TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/TX-79/12+225-7		

4. Title and Subtitle	5. Report Date
Land Use Impact of Widening West 43rd Avenue in a Developed Residential Area in Houston, Texas	February 1979
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
Cary W. Herndon, Jr., Jesse L. Buffington	Research Report 225-7
9. Performing Organization Name and Address	10. Work Unit No.
Texas Transportation Institute Texas A&M University College Station, Texas 77843	11. Contract or Grant No. Research Study 2-8-77-225
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	Interim - September, 1976 February, 1979
State Department of Highways and Public Transportation 11th and Brazos Austin, Texas 78701	14. Sponsoring Agency Code

15. Supplementary Notes

Research performed in cooperation with DOT, FHWA, and SDHPT.
Research Study Title: Economics of Highway Design Alternatives

16. Abstract

Previous studies on the effects of highway construction upon land use have focused mainly upon the effects of the construction of new highways. In view of a new emphasis upon upgrading and expanding existing facilities rather than building new ones, the need arises for information concerning the effects of such improvements upon land use. This report relates the findings of research done in an area of Houston, Texas, where West 43rd Avenue was upgraded from a two-lane to a four-lane street. The improvement took place in a developed urban area where the predominant land use was residential. Land use changes were analyzed for both abutting and nonabutting properties that might have been affected by the street improvement. Data were collected for an 18-year period including five years before construction began. Total acres in each type of land use were determined for two "before construction" years, 1960 and 1965, and for two "after construction" years, 1975 and 1978. Comparisons were made of the types and rates of development before and after the upgrading occurred. The data are reported in narrative, graphic, and tabular form. Causes of development in the area other than the street improvement were also researched and are reported. Highway planners should be able to use this report and subsequent reports of this study to make more accurate predictions of land use changes due to specific highway improvements.

17. Key Words	18. Distribution Statement
Highways, impact, land use, abutting and nonabutting property	No Restrictions. This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	52	

Form DOT F 1700.7 (8-69)

LAND USE IMPACT OF IMPROVING WEST 43RD AVENUE IN A DEVELOPED RESIDENTIAL AREA IN HOUSTON, TEXAS

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Research Report 225-7
Research Study Number 2-8-78-225
Economics of Highway Design Alternatives

Sponsored by
State Department of Highways
and Public Transportation

in Cooperation with the
Federal Highway Administration
U.S. Department of Transportation

February 1979

Texas Transportation Institute
Texas A&M University
College Station, Texas

PREFACE

The authors wish to acknowledge the assistance that others have given in conducting this study. Special thanks are due Mr. James W. Barr and Mr. James R. Farrar of the Texas State Department of Highways and Public Transportation. Also, Mr. Robert Todd, Mr. Merwyn Hirsh, and Mr. Chris Olavson of the Houston-Galveston Regional Transportation Study were helpful in providing materials and data sources.

Officials of the City of Houston supplied valuable land use and traffic information and were very cooperative in providing background data for the study. Mr. Joe C. Chow and Mr. David Waller of the City Planning Department were very patient and provided invaluable assistance in the collection and evaluation of the available data. Several business people and residents of Houston provided additional information.

Members of the Texas Transportation Institute staff have rendered valuable assistance. Mrs. Pamela J. Cosby provided guidance in the collection of data and in the writing of the manuscript. Special assistance was given by Mrs. Karen Spohr in typing and reviewing this manuscript.

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented within. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

ABSTRACT

Previous studies on the effects of highway construction upon land use have focused mainly upon the effects of the construction of new highways. In view of a new emphasis upon upgrading and expanding existing facilities rather than building new ones, the need arises for information concerning the effects of such improvements upon land use. This report relates the findings of research done in an area of Houston, Texas, where West 43rd Avenue was upgraded from a two-lane to four-lane street. The improvement took place in a developed urban area where the predominant land use was residential. Land use changes were analyzed for both abutting and nonabutting properties that might have been affected by the street improvement. Data were collected for an 18-year period, which includes five years before construction began. Total acres in each type of land use were determined for two "before construction" years, 1960 and 1965, and for two "after construction" years, 1975 and 1978. Comparisons were made of the types and rates of development before and after the upgrading occurred. The data are reported in narrative, graphic, and tabular form. Causes of development in the area other than the street improvement were also researched and are reported. Highway planners should be able to use this report and subsequent reports of this study to make more accurate predictions of land use changes due to specific highway improvements.

SUMMARY OF FINDINGS

Land use data were collected for the West 43rd Study Area in Houston, Texas, to determine the impact on land uses and rates of change in land uses due to improving West 43rd Avenue from a two-lane, open drainage road to a four-lane street with curbs and gutters. The study reviews data collected for an 18-year period from 1960 to 1978. The period includes five years before planning and construction, ten years during which planning and construction took place, and three years after construction was completed.

Summarizing the findings:

(1) There have been very few changes in the entire Study Area between 1960 and 1978.

   (a) The stage of development was classified as developed in 1960. All of the properties were developed or platted and scheduled for development at the time. Limited amounts of development have occurred since 1960.

   (b) The predominant land use has remained single-family residential throughout the period.

   (c) Single-family residential had the highest absolute increase, while other use categories had little or no increase.

   (d) The majority of the increase occurred between 1960 and 1965 when Shepherd Park Plaza subdivision was being developed, which was in the period prior to the street improvement.

   (e) Other changes in land use involved several small tracts changing from one use to another, but these were not important developments.

(2) Abutting properties along West 43rd Avenue remained almost unchanged throughout the study period.

   (a) The predominant land use on abutting properties remained single-family residential during the 18-year period with only one acre changing from unimproved to single-family.

(b) All other categories of abutting land remained unchanged.

(3) Nonabutting properties in the West 43rd Avenue Study Area experienced some changes in land use during the study period.

(a) Single-family residential realized the highest absolute increase.

(1) The majority of the increases occurred between 1960 and 1965. Over 40 acres of unimproved land were developed as single-family residential.

(2) Slight increases in single-family residential acreage were experienced between 1965 and 1975, and also between 1975 and 1978.

(b) Nonabutting commercial acreage fluctuated throughout the 18-year period, while other land uses remained virtually the same.

(4) The impact of the improvement on change in the Study Area was affected by several factors.

(a) The improved section of West 43rd Avenue traversed a stable residential area. Area residents, who opposed major changes in land use, controlled land use changes through subdivision or deed restrictions.

(b) All of the land in the Study Area had either been developed or platted for development prior to 1960. Very little unimproved land remained that was available for development.

(c) Although economic and population growth in the Houston metropolitan area was phenomenal during the study, development did not occur in the Study Area because unimproved properties, ripe for commercial and residential development, were readily available close to the area studied.

IMPLEMENTATION STATEMENT

This report relates the findings of a case study on land use changes that have occurred after an existing street was improved. The findings can be implemented immediately by highway agencies in predicting what might happen as a result of a similar street improvement in a comparable area elsewhere.

This case study is one of several being done in Texas cities. The predictive capabilities will be increased