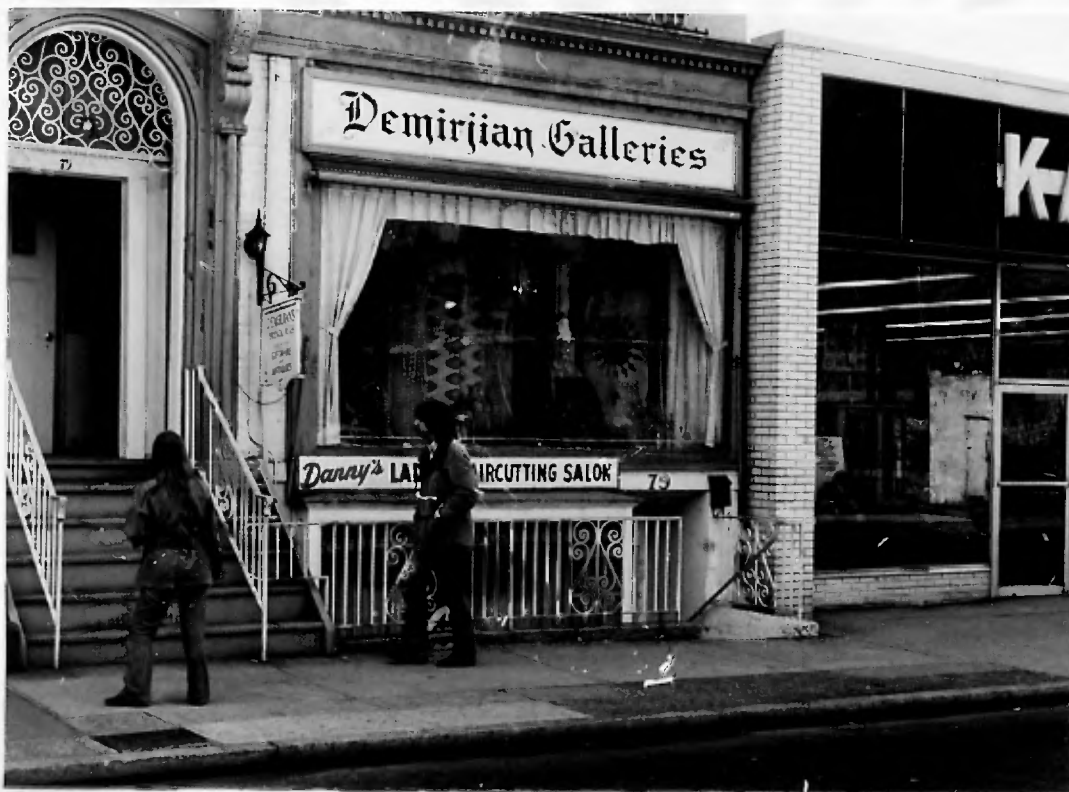


Figure 3c. Photo of Halsey Street

Table 1. Sample Halsey Street pedestrian counts

Location (Halsey St. &)	Time ( PM )	Total Pedestrians	
		5 Min.	Per Hour
Washington Place	12:30-12:35	105	1260
Central Avenue	12:36-12:41	103	1236
Bleeker Street	12:43-12:48	151	1812
New Street	12:50-12:55	129	1548
Linden Street	12:56- 1:01	125	1500
West Park Street	1:10- 1:15	85	1020
Warren Street	1:17- 1:22	115	1380
Cedar Street	1:22- 1:27	63	756
Raymond Blvd.	1:28- 1:33	165	1980
Academy Street	1:35- 1:40	137	1644
Bank Street	1:42- 1:47	156	1872
Market Street	1:49- 1:54	142	1704

Source: Survey taken January 24, 1973

pedestrian mall, see Table 16. in the Appendix, and the many ways Halsey Street lends itself to mall development, it will be the site under study in this report.

#### Pedestrian Mall Characteristics

"The achievement of the mall objectives will require a design that is urban in character, not one borrowed from suburban shopping centers. The design

must consider the many different types of downtown patrons and the modes of transportation people will use to reach the principal retail street. The plan should seek to create an image in character with a dynamic downtown area.

The architectural design should be a part of the mall and not a separate treatment imposed on the environment. The land-scaping should be simple without excessive adornment and have a high degree of functionalism. All accents and features of the mall should be carefully related to the structural elements of existing buildings. Present orientation, except as it reflects structure, should be ignored in the architectural development. If this is accomplished, no superficial changes in the existing buildings will affect the validity of the relationship of the mall to the structures.

In order for the mall to have a distinctive quality, certain architectural features may be used throughout. These may include the following;

1. Specially-designed street lights
2. Uniform bus shelters
3. Tile grid accent bands of uniform texture and width, to delineate special areas and to accent structural elements

4. Uniform basic finish, such as rustic terrazzo on all otherwise undecorated sidewalks
5. Specially-designed traffic signals at cross street intersections and at mid-block crossings, in the case of transitways "<sup>2</sup>

Examples of these pedestrian mall characteristics can be seen in Figures 4a. and 4b., showing existing United States mall photographs.



Figure 4a. Existing United States mall photos  
Source: Lincoln Road Mall Association

<sup>2</sup>Ibid., p.31.



Figure 4b. Existing United States mall photos  
Source: Lincoln Road Mall Association

## II. BUSINESS ECONOMIC ANALYSIS

### Downtown Versus The Suburban Shopping Center

This chapter is concerned with trends dealing with the retail trade found for the City of Newark, its central business district, and its standard metropolitan statistical area. Their relative positions and sizes can be seen in Figure 5..

The five consecutive Tables 2., 3., 4., 5., and 6., show quantitatively that for the past ten years Newark's CBD dollar volume retail trade is down considerably, while the city's dollar volume retail trade as a whole is also down but not by as great amount percentage-wise as the CBD. The SMSA or region surrounding Newark shows a great deal of dollar volume retail trade growth. Why is this? The answer is simple. The new regional shopping centers with free parking and easy access are drawing more city residents to shopping there and away from Newark.

The city is losing its stores to the more attractive areas which also have less vandalism than Newark, and lower tax rates. Newark now has almost a ten percent tax rate, that's ten dollars on every one hundred dollars of assessed valuation.





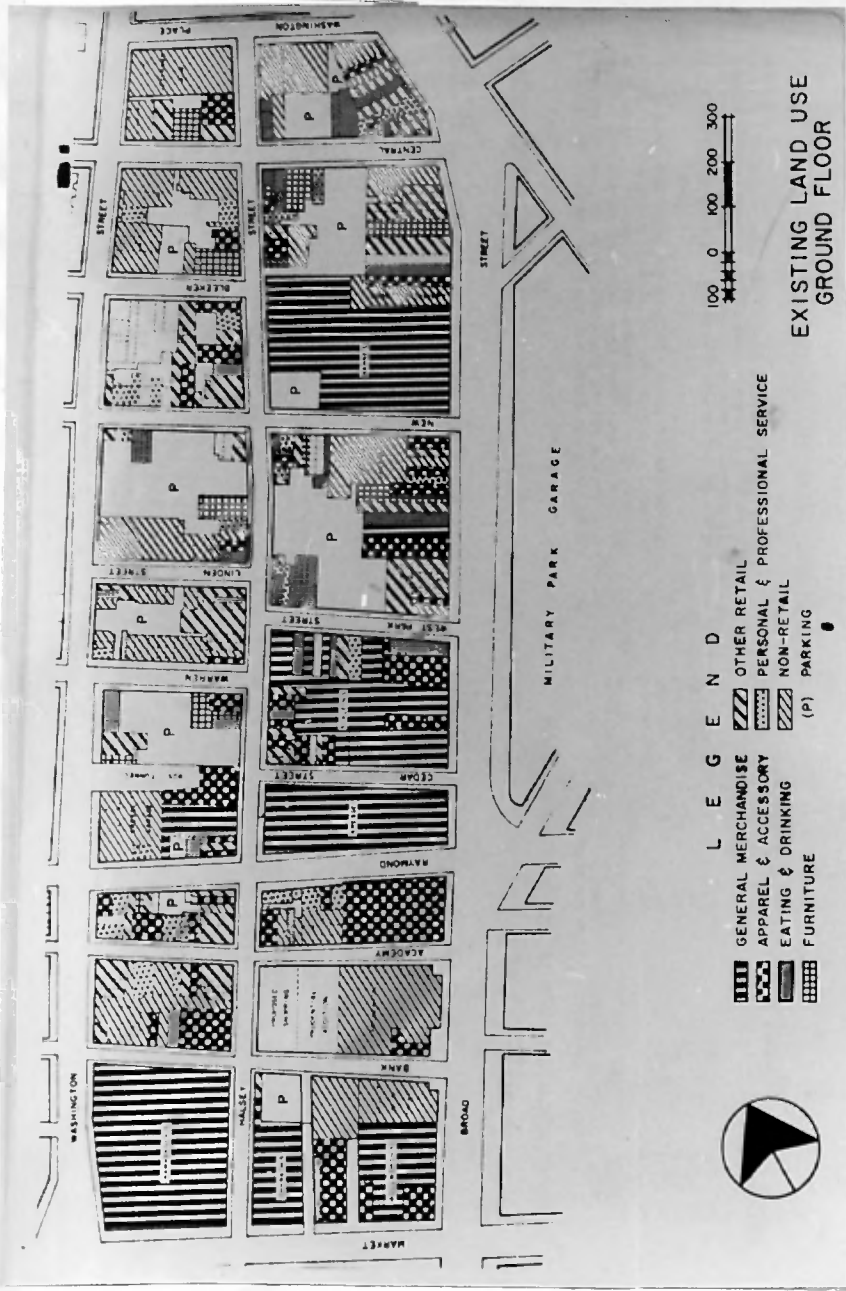


Figure 6. Existing land use - ground floor  
Source: Newark City Planning (1963)

Table 2. Central Business District Retail Trade: 1963 & 1967

Kind of Business	#Establishments 1963	Sales \$1000	#Establishments 1967	Sales \$1000
General Merchandise	25	122,523	24	109,474
Apparel-Accessory	174	44,519	137	45,965
Food Stores	87	14,127	53	15,213
Furniture-Appliance	60	15,104	43	11,718
Eating & Drinking	270	23,252	242	23,355
Drug Stores	15	4,425	15	4,797
Automotive Dealers	10	21,511	7	13,270
Gas Stations	22	1,829	17	2,047
Building Materials	12	1,429	5	1,401
Other Retail	15	4,425	15	4,797
Retail Total	875	266,804	697	243,158

Source: 1967 Census of Business

Table 3. City of Newark retail trade: 1963 & 1967

Kind of Business	#Establishments 1963	Sales \$1000	#Establishments 1967	Sales \$1000
General Merchandise	88	143,059	84	127,709
Food Stores	1,153	121,078	817	131,235
Apparel-Accessory	455	66,550	329	62,342
Furniture-Appliance	243	38,417	195	35,348
Eating & Drinking	1,297	80,069	1,200	79,592
Drug Stores	134	19,757	112	19,659
Automotive Dealers	89	73,698	72	73,083
Gas Stations	144	25,396	113	24,671
Building Materials	129	12,596	84	9,996
Other Retail	693	65,970	643	65,643
<b>Retail Total</b>	<b>4,525</b>	<b>646,590</b>	<b>3,749</b>	<b>629,278</b>

Source: 1967 Census of Business

Table 4. SMSA retail trade: 1963 & 1967

Kind of Business	#Establishments 1963	Sales \$1000	#Establishments 1967	Sales \$1000
General Merchandise	403	316,688	436	390,915
Food Stores	3,224	591,730	2,794	750,413
Apparel-Accessory	1,558	200,812	1,357	223,235
Furniture-Appliance	989	146,662	924	173,420
Eating & Drinking	3,421	225,073	3,455	265,398
Drug Stores	535	76,323	499	91,967
Automotive Dealers	607	450,921	565	478,329
Gas Stations	1,462	152,428	1,382	176,626
Building Materials	648	96,194	509	103,126
Other Retail	2,671	249,776	2,905	297,245
Retail Total	15,518	2,506,607	14,826	2,950,674

Source: 1967 Census of Business

Table 5. CBD sales as percent of City and SMSA sales: 1963 & 1967

Kind of Business	% of City Sales 1963	City Sales 1967	Gain	% of SMSA Sales 1963	SMSA Sales 1967	Gain
General Merchandise	41.3	38.6	-2.7	10.6	8.2	-2.4
Food Stores	11.7	11.6	-0.1	2.4	2.0	-0.4
Apparel-Accessory	66.9	73.7	+6.8	22.2	20.6	-1.6
Furniture-Appliance	39.3	33.2	-6.1	10.3	6.8	-3.5
Eating & Drinking	29.0	29.3	+0.3	10.3	8.8	-1.5
Drug Stores	22.4	24.4	+2.0	5.8	5.2	-0.6
Automotive Dealers	29.2	18.2	-11.0	4.8	2.8	-2.0
Gas Stations	7.2	8.3	+1.1	1.2	1.2	0.0
Building Materials	11.3	14.0	+2.7	1.5	1.1	-0.4
Other Retail	6.7	7.3	+0.6	1.8	5.4	+3.6
<b>Retail Total</b>	<b>41.3</b>	<b>38.6</b>	<b>-2.7</b>	<b>10.6</b>	<b>8.2</b>	<b>-2.4</b>

Source: 1967 Census of Business

Table 6.  
 CBD, City, SMSA-Percent change in sales: 1963 to 1967

<u>Kind of Business</u>	<u>CBD</u>	<u>City</u>	<u>SMSA</u>
General Merchandise	-10.7	-10.7	+23.4
Food Stores	+7.7	+8.4	+26.8
Apparel-Accessory	+3.2	-6.3	+11.2
Furniture-Appliance	-22.4	-8.0	+18.2
Eating & Drinking	+0.4	-0.6	+17.9
Drug Stores	+8.4	-0.5	+20.5
Automotive Dealers	-38.3	-0.8	+6.1
Gas Stations	+11.9	-2.9	+15.9
Building Materials	-23.1	-20.6	+7.2
Other Retail	-10.0	-0.5	+19.0
<hr/>			
Retail Total	-8.9	-2.7	+17.7

Source: 1967 Census of Business

By implementing a pedestrian mall in the CBD, it is hoped to make these stores more competitive with the region by making an attractive shopping area with few pedestrian-vehicular conflicts.

In the four other pedestrian malls used for comparison and study data discussed later in this report, it was the economic threat posed by the emergence of out-lying shopping centers, coupled with a decaying

downtown that sparked interest in building a pedestrian mall. In all cases as in Newark's situation, the downtown was still functioning in an economically viable manner, but was losing a share of ~~its~~ commercial activity every year to the suburban areas. This loss was stopped and reversed with an implementation of a pedestrian mall in the four areas studied as is hoped to be accomplished in the Halsey Street area.

It is also the goal of this study to help reverse the trend of commercial business leaving Newark to these regional areas. In the past the implementation of pedestrian malls in other cities with deteriorating CBD's have been able to reverse this trend and even attract new business to their city. An attractive pedestrian mall is a good public relations selling point for a city to show off.

Of Newark's fifteen largest employers, three of these are located on Halsey Street: Hahne and Company, Bambergers, and Prudential Insurance Company. The latter two are also grouped within Essex County's fifteen largest employers. There are indicators that these firms would like to move out of Newark. A pedestrian mall on Halsey Street where they are located might be an incentive to stay. Certainly if the area

keeps deteriorating at its present rate they have much more of an incentive to leave than to remain.

### Income and Purchasing Power

"In 1949, the median income of families in the City of Newark was 83 percent of that for the SMSA as a whole. By 1959, the comparable figure was only 76 percent. What had happened in the intervening period was, of course, the out-migration to the suburbs of higher income households. As of 1960, 44 percent of the city's households had annual incomes of below \$5,000. and only 12 percent had annual incomes of above \$10,000.. For the SMSA as a whole, the comparable figures were 26 percent for the below \$5,000. group and 27 percent for the above \$10,000. group. However, despite this adverse trend in its relative income status, the city's residents still, as of 1960, represented a market of close to \$750,000,000. in purchasing power. And, assuming no change in their relative status in the future, their purchasing power, at present population levels, could amount to close to \$1.4 billion in dollars of constant purchasing power by 1980."<sup>3</sup> It is this share of the market of purchasing

<sup>3</sup>1964 Newark Master Plan. (Newark, New Jersey. 1964)  
p.21.



power existing in the city of Newark itself that is hoped to be captured with the implementation of the Halsey Street Mall. The economic threat posed by the emergence of outlying shopping centers, coupled with a deteriorating downtown is the prime motivation for a pedestrian mall in Newark's CBD.

### III. CIRCULATION

#### The Present Traffic Situation

Existing traffic volumes on Halsey Street and surrounding streets for both average weekday traffic and PM peak hour traffic can be seen on flow maps in Figure 7.. These maps show that during off peak hours, Halsey Street handles only minimal traffic volumes of approximately two hundred vehicles per hour. During the PM peak hour, Halsey Street carries a practical capacity volume of five hundred vehicles per hour. The Newark Master Plan, as based upon the 1965 Highway Capacity Manual, defines volume and capacity as follows; "Traffic volume is the maximum number of vehicles that can pass over a given section of a lane or roadway in one direction on multi-lane highways (or in both directions on a two or three-lane highway) during a specified time period while operating conditions are maintained corresponding to the selected or specified level of service. Practical capacity is the maximum number of vehicles that can pass a given location over a specified period of time without causing unreasonable delay, hazard, or restriction to the drivers freedom to maneuver under prevailing roadway and traffic conditions."<sup>4</sup>

<sup>4</sup>Ibid., p.76.

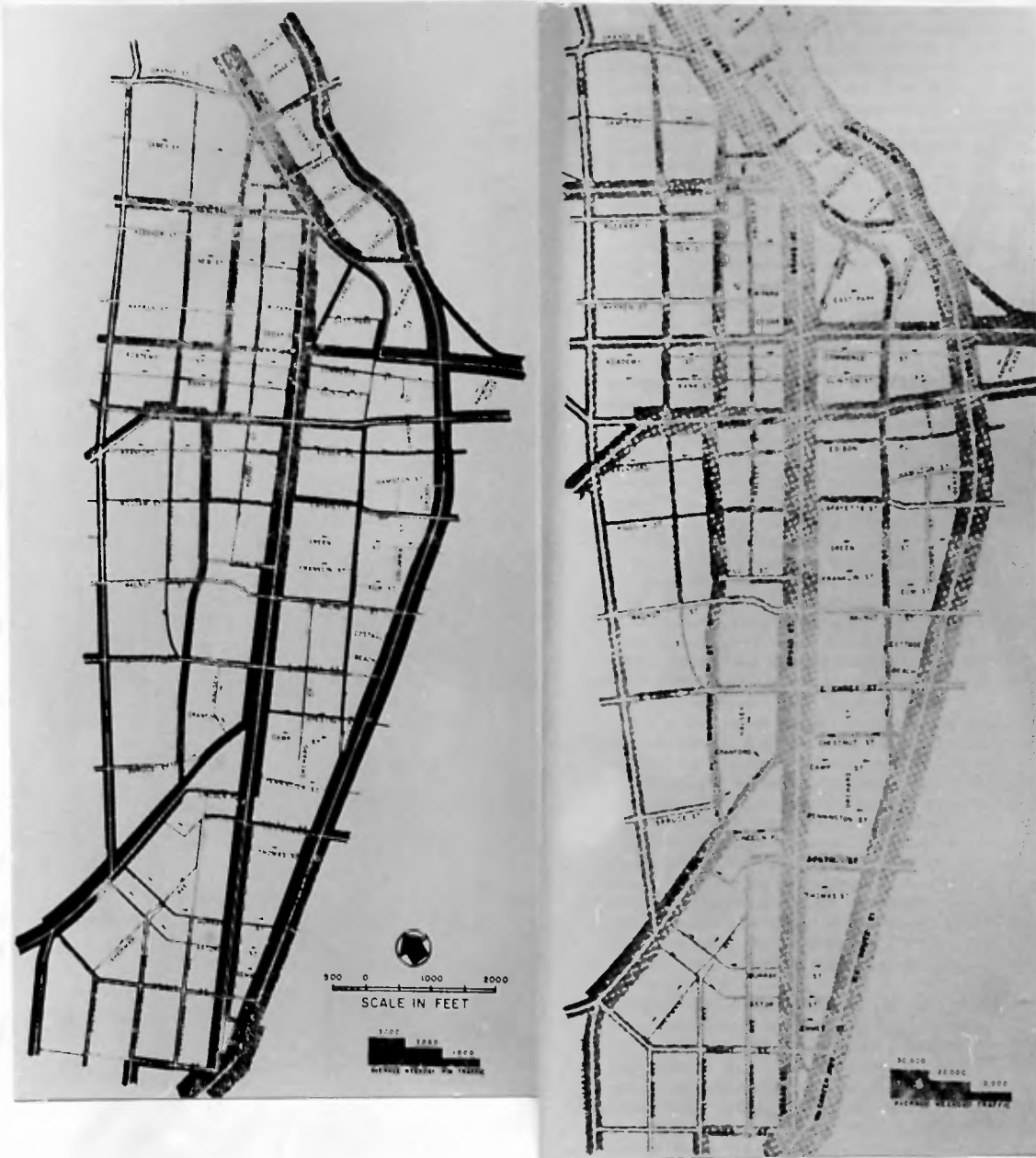


Figure 7. Newark traffic flow maps; (left) PM peak hour; (right) average weekday traffic  
 Source: N.C.H.R.P. Report #113

It will be shown as this chapter proceeds that Broad Street and University Avenue can absorb most of the traffic displaced off Halsey Street with the implementation of a pedestrian mall. "Halsey Street is not a major through traffic artery and much of the present traffic volume is generated by cars circling the block to pick up or discharge passengers; or seeking off-street and curb parking near their destinations. The closing of Halsey Street, therefore, will not cause any major disruption in through-traffic patterns."<sup>5</sup>

In proving this assumption it is necessary to introduce the level of service concept and its quality measure of traffic service being provided to the vehicle and driver. A list of comparison of level of service definitions used in this study can be seen in Table 7.. When using these stated criteria of level of service, Halsey Street is at level A during the off-peak hours, free flow, and level E during the PM peak hour, unstable flow. The two streets parallel to Halsey Street are expected to absorb this streets traffic are Broad and University which are both at level A during the off-peak hours, and levels E and D

<sup>5</sup>Halsey Street Mall (Preliminary Report). (Newark, New Jersey, 1963) p.9.

Table 7. Comparison of level of service definitions

<u>Level of service downtown street</u>	<u>Description of traffic condition</u>	<u>Travel speed mph</u>
A-free flow	some stops	=25
B-stable flow	delays not unreasonable	=20
C-stable flow	delays significant but acceptable	=15
D-approaching unstable flow	delays tolerable	=10
E-unstable flow	congestion	less than 10 but moving
F-forced flow	jammed	stop & go

Source: N.C.H.R.P. Report #113

respectively during the PM peak. By closing Halsey Street the vehicles traveling there during the off-peak hours will be moved from a free flow traffic situation on Halsey Street to a free flow traffic situation on either Broad or University. No level of service change is experienced during this time of the day. For the PM peak hour, vehicles will be rerouted from an unstable flow situation on Halsey Street, to an equally unstable flow situation on Broad Street or an approaching unstable flow on University. No level of service change is experienced during this time of

the day. It is important to stress that the amount of traffic volume rerouted to the parallel streets is almost negligible and will not affect their existing level of service in any appreciable way. This can be readily seen by comparing the existing level of service and traffic volumes for Halsey Street and parallel streets in Table 8.. It is therefore concluded that the rerouting of traffic from Halsey Street to parallel streets is possible and realistic.

When proposing a change in a streets classification such as that of Halsey Street, it is important to check with the Master Transportation Plan of Newark to insure that it will not interfere with goals set forth in these documents. This has been done and the data listed for convenience in Tables 9. and 10..

It can be seen that the implementation of the Halsey Street Mall will coincide with Newark's Master Plan's proposed changes for the transportation network.

#### Existing Parking

Two studies of existing parking facilities were obtained for this paper. The first, which was completed in 1968, indicates the number of parking spaces available in specified zones in the Halsey Street area. This study also shows the number of vehicles entering

Table 8. Level of service for Halsey Street and parallel streets

<u>PM peak hour</u>	<u>Location</u>	<u>Direction</u>	<u>#Lanes</u>	<u>Volume</u>	<u>Travel speed</u>	<u>Level of service</u>
	Halsey St.	One-way S.	2	500vph	10.1mph	E
	Broad	S. Bound	2	1000vph	8.4mph	E
		N. Bound	4	1500vph	13.3mph	D
	University	One-way S.	2	750vph	13.0mph	D
<u>Off-peak hours</u>						
	Halsey St.	One-way S.	2	200vph	25.0mph	A
	Broad	S. Bound	3	625vph	25.0mph	A
		N. Bound	3	560vph	25.0mph	A
	University	One-way S.	2	420vph	25.0mph	A

Source: N.C.H.R.P. Report #113

Table 9. Newark street classification definitions

- Local street:** Function is to serve the land uses within a localized area. Normally, there are no restrictions for access to abutting land uses.
- Collector street:** Function is to serve internal traffic movement within the various sections of the city and connect with the major arterial system. Minor access limitations may be necessary at critical points.
- Major Arterial:** Function is to serve, in conjunction with expressways, as the primary network for travel between principal sections of the city. Access to abutting land should be free. However, parking and loading may be prohibited or restricted to improve a street's capacity.
- Primary Arterials: (One way)** Function is to expedite the movement of through traffic between the city and surrounding communities. Intersections are at grade. Generally, there is direct access to abutting properties. Spacing is from one to two miles, depending on density. The right of way is 74 feet with pavement of 54 feet, consisting of a right-hand curb lane of 12 feet, a left hand curb lane of 9 feet, and three moving lanes of 11 feet each.
- Primary Arterials: (Two way)** Function is to expedite the movement of through traffic between the city and surrounding communities. Intersections are at grade. Generally, there is direct access to abutting property. Spacing is from one to two miles, depending on density. The right-of-way is 120 feet with pavement of 90 feet, consisting of two curb lanes of 12 feet each, and six moving lanes of 11 feet each.

Source: 1964 Master Plan of Newark



Table 10. Existing and proposed street classifications: Halsey Street area

Street	Existing classification	Proposed classification	Master Plan
Washington	N-S major arterial		Improved to primary arterial, two way between Clinton Ave. and Plane Street one way north between Plane Street and Broad Street.
Market	E-W major arterial		Improved to primary arterial from Springfield Ave. to Raymond Blvd..
Broad	N-S major arterial		Improved to primary arterial between Broadway and N.J. Rt. 21 viaduct.
Washington Place	Local		
Halsey	N-S collector		
Bank	Local		
Academy	Local		
Raymond	E-W major arterial		Improved to primary arterial from I75 to U.S. Rt. 1 and 9. The old Morris Canal bed should be utilized in conjunction with the existing roadway to achieve part of this improvement.
Cedar	Local		

continued next page

Table 10. continued

Street	Existing Classification	Proposed classification Master Plan
Warren	E-W major arterial	
West Park	Local	
New	Local	
Bleeker	Local	
Central	E-W major arterial	Improved to primary arterial street from Broad Street to I75.

Source: 1964 Newark Master Plan

into each zone, and the number of vehicles leaving each zone which is an indicator of parking turnover rate. A map of these parking assignment zones can be seen in Figure 8., and its associated data can be seen on the following page in Table 11..

A check and update of this survey was taken in January of all off-street parking lots and garages in the Halsey Street area. This survey is listed in Table 12..

The two surveys indicate that there exist 1,375 off-street parking spaces and 31 on-street parking spaces. The elimination of these on-street spaces will have little effect on the parking situation in the Halsey Street area. All parking is at a distance of one block or less from Halsey Street with the majority of spaces found on Halsey Street itself.

The parking lots and garages have a fairly low turn-over rate as most parking is done by commuters staying for the whole working day. However, most of these lots and garages are not filled to capacity and have sufficient space to accommodate more shopping orientated customers which have a high turnover rate.

Military Park Garage for example has a total

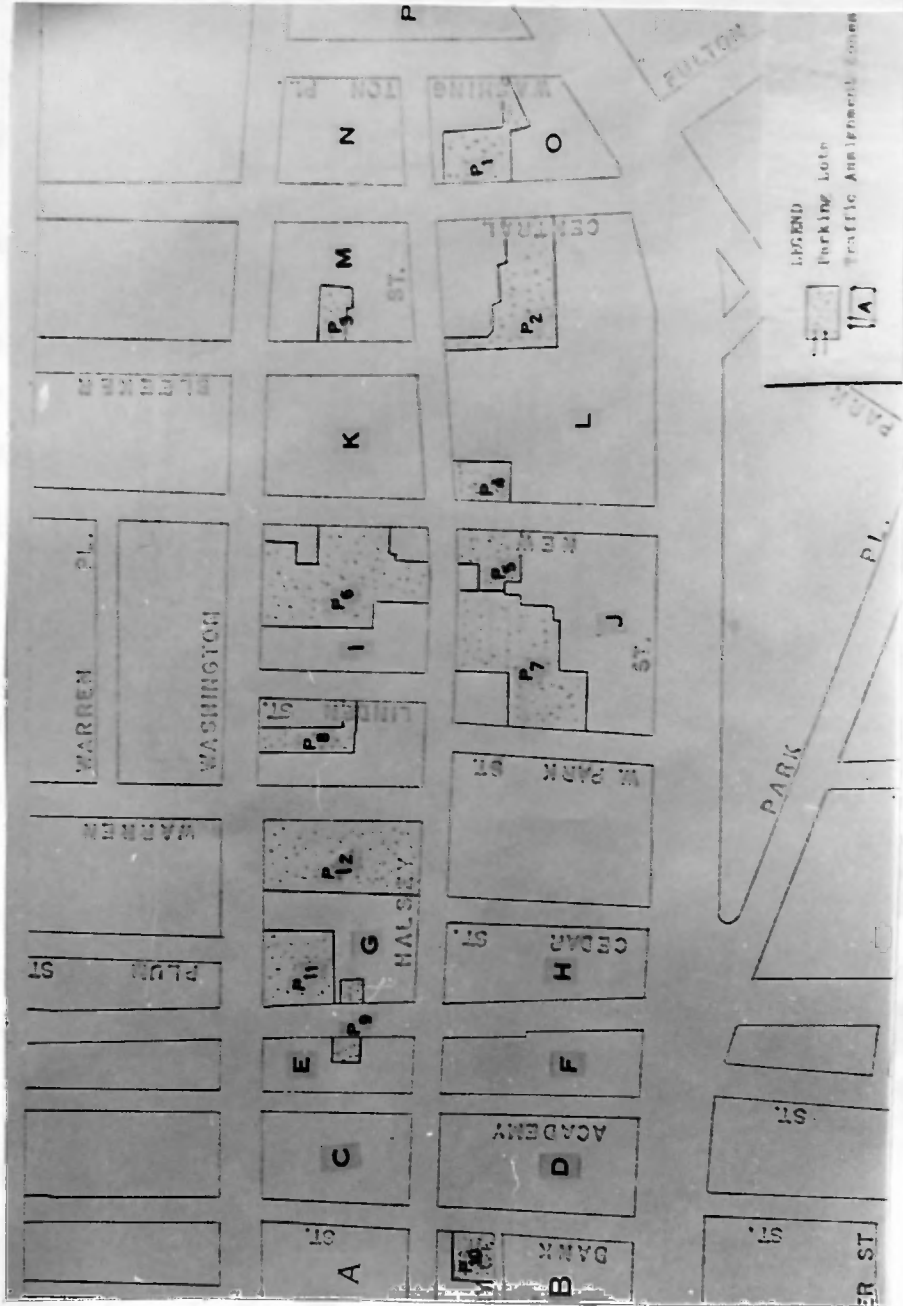


Figure 8. Newark traffic and parking assignment zones

Table 11. Halsey Street traffic assignment zones, evening peak hours

Zone	# of on & off street parking spaces	Trips into zone	Trips out of zone	Total trip ends
A	0	0	0	0
B	45	25	47	72
C	0	0	0	0
D	0	0	0	0
E	16	0	4	4
F	0	0	0	0
G	812	91	239	350
H	0	0	0	0
I	100	24	61	85
J	230	60	152	212
K	0	0	0	0
L	155	39	97	136
M	0	0	0	0
N	0	0	0	0
O	48	18	34	52
P	0	0	0	0
Total	1406	257	654	911

Halsey Street area parking ratio = 0.6 vehicles per parking space

Source: N.C.H.R.P. Report #113

Table 12. Halsey Street parking survey

Map location	Parking lot name & licence #	Number of spaces
P <sub>1</sub>	Maiden lane park lic. # unknown	85
P <sub>2</sub>	John V. Martin lic. # 63	125
P <sub>3</sub>	Name unknown lic. # 75	45
P <sub>4</sub>	Hahne's auto-park lic. # 44	30
P <sub>5</sub>	Maiden lane park lic. # 93	35
P <sub>6</sub>	Maiden lane park lic. # 111	150
P <sub>7</sub>	Maiden lane park lic. # 112	220
P <sub>8</sub>	Triple H parking lic. # 8	45
P <sub>9</sub>	Lords parking lic. # 55 & 56	25
P <sub>10</sub>	Maiden lane park lic. # 100	35
P <sub>11</sub>	Two Guys garage lic. # unknown	30
P <sub>12</sub>	Park & Lock lic. # unknown	550
Total parking spaces		1375

Source: Survey taken January 31, 1973 by on site  
counts of approximate maximum number of spaces

Table 13. Typical Halsey Street parking rates  
(Incl. tax)

<u>Location</u>	<u>1st hour</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>5th</u>	<u>Maximum</u>
P <sub>12</sub> Park & Lock	\$0.70	\$1.20	\$1.70	\$2.20	\$2.20	\$2.20
P <sub>7</sub> Maiden Lane	\$0.70	\$1.20	\$1.70	\$2.20	\$2.20	\$2.20
P <sub>4</sub> Haynes	\$0.52	\$0.81	\$1.10	\$1.39	\$1.68	\$3.39

Rates if not using stores sponsoring parking:

P <sub>12</sub> Park & Lock	\$0.80	\$1.30	\$1.80	\$2.20	\$2.20	\$2.20
P <sub>7</sub> Maiden Lane	\$0.80	\$1.30	\$1.80	\$2.20	\$2.20	\$2.20
P <sub>4</sub> Haynes	\$0.75	\$1.20	\$1.66	\$2.12	\$2.58	\$5.35

Source: On-street survey

capacity of 1,030 vehicles. Its normal weekday vacancy is 100 to 150 spaces and the normal Saturday vacancy is 700 spaces.

Unfortunately, the parking fees are designed with the long term commuter parker in mind. Even with some of the bigger commercial stores in the area sponsoring a limited amount of parking subsidies, the cost of parking to a shopping oriented person on Halsey Street

is exorbitant. This can be readily seen on Table 13., showing the typical Halsey Street parking rates. Therefore, it is concluded that at the present time, and even in the immediate future, there is not a lack of parking space for the shopper attracted to a Halsey Street Mall. The problem is a lack of parking levys designed for the shopper, and inadequate parking subsidies to accomplish this goal and compete at least in a limited way with free regional shopping parking.

The last point discussed in relation to parking on Halsey Street is the fact that with an implementation of a pedestrian mall, all existing lots and garages have adequate and existing access to side streets to remain in operation . There will be no loss to parking facilities due to the implementation of the mall and no cost to any parking establishment involved. This can be seen in Figure 9. of this paper showing existing parking, loading, and traffic flow.

#### Existing Loading

The on-street loading existing on Halsey Street has been a major obstacle to the implementation of a pedestrian mall in the area. As can be seen in Figure 9. of this paper, the closing of Halsey Street to commercial traffic would cause serious problems of



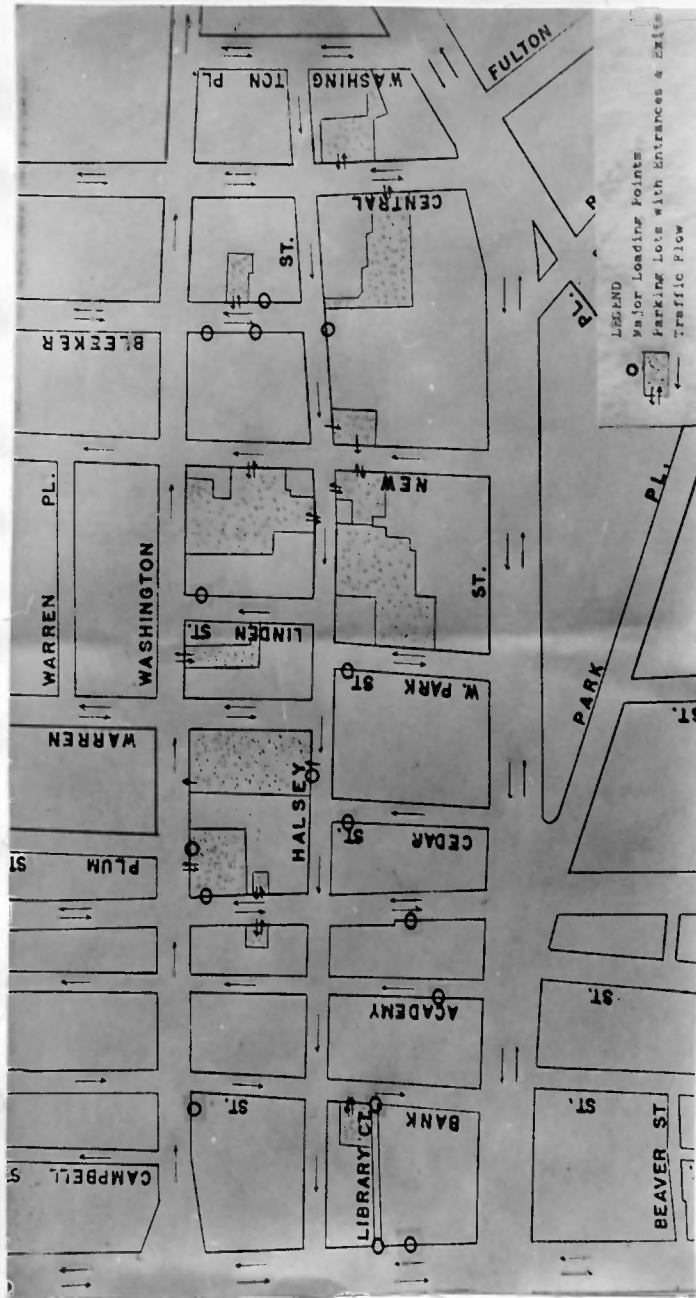


Figure 9. Existing parking, loading, and traffic flow

Table 14. Estimated truck loading at major stores

Store	Average # of trucks/day	Average # of trailer trucks per day	Peak hours
Bambergers	56	8	8-11 AM
Haynes	58	23	8-12 AM
Kliffens	55	12	8-11 AM
Kresges	95	8	7-12 AM
Orbach's	18	1	7-9 AM

Source: Newark City Planning

supply to a large amount of the bigger retail stores involved. With the Newark City Planning concept of a Halsey Street pedestrian mall, all commercial truck loading would be banned from Halsey Street with loading only permitted on side streets. The large commercial stores have blocked the implementation of this mall because they believed it would be impossible to supply their stores with goods. It is the considered opinion of this study that this would be true as the side streets are for the most part very narrow and inadequate for truck service.

In researching this problem it was discovered that the majority of truck loading occurs between the hours of seven to twelve AM as can be seen in Table 14..

This is important to know as one solution might be to limit commercial traffic to just this block of time leaving the rest of the day, which is a time of much higher retail activity than in the morning, to the pedestrian shopper. In effect this is what is recommended, with the addition that some kind of barrier be built on Halsey Street at each major truck loading point, to make this loading as invisible to the pedestrian as possible. These barriers could be made attractive without excessive expense and would be paid out of the total mall construction costs shared by all occupants of Halsey Street and the City of Newark.

#### Existing Public Transit

There will be no lack of public transportation surrounding and serving a pedestrian mall if it was to be built on Halsey Street. As can be seen on Figure 10. of Newark bus route locations, there are thirty-four bus routes within just one block walking distance from Halsey Street. Also, the Newark City Subway has a stop on Washington Street again just one block from Halsey Street. Therefore, there is no problem of a lack of public transit in the area.

At the present time there are a total of two hundred and eighty-eight single daily<sup>245</sup> trips on Halsey

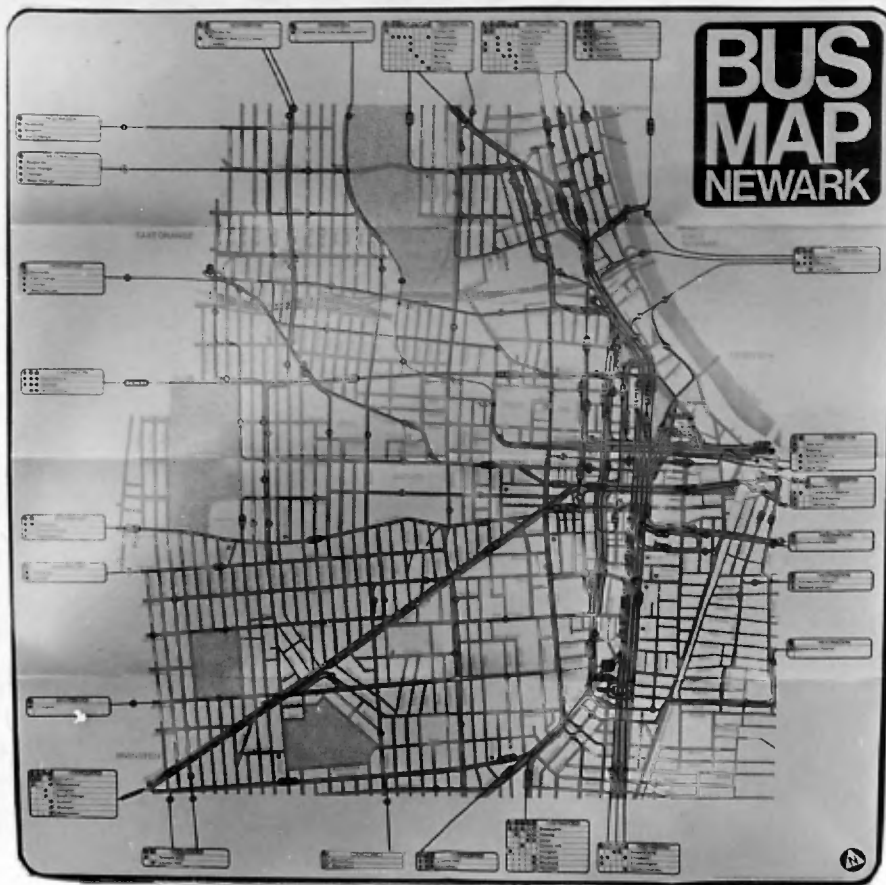


Figure 10. Newark bus route locations  
Source: Newark Model Cities Program

Street, and one hundred and seventy-four single Saturday bus trips. Sunday and holiday bus trip service on Halsey Street along with weekday and Saturday bus trips are listed in Table 15. of this report.

The question of whether to reroute these buses off Halsey Street with the implementation of a pedestrian mall must be asked. There is already a massive

Table 15. Bus trips on Halsey Street: single trips

Route	Weekdays	Saturdays	Sundays	Holidays
2	59	39	27	52
28	24	10	0	14
29-60	139	95	60	109
116	7	0	0	4
111-112	37	16	0	23
114	22	14	0	18
Total	288	174	87	220

Source: Transport of New Jersey

number of bus routes and volume of bus traffic surrounding the proposed mall area, it is deemed that to reroute buses off Halsey onto these already crowded streets in terms of loading space, would be unfeasible.

Loading space is that physical area of roadway and sidewalk that is taken up by the bus and passengers that are loading and alighting. There is only so much space available to have an efficient movement of buses and passengers and on the roadways parallel to Halsey Street, this space is now used to capacity.

When looking more closely at the number of buses

traveling on Halsey Street it is found that the great majority of these are arriving during the morning and evening peak hours. This leaves a relatively acceptable amount of buses traveling through the mall area during the shopping day. Also, these buses can provide a transit service providing pedestrians with transportation from the north end of the mall to the south. Some type of agreement should be worked out with Public Service to provide either a very low fare, say ten cents, or free fare if possible, to provide this service of shopper transportation on the mall.

#### IV. PROPOSED PEDESTRIAN MALLS

##### April 1973 Trial Saturday Mall

As of the first Saturday in April a trial pedestrian mall will be instituted on Halsey Street. It will exist only on Saturdays as a study situation preceeding proposed weekday closings during off-peak hours. Its structure will be limited to that of merely putting portable wooden police barriers wherever traffic is to be restricted. The exact area of this trial mall can be seen in Figure 11..

"The idea of the pedestrian mall has caught the imagination of the public and of merchants. These groups sometime fail to see, however, that a mall is only one of many elements essential for successful central area revitalization. The illusion of simplicity in closing streets without the need for large expenditures has encouraged many downtown associations, in collaboration with city officials, to take this one step as a merchandising gimmick. A familiar practice is to close a street for a few blocks and install temporary planter boxes, park benches and other paraphernalia - and do nothing else. This represents a feeble, half-hearted attempt to institute a central area revitization program, and the results are usually

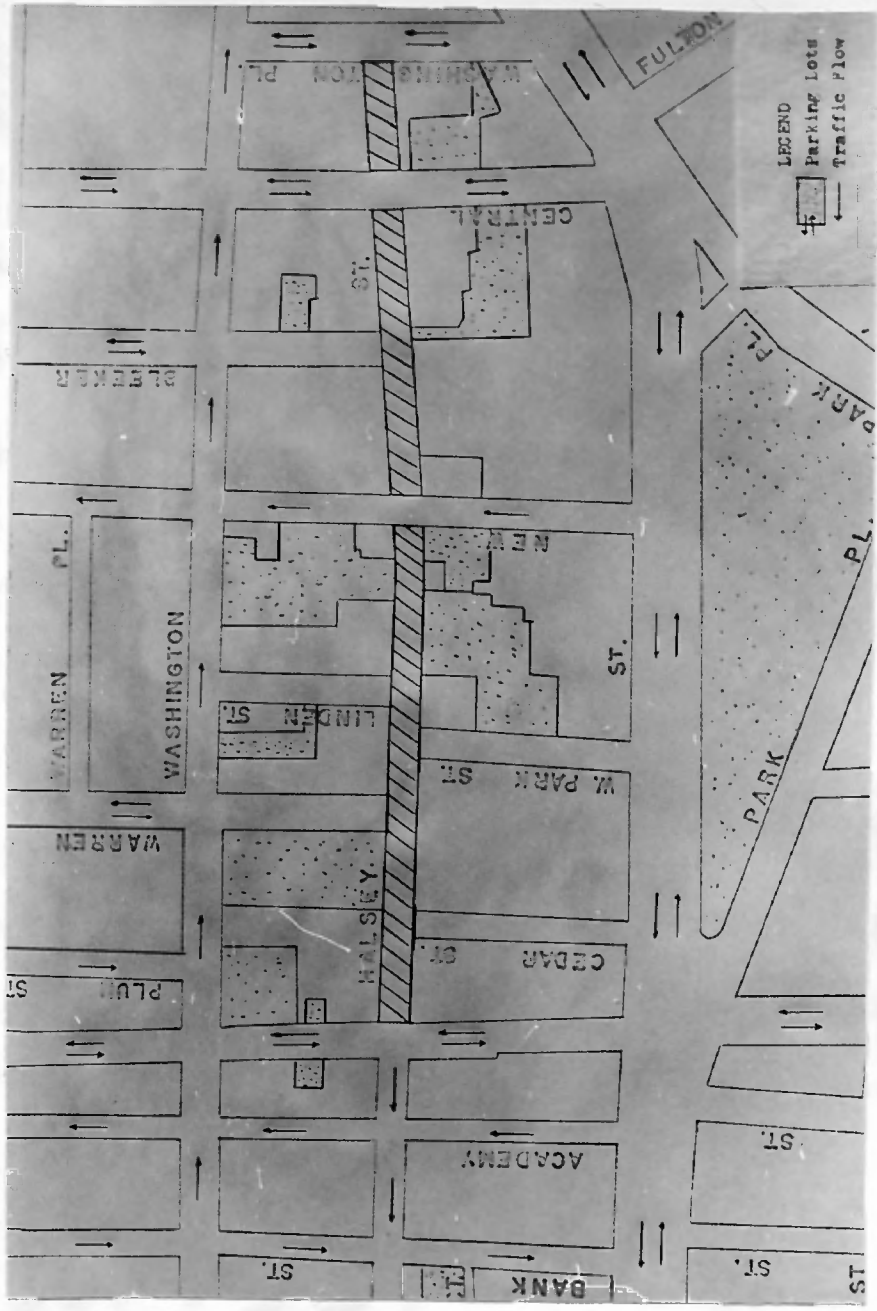


Figure 11. April 1972 trial Saturday mall



disappointing. Many people then pronounce the mall concept a failure. Very few cities have continued beyond this point and instituted a complete revitalization program including a permanent mall."<sup>6</sup> It is hoped that this trial mall does not ruin the chances for the implementation of a permanent mall on Halsey Street.

#### Alternate Permanent Mall Concept

In doing the research for this study an alternate permanent mall has been designed to correspond with the concepts that will be recommended in this paper. Proposed parking, loading, and traffic flow can be seen in Figure 12., and the proposed physical ground layout can be seen in Figure 13.. This mall design will restrict all private vehicular traffic from Halsey Street except for the specified cross streets. Commercial truck loading will be allowed on Halsey between the hours of seven and twelve but visual barriers will be built around truck bays. Buses will not be rerouted off the street because of the relatively light service during the peak shopping hours and of the transportation service they can provide. Existing

<sup>6</sup>Institute of Traffic Engineers Information Report. (Washington, D.C., 1966) p.27.

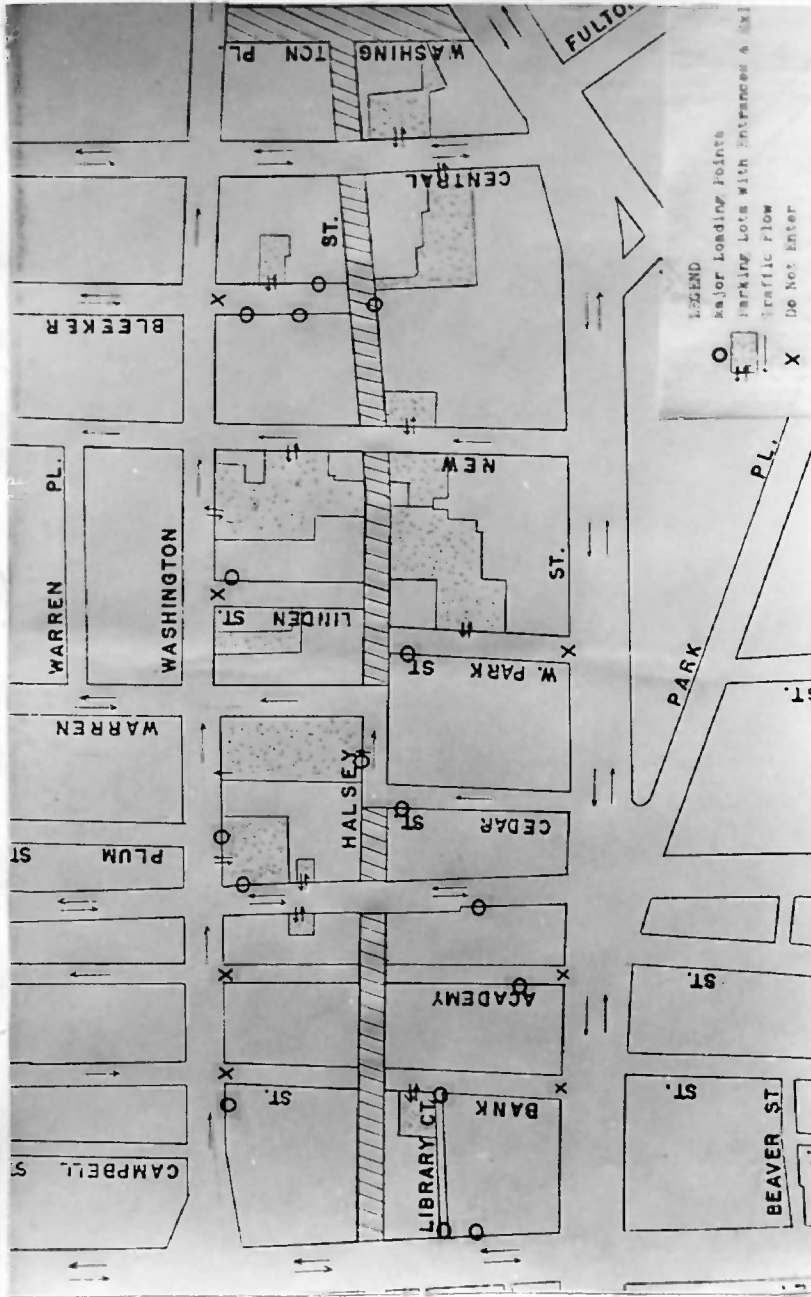


Figure 12. Proposed parking, loading, and traffic flow

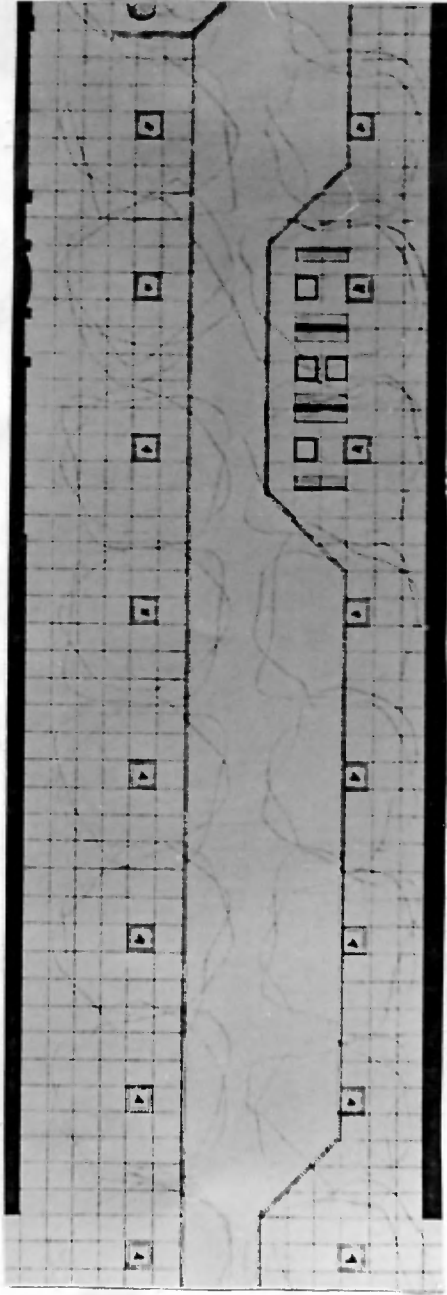


Figure 13. Proposed physical ground layout

parking lots and garages will be able to use existing exits and entrances on side streets. It must be stressed that this concept is desired as a permanent mall with a large expenditure to give the area a high quality reputation and an attractive shopping atmosphere.

A combination of concrete, brick, and sodded park areas are part of this plan. Overhead structures, new lighting fixtures, planting areas, beams, benches, and childrens play areas should typify the area. Utilities should be underground and landscape and sodded areas are served by underground sprinkling. Kiosks, telephone stations, mall directories, fountains, and additional landscape features will complete the mall.

Figure 14. shows two artists concepts of the Halsey Street Mall, while Figure 15. shows a photo concept of the mall as compared to the existing Halsey Street area as we know it today.



Figure 14. Artist's concepts of a Halsey Street Mall  
Source: Newark City Planning



Figure 15. Photo concept of Halsey Street Mall as compared to design area  
Source: Burdick Mall, Kalamazoo, Michigan

## V. IMPLEMENTATION

### Emergency Systems

"Closing of streets to vehicular traffic entirely, as in many mall proposals, may actually increase the need for police protection. The possibility of the arrival of people at any time throughout the day and night serves as a deterrent to crime. Just as a back alley invites crime because of its seclusion, the pedestrian mall can, if not properly policed, encourage crime during periods when pedestrian traffic is light.

Malls which retain a vehicular path for restricted use, such as the proposed Nicollet Avenue Mall in Minneapolis, can be protected to a degree by cruising patrol cars. Many businesses employ private security services to supplement municipal police. An increase in foot patrols, or 'beat' policemen, however, may be required.

Some persons believe that lack of vehicular access to the front of commercial buildings may actually discourage attempted crimes, since a vehicle is an important means of escape. Police officials tend to discount this factor, however.

Equally important in planning, design, and operation of pedestrian malls is the provision of adequate access for fire-fighting equipment. Large multi-story buildings require access from both front and rear in event of fire. The problem is particularly acute if the building is located mid-block between other large buildings. Access is required not only for firemen with hand equipment but also for pumpers, snorkles, and ladder trucks. Since many structures have no windows on the rear side, ladder trucks must have access to the building front for reaching upper floors to rescue trapped people and to fight the fire.

Trees and planter boxes, benches, light standards, and other fixed objects must be located as not to hamper fire-fighting operations. Particular attention is needed to ensure adequate turning radii for ladder trucks at cross streets. Fire hydrants and fire-police alarm boxes can be designed to harmonize with a mall, but they should be easily identifiable and properly spaced. Streets and sidewalks should be designed with sufficient structural strength to support heavy fire-fighting equipment."<sup>7</sup>

#### Maintenance & Control

With an implementation of a pedestrian mall, it is

<sup>7</sup>Ibid., pp. 27-28.



important to ask who will provide maintenance of the facility, who will be responsible for the mall's control, and what these associated costs would be.

Research done in the area of maintenance shows that usually the city's department of parks and recreation provides the maintenance service, with the cost defrayed by assesment to the benefitting property owners. This cost is also sometimes shared with the city by having the city contribute the amount of money that would be provided for another street of equal size, which is the recommendation for a Halsey Street Mall.

A cost estimate for the maintenance of the Halsey Street Pedestrian Mall has been done using data from Table 17. found in the Appendix. The calculation of this cost estimate can be seen on Table 20., also located in the Appendix and was found to be \$20,000. per year.

Who will control a pedestrian mall is a very important question. The usual method is that of the organization of a mall committee made up of community, government, professional, and business members, and this is the recommended structure of control for the Halsey Street Mall. This group makes all decisions

about what can and what cannot be done on or to the mall. They control all activities such as art shows, ethnic festivals, displays, bands, etc...

It is important to have all groups be involved with the control of the mall so that it will be felt that it is part of all communities and not separate from them. This is needed to facilitate community support of the project, and reduce vandalism and possible sabotage. Also it will be easier to obtain implementation if full cooperation and optimism can be shown by a multi-group member mall organization.

Other methods of maintenance and control could be:

1. City government
2. Mall commission
3. Community
4. Business interests
5. Combination of any of above

#### Financing and Costs

The usual method of financing a pedestrian mall's cost are as follows:

1. Special assesment on property owners benefiting from the mall
2. Federal redevelopment funds when available
3. City tax, loans, or bonds
4. Private contributions
5. Combination of any of above

"It is advised having local merchants and not the

City pay all costs of a mall study. While the city could bear the cost of a planning consultant, as might any one of several local companies or individuals, the plan would thereafter be called 'the City's plan' or the 'XYZ Company Plan.' By getting most downtown owners or leaseholders to share the cost, the plan becomes known as 'our plan'. Having paid for it, large and small businesses give it the impetus to proceed. This strategy is essential if the plan is to be sponsored aggressively by the merchants."<sup>8</sup>

A cost estimate for the construction of the Halsey Street Mall has been calculated to be \$400,000. on Table 18. found in the Appendix.

#### Benefit-Cost- Analysis

In applying the procedure of benefit-cost analysis to this project the following steps will be carried out.

- I. Macro and micro selection of the facility to be built
- II. Listing of the categories of benefits and costs
- III. Computation of the time stream of benefits and costs
- IV. Computation of present values
- V. Determination of the benefit-cost ratio

<sup>8</sup>Ibid., p.38.

## I. Selection of Alternative Facilities

For the purposes of this benefit-cost analysis this selection has already been carried out and decided upon as the Halsey Street site.

## II. Categories of Benefits and Costs

When determining the costs and benefits of a project, it is very important to ask, "to whom" will these classifications be assigned? For this analysis those paying costs and those receiving benefits will be broken up into three categories: the public, the Halsey Street business community, and the city of Newark.

### A. Costs

The costs of this project are relatively easy to assign. First, there are the costs shared in some form by the business community and the City of Newark for construction, operation, and maintenance of the mall. Second, is a cost incurred upon the public of increased traffic congestion in the area for those vehicles being restricted from Halsey Street. The third and final cost is that cost caused by a decrease of commercial activity for the business community in the Halsey Street area during the construction

phase of the project.

## B. Benefits

There will be many benefits that will be enjoyed by many different groups due to an implementation of the Halsey Street Mall. Benefits will first be listed under the categories of National Income, Regional Development, Environmental Factors, and Quality of Life. Later on in this section these benefits will be computed according to which group benefits: the public, the Halsey Street business community, and the City of Newark.

### 1. National Income

#### a. Primary

I. Increased tax base due to higher property values.

### 2. Regional Development

#### a. Primary

I. Increase of property values in the area.

II. Increased economic growth in the area.

III. Creation of more jobs in the area due to projected decrease of store vacancies.

#### b. Externality

I. Revitalize Newark's CBD by providing tangible proof that Newark is improving and restore faith for private investment.

II. Pride in Newark.

3. Environmental Factors

a. Primary

I. Reduced pollution from restriction of motor vehicles from the area.

II. Reduced noise due to restriction of vehicles from the area.

III. New structures improve visual impact of the area.

IV. Abolished pedestrian-vehicular conflicts.

4. Quality of Life

a. Primary

I. Improve shopping environment and atmosphere.

Benefits by Group

This pertains to those groups which a possible dollar value can be computed. They are:

1. Business community

a. Income from projected increase patronage.

b. Increase of property values due to mall construction and projected economic growth in the Halsey Street area.

2. City of Newark

- a. Increased City of Newark property taxes from higher evaluations and new construction.

These benefits are to be compared with the following costs:

1. Business community and City of Newark
  - a. Capital cost (amortization of bonds)
  - b. Operating and maintenance costs.
2. Business community
  - a. Loss in dollars due to construction phase limitations on the area.
3. The public
  - a. Time and inconvenience cost of being rerouted off Halsey Street.

III. Computation of Time Stream of Benefits and Costs

A. Time span and interest rate

The project is designed for a service life of ten years and a construction period of two months. The interest rate will be taken at ten percent.

B. Business community and City of Newark

1. Capital cost: The total cost of the mall is calculated to be \$400,000. on Table 18. of this report. This total amount would have to be spent all at once and therefore bonds

would have to be issued for \$1,037,496. at the beginning of construction, with a ten year amortization. The reason for using a ten year period is because it has been shown this is the average amount of time for a pedestrian mall life before a major renovation is needed.

2. Operating and maintenance costs: These costs are calculated to be \$20,000. per year on Table 20. of this report. This includes the cost of gardening needs, electricity, cleaning, and routine maintenance of the area. (No increase of this figure is included for inflation since virtually all costs and benefits would have to be inflated and because no realistic figure can be put on a rate of inflation.

### C. The public

1. Cost of traffic congestion: The general technique used in transportation is to compare existing travel conditions to those projected with the new facility, and then to assign benefits or in this case, costs, on the basis of user time saved or not saved because of the facility. As calculated in



the next section of this report it has been found to be \$8,500. per year.

D. Business community

1. Initial loss of patronage to business due to construction constraints on the area: It has been found that there has been at most if any a ten percent loss of patronage during the construction phase of most pedestrian malls in the United States. Therefore a ten percent loss of business will also be assumed for the two month duration of mall construction. This was determined to be a loss of \$810,527. in the next section of this report.
2. Income from increased patronage: The total estimated projected patronage for Halsey Street Mall as calculated in the next section of this report was found to be a 54% increase. From this figure it is not unreasonable to expect a 1% increase in Halsey Street area total annual revenue. An average of other pedestrian mall increased revenues as seen in the next section of this report was found to be a 15% increase. This assumed 1% increase was calculated to be \$486,316. per year and is deemed to be very conservative.

3. Increase of property values: The total estimated projected increase of property values due to the Halsey Street Mall's implementation as calculated in the next section of this report was found to be \$159,951.

#### E. City of Newark

1. Increase of taxable income: The total estimated increase in property taxes due to the Halsey Street Mall as calculated in the next section of this report was found to be \$15,995. These property taxes derived from this construction are properly included as benefits of the mall's implementation.

### Calculations

#### B. The public

1. Cost of traffic congestion: Since the peak hour volume on Halsey Street is only 500 vehicles per hour, and this is the only time when there might be any inconvenience to drivers, it is estimated that for this evening peak hour and the morning peak hour 1000 vehicles will experience an inconvenience rerouting time of one minute. This would be

1000 man-minutes per day for 255 working days equaling 155,000 man-minutes per year or 4,250 man-hours. It is very difficult to put a dollar value on this delay time. A rather arbitrary value of \$2.00 per hour rerouting travel time will be used. Therefore, delay time cost is calculated to be \$8,500 per year.

### C. Business community

1. Initial loss of patronage to business due to construction constraints on the area:

1967 total Newark CBD retail trade = \$243,158,000.

Approximately 20% of CBD retail trade takes place in the Halsey Street area = \$48,631,600.  
 For two months the average income = \$8,105,266.  
 A ten percent loss to the above = \$810,526.66

2. Income from increased patronage:

	<u>%Ped. Increase</u>	<u>City Sales</u>
Lincoln Road Mall	+50%	unknown
Pomona Mall	+75%	+20%
Burdick Mall	+30%	+10%
Fresno Mall	+60%	+14%
Average	+54%	+15%

1967 total Newark retail trade = \$243,158,000.  
 Approximately 20% of CBD retail trade takes place in Halsey Street area = \$48,631,600.  
 For a very conservative 1% increase  
 = \$486,316./year

These figures are comparable to Newark's situation in that all four cities had commercially viable CBD's that were losing business to growing suburban centers. The buying power was available inside each city

as was proved for Newark but was being drained to suburbia. With the implementation of a pedestrian mall some of this outside flow of money was again spent in the city which is believed what will happen if a pedestrian mall is built in Newark Downtown.

3. Increase of property values: The only data available on this was from Burdick Mall whose assessed evaluations rose from 4.7 million to 6.0 million the first year of the malls implementation. This amounts to a 28% increase. Therefore it does not seem unreasonable to assume a 1% increase in assessed evaluations for the Halsey Street Mall area. The total Newark tax records give this area an evaluation of \$15,995,100.. A 1% increase would equal \$159,951.. This figure will be held constant for the ten year design period.

#### D. City of Newark

1. Increase of taxes: From the increased property values calculated above and a 10% Newark City tax rate, ( \$10 on every \$100 assessed), the increase of taxes is calculated to be \$15,995.10 per year.

#### IV. Computation of present values

Present value of all costs and benefits are computed using a 6% interest rate. They are listed in the following:

	<u>Present value</u>
A. Business community and City of Newark	
1. Costs	
a. Capital	\$1,037,496.00
b. Operating and maintenance costs	\$ 147,334.13
B. The public	
1. Costs	
a. Cost of traffic congestion	\$ 62,617.01
C. Business community	
1. Costs	
a. Initial loss of patronage due to construction constraints	\$ 810,526.66
2. Benefits	
a. Income from increased patronage	\$3,559,843.20
b. Increase of property values	\$ 159,951.00
D. City of Newark	
1. Benefits	
a. Increase of taxable income	\$ 117,830.96

#### V. Computation of Benefit-Cost Ratio

There are several ways to compute the benefit-cost ratio. The first is to simply sum total costs and total benefits and take the ratio. Doing this yields:

Total benefits	=	\$3,559,843.20
Total costs	=	\$2,057,973.70
Benefit-cost ratio	=	1.73

Another computational scheme would be to determine the net benefit or cost to a given sector.

A. Business community and City of Newark

Total costs	=	\$1,184,830.13
Total benefits		0.0
Net cost	=	\$1,184,830.13

B. The public

Total costs	=	\$ 62,617.01
Total benefits		0.0
Net cost	=	\$ 62,617.01

C. Business community

Total costs	=	\$ 810,526.66
Total benefits	=	\$3,719,794.20
Net benefits	=	\$2,909,267.54

D. City of Newark

Total costs	=	\$ 0.0
Total benefits	=	\$ 117,830.96
Net benefits	=	\$ 117,830.96

The benefit-cost ratio is then computed using total net benefit and total net cost.

Total net benefit	=	\$3,027,098.40
Total net cost	=	\$1,247,447.10
Benefit-cost ratio	=	2.43

In conclusion, it must be pointed out that even the simple benefit-cost ratio of 1.73 is very conservative. The capital costs have been estimated using high bond interest rates (10%) over a short

period of amortization. Also, where higher growth rates have been shown due to the implementation of a pedestrian mall, only a 1% rate has been used for the Halsey Street Mall.

Yet another body of data renders the benefit-cost ratio conservative, and that is the weight of environmental and Quality of life factors. What is the worth of improving Newark's shopping atmosphere by removing pedestrian-vehicular conflicts, by removing the smelly vehicular pollutants from the shopping area, by removing the vehicular noise, and by giving a visual impact to the area that would be pleasant to shop in and be proud of?

These and other factors cannot be quantified, but can only be qualitatively used to further demonstrate the merits of this project.

#### Pedestrian Mall Legislation

At the present time pedestrian mall legislation (Senate, No. 967) is pending in committee of the New Jersey State Legislature. Before a mall can be built in this state it must conform to this bill when it is passed. A summary of this legislation is as follows; "The bill would allow municipalities to convert city streets into pedestrian malls. It is especially

significant in historic urban centers where streets were developed in a preautomobile age and where pedestrian malls may add a unique dimension to downtown shopping. (It should be noted that closing historic-center areas to traffic is also being experienced in Rome.

The bill would authorize municipalities to forbid most vehicular traffic on certain streets in downtown business areas and to turn the streets over exclusively to pedestrians. City councils would be required to inform all owners and tenants of land adjacent to the proposed mall that such a plan was being considered. If a mall ordinance were adopted, the city council would be permitted to assess and tax properties adjacent to the mall for all mall related improvements and facilities. The municipality could expand or reduce the area included in the mall at any time, or could abandon the mall if it felt it were not a successful project. The city council would be empowered to regulate street furniture, mall use by store owners, landscaping, etc...

In short, the bill would permit historic urban centers greater latitude in best using their land and streets."<sup>9</sup>

Source:<sup>9</sup> New Jersey State Legislature



## VI. CONCLUSIONS

From doing this study several conclusions have been reached. First, it has been decided that the only feasible location for a pedestrian mall in Newark Downtown is on Halsey Street. Second, it has been proved that Newark's CBD is economically decaying even though purchasing power for the area is still increasing. Third, it has been shown that parking is adequate for commuter demand but nothing is really provided for shopping demand. Fourth, even though truck loading is a major problem to the implementation of a mall, it is concluded that it is not an insurmountable problem and designs have been provided to prove this. Fifth, the street traffic flow patterns and volumes are not considered a problem as parallel streets will be able to handle diverted Halsey Street vehicles. Sixth, public transit surrounds the area and is deemed more than adequate to handle those wishing to shop at the mall and use public transit. Finally, the benefit-cost analysis shows that it is feasible to construct a permanent pedestrian mall on Halsey Street in Newark Downtown.

## VII. RECOMMENDATIONS

From the research and conclusions found in this study it is recommended that a permanent mall of the cost and design described in this paper be constructed on Halsey Street. It is also recommended that low cost short term shopping trip parking be provided either through direct subsidy of existing facilities or new parking lots built for this purpose, the former being the preferred solution at this time. The mall should be built as soon as possible because of ever-rising construction costs and because of the community interest existing in the project at the present time. All stated criteria has been met by these recommendations.

IX. APPENDIX

Table 16. Halsey Street Association

Purpose: To project the significance of Newark in its phases.

- A. Cultural- Nationally famous museum
  - Copious library
  - Five colleges
- B. Transportation center- Vital to rail
  - Waterport
  - Airport
  - Trucking
- C. Leading institutions- In banking
  - Insurance
  - Commercial
  - Industrial
- D. Our downtown shopping area- Is the most varied and extensive in the State of N.J.

- To propose and institute:
1. Larger downtown parking
  2. Street lighting
  3. Safer streets
  4. To enhance cleaning of areas
  5. Beautifying as our motto
  6. Halsey Mall-trees-benches

Source: The Halsey Street Association  
 26 Halsey Street  
 Newark, New Jersey

Table 17. Existing Pedestrian Mall Data

Lincoln Road Mall: Miami Beach, Florida-1960

Extent of project--- 3000 feet by 100 feet

Prime contractor---- City of Miami

Cost of project----- \$600,000. assessed to 59 property owners of 65 parcels of land along Lincoln Road. They will pay over a ten-year period the cost plus interest on the unpaid balance.

Maintenance----- Seven men at \$50,000. per year

Consequences----- A 50% increase in pedestrian traffic reported the first year of the malls implementation. Merchants on the mall report their business has improved.

Pomona Mall: Pomona, California-1962

Extent of project--- 2900 feet by 70 feet

Prime contractor---- Milburn and Sansone, General Contractors

Cost of project----- \$620,718. assessed to 71 property owners of 91 parcels of land on the mall with an assesment levy of \$118. per front foot. The bond term is 25 years with interest of 5.1 percent.

Maintenance----- Controlled by the Mall Commission. The maintence cost is \$16,000. per year.

Consequences----- A 75% increase in pedestrian traffic in April 1963 over April 1962. Also a 20% increase in city sales was realized.

Sources: City of Miami Beach, Florida  
City of Pomona, Administrative Staff

Table 17. continued

Burdick Mall: Kalamazoo, Michigan-1958

Extent of project--- 1200 feet by 66 feet

Prime contractor---- City of Kalamazoo

Cost of project----- \$112,848. The property owners on the mall paid  $\frac{1}{2}$  of the original mall development. Assessment roles were set up on a formula of fifty % based on front footage, and ten % based on square footage.

Maintenance----- Controlled by Department of Parks and Recreation. A fifty-fifty approximate sharing of costs between property owners and Kalamazoo City for a maintenance budget of \$18,330. for 1972. This breaks down to \$4.25 per front foot/per year/per property owner.

Consequences----- A 30% increase in pedestrian traffic was recorded by sample counts. Also a 10% increase in city sales was realized.

Fulton Mall: Fresno, California-1964

Extent of project--- 3700 feet by 80 feet

Prime contractor---- Local private firm

Cost of project----- \$1,841,000. assesment of mall property owners was \$708,000., Federal Urban Renewal Redevelopment Funds \$1,115,000., City of Fresno General Fund \$18,000., and contributions of \$180,000. for art objects on the mall.

Maintenance----- City Parks and Recreation Dept.

Consequences----- A 60% increase in pedestrian traffic reported the first year. Also a 14% increase in city sales was realized.

Sources: City of Kalamazoo, Michigan  
Fresno Redevelopment agency, California



Table 19.  
Calculation of Halsey Street Alternate Funding Assesment

Total Mall cost = \$400,000.  
 Total assesed Halsey Street property values  
 = \$15,995,100.  
 Ten percent of assesment values = \$159,951.  
 Halsey Street front footage = 3,925 feet  
 Front-footage assesment = \$61.16 per front foot

Table 20. Calculation of Halsey Street Maintenance Costs

Lincoln Road Mall

\$50,000./ year for 300,000 Ft<sup>2</sup> = .17/year/Ft<sup>2</sup>

Pomona Mall

\$16,000./year for 203,000 Ft<sup>2</sup> = .08/year/Ft<sup>2</sup>

Burdick Mall

\$18,330./year for 79,000 Ft<sup>2</sup> = .23/year/Ft<sup>2</sup>

Fresno Mall

No data available

Halsey Street Mall

Average of the above maintenance costs = .16/year/Ft<sup>2</sup>  
 For a mall area of 125,000Ft<sup>2</sup> this would compute to  
 a maintenance cost of \$20,000. per year.

Source: Data supplied by individual malls

Table 21. Halsey Street Area Property Data

This chart is provided because if a pedestrian mall is implemented on Halsey Street it will be important to know who owns property there and where they can be reached. It will also be needed to know what the land dimensions are and net taxable property values for mall assesment purposes.

<u>Owners name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Ben Travisano 26 Halsey St.	25' by 91.2'	\$27,800.
Mutual Benefit Life (Hayne Co.) 52-58 Halsey St.	81' by 118'	\$120,000.
William Yeshel et al 1064 Clinton Ave. Irvington 28-36 Halsey St.	93.4' by 113.3'	\$114,900.
Sonyat Mandel Berna Fisbfer 63 Bersley Terrace Irvington 4 Halsey St.	19.3' by 100'	\$41,000.
Locus Koeller 22 Beach Drive Ocean View Tuckertow, N.J. 43 Halsey St.	18.2' by 100'	\$22,500.
Charles Ambrose 45 Halsey St.	18.2' by 100'	\$22,500.

Source: Newark Tax Assessor



Table 21. Halsey Street Area Property Data

<u>Owners name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Ruth Krueger 185 Grumman Ave. Newark 47 Halsey ST.	18.2' by 100'	\$23,100.
Forty-Nine Corp. 49 Halsey St.	18.2' by 100'	\$21,300.
La Nor Investment 84 Springfield Ave. Newark 51-53 Halsey St.	40' by 100'	\$47,300.
Forty-Nine Corp. 49 Halsey St. Newark 55 Halsey St.	25' by 100'	\$27,500.
Joseph B. Reilly 57 Halsey St.	26' by 100'	\$32,400.
Harry Troy Holding Co. 59 Halsey St.	24' by 100'	\$30,100.
Sheet Metal Works Loc. 17 Pens. Fd. 41 New St. Newark 61 Halsey St.	25.4' by 80'	\$34,200.
Jewish Comm. Council of Essex County 30 Clinton St. Newark 17-21 Halsey St.	60.1' by 99.2'	\$ Exempt
Carl F. Scheller 32 Gerard Pl. Maplewood 23 Halsey St.	20' by 100'	\$23,200.

Source: Newark Tax Assessor

Table 21. Halsey Street Area Property Data

<u>Owners name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Sidney & Geraldine Freund 19 Sandelwood Lane Colonia, N.J. 25 Halsey St.	17' by 100'	\$20,000.
Sidney & Geraldine Freund 25 Halsey St. 27 Halsey St.	16.1' by 100'	\$23,200.
Di Sirolame Const. Company Inc. 10 Bleeker St. Newark 29 Halsey St.	17' by 100'	\$22,000.
Louis & Gertrude Sclerling 31 Halsey St.	17' by 100'	\$21,000.
Martin & Sophie Spitz 27 Madison Ave. Maplewood 33 Halsey St.	30' by 85.7'	\$26,700.
Izoe Appliance Corp. 35-37 Halsey St.	51.6' by 87.2'	\$58,500.
Chase Newark Corp. 999 Asylum Ave. Hartford Conn. 74-84 Halsey St.	132.1' by 125.6'	\$139,400.
Fidelity Union Trust Company 755 Broad St. Newark 68-70 Halsey St.	40' by 40.8'	\$41,500.

Source: Newark Tax Assessor

Table 21. Halsey Street Area Property Data

<u>Owners name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Z. & S. Jay et al (Crosstein D.) 900 Broad St. Newark 104-116 Halsey St.	156.8' by 145'	\$582,400.
David Crosstein 900 Broad St. Newark 102 Halsey St.	7.9' by 80.6'	\$31,100.
Lawrence Corp. 80-84 Commerce St. Newark 138 Halsey St.	9' by 35.2'	\$ Exempt
Herro Co. (P. Mandelbaum) 17 Academy St. Newark 138 Halsey St.	21.1' by 70.7'	\$92,500.
Jacob A. Time 225 West 57th St. NYNY 113-119 Halsey St.	80' by 151.4'	\$216,800.
Joe Morban Inc. (G. Nodelman) 601 West 26th St. NYNY 121-125 Halsey St.	70' by 151'	\$239,700.
Azteck Personnel Inc. 200 Washington St. Newark 127-131 Halsey St.	43' by 135'	\$247,300.
J. Rice 3rd Estats 744 Broad St. Newark 137-145 Halsey St.	109.6' by 120'	\$574,000.

Source: Newark Tax Assessor

Table 21. Halsey Street Area Property Data

<u>Owner's name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Halsey Parking Co. 166 Washington St. Newark 101-111 Halsey St.	153.8' by 250'	\$1,004,300.
91 Halsey St. Corp. 91-93 Halsey St.	50' by 153.1'	\$177,200.
Barton Reality Co. 124 Washington St. Newark 87-89 Halsey St.	50' by 127'	\$135,300.
David & Rose Rosenbaum 374 Redmond Rd. S. Orange, N.J. 95 Halsey St.	30' by 77'	\$50,700.
Tenlon Reality Corp. 1860 Broadway - Rm.1104 NYNY 97-99 Halsey St.	32.3' by 77.3'	\$83,200.
Samuel Berta et al 58 Park Place Newark 69 Halsey St.	24.3' by 59.8'	\$18,100.
166 Washington St. Newark 71 Halsey St.	22.4' by 89'	\$52,000.
1st Methodist Church (Maiden Lane) 225 Washington St. Newark 73-77 Halsey St.	77' by 100'	\$112,400.

Source: Newark Tax Assessor

Table 21. Halsey Street Area Property Data

<u>Owners name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Ann Demeyian 79 Halsey St.	22' by 54'	\$21,700.
Volunteers of America 81 Halsey St. Newark	22' by 54'	\$ Exempt
Aaron & Gertrude Schwartz 83 Halsey St. Newark	22' by 54'	\$21,900.
George & Mary Capetano 85 Halsey St. Newark	22' by 54'	\$29,500.
Rosco Building Co. Inc. 1235 W. Chestnut St. Newark 238-242 Halsey St.	60' by 70'	\$39,800.
Sol & Bessie Kornfeld 220 Hillside Ave. Springfield, N.J. 232 Halsey St.	40' by 76'	\$17,600.
Sol & Bessie Kornfeld 228-230 Halsey St.	38.6' by 158.4'	\$26,100.
Sol & Bessie Kornfeld 222-226 Halsey St.	75.2' by 161'	\$49,800.

Source: Newark Tax Assessor

Table 21. Halsey Street Area Property Data

<u>Owner's name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Branford & Halsey Reality Co. 195 Market St. Newark 206-220 Halsey St.	205.6' by 81.8'	\$240,000.
Hartacol Association 111 South Orange Ave. South Orange, N.J. 200 Halsey St.	28' by 61.2'	\$46,300.
Halsey Investment Co. (B. Hurley) 140 Market St. Newark 186-198 Halsey St.	171' by 57.1'	\$150,800.
Humphrey Holding Co. 49 Ackerman St. Bloomfield 229-225 Halsey St.	95.7' by 123'	\$48,400.
Humphrey Holding Co. 237 Halsey St.	25.2' by 65.4'	\$8,900.
Humphrey Holding Co. 239-241 Halsey St.	45.9' by 124.7'	\$25,900.
Newark Morning Ledger Co. Star Ledger Plaza Newark 213-219 Halsey St.	85' by 119.8'	\$62,500.
Newark Morning Ledger Co. 221-225 Halsey St.	72.4' by 100'	\$55,100.

Source: Newark Tax Assessor

Table 21. Halsey Street Area Property Data

Owners name & mailing address	Land dimensions	Net tax property
Rica, N.J. Inc. 108 Washington St. Newark 193-197 Halsey St.	90.7' by 58.1'	\$81,500.
Albert H. Barmi Etats 195 Prospect Ave. East Orange 199 Halsey St.	20.3' by 55.4'	\$17,200.
Albert H. Barmi Etats 201 Halsey St.	14.1' by 55'	\$21,700.
Prudential Ins. Co. 761 Broad St. Newark 147-159 Halsey St.	175.2' by 281.9'	\$9,809,400.
Newark Housing Authority 57 Sussex Ave. Newark 276 Halsey St.	15' by 206.1'	\$ Exempt
Margaret Perloff & Adella Goodman 8 Lemedo Dr. Livingston, N.J. 274 Halsey St.	23.6' by 61'	\$13,000.
Margaret Perloff & Adella Goodman 272 Halsey St.	20' by 61'	\$10,900.
Magaret Perloff & Adella Goodman	20' by 61'	\$11,100.
Broad National Bank of Newark 905 Broad St. Newark 268 Halsey St.	20.9' by 95'	\$6,900.

Source: Newark Tax Assessor

Table 21. Halsey Street Area Property Data

<u>Owner's name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Broad National Bank of Newark 905 Broad St. Newark 264 Halsey St.	50.5' by 190.8'	\$24,000.
City of Newark 906 34 Broad St. Newark 265-267 Halsey St.	50.7' by 120.8'	\$ Exempt
Edrol Management Corp. 429 Orange Rd. Montclair, N.J. 269-275 Halsey St.	82.2' by 60'	\$36,800.
Arch Crown Tag & Stamping Co. 277 Halsey St. Newark	21.7' by 110.5'	\$24,100.
Ed Rob Management Corp. 4 Brayton Road Liningston, N.J. 279-281 Halsey St.	43.5' by 110.7'	\$33,000.
Arram & Helen Yeues 348 Washington St. Newark 283-285 Halsey St.	35.5' by 93'	\$12,600.
Arram & Helen Yeues 287 Halsey St.	32.5' by 173'	\$39,800.
Hered Corp. (Vogelbaum) 106 Broad St. Newark 289-293 Halsey St.	67.1' by 126.8'	\$48,400.

Source: Newark Tax Assessor



Table 21. Halsey Street Area Property Data

<u>Owner's name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Crown Starter Co. Inc. N.J. Corp. Newark 295-301 Halsey St.	87.1 by 124'	\$120,500.
Female Charity Society 303-305 Halsey St. Newark	40.7' by 122.7'	\$ Exempt
Stanton Building Co. (Tedar) 744 Broad St. Newark 389 Halsey St.	15.8' by 69.8'	\$3,500.
James & Ann E. Scarano 20 Huntington Rd. E. Brunswick, N.J. 391 Halsey St.	15.8' by 69.8'	\$10,100.
Rita & L. Broemel 1510 Embassy Mobile Home Clearwater, Florida 393 Halsey St.	25' by 115.7'	\$11,300.
Max Tessler 308 Forest Road S. Orange, N.J. 397 Halsey St.	25' by 110'	\$9,600.
Max Tessler 399 Halsey St.	36' by 102.1'	\$6,400.
Harry Koplin 390 Elizabeth Ave. Newark 401-407 Halsey St.	89.9' by 101.2'	\$17,200.

Source: Newark Tax Assessor

Table 21. Halsey Street Area Property Data

<u>Owner's name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net Tax Property</u>
Glen & Merle Hobotoal 409 Halsey St. Newark	25' by 101'	\$9,100.
James Nasso 413 Halsey St. Newark 411 Halsey St.	25' by 101'	\$10,500.
James Nasso 413 Halsey St.	25' by 100'	\$7,100.
James Nasso 415 Halsey St.	25' by 100'	\$13,100.
Pauline Neville 77 Pamona Ave. Newark 419-421 Halsey St.	45' by 100'	\$19,900.
Odessey House, Inc 61 Lincoln Park Newark 420-424 Halsey St.	78.2' by 87.8'	\$4,600.
Odessey House Inc. 412-418 Halsey St.	90' by 87.8'	\$71,000.
Joseph & Yolanda Sugmund 365 S. Ridgewood Rd. S. Orange, N.J. 410 Halsey St.	20' by 77'	\$8,600.
Joseph & Yolanda Sugmund 408 Halsey St.	19.5' by 77'	\$8,600.

Source: Newark Tax Assessor

Table 21. Halsey Street Area Property Data

<u>Owner's name &amp; mailing address</u>	<u>Land dimensions</u>	<u>Net tax property</u>
Adrian M. Unger 11 Commerce St. Newark 406 Halsey St.	18.9' by 74.3'	\$1,600.
Milton M. Unger 11 Commerce St, Newark 404 Halsey St.	18.9' by 74.3'	\$1,600.
Milton M. Unger 402 Halsey St.	18.9' by 74.3'	\$1,600
Victor H. Potamkin Estats 1015 Broad St. Newark 400 Halsey St.	18.9' by 74.3'	\$1,600.
Victor H. Potamkin 390-398 Halsey St.	110.5' by 88.2'	\$49,000.
	Total	\$15,995,100.

Source: Newark Tax Assessor

REFERENCES

- Census Of Buisness, 1967, Vol.2A, pp. 20-31.
- Grune, Claude. Systems Analysis Applied To The Problem Of Local Urban Governments. Pleasantville, New York, 1966.
- Halsey Street Mall - Preliminary Report. Prepared by: Department of Administration, Division of City Planning, Newark, New Jersey, March 1963, p. 9.
- Highway Capacity Manuel 1965. Washington D.C.: Highway Research Board, 1965, pp. 6-8.
- Institute Of Traffic Engineers Information Report, October 1966. Washington D.C., 1966, pp. 5-38.
- Moriece and Gary Consultants. Harvard Square For People. Boston Massachusetts, 1968.
- Newark Master Plan, 1964. Prepared by: Newark Planning Board, 1964, pp. 21-76.
- Pontier, Walter E., and Walter H. Kraft. National Cooperative Highway Research Program Report 113 - Optimizing Flow On Existing Street Networks. New Jersey: Edwards and Kelcey, 1971, pp. 63-139.
- \*Also, pamphlets, fact sheets, brochures and booklets supplied by the following cities:
- Fresno, California
  - Kalamazoo, Michigan
  - Miami Beach, Florida
  - Pamona, California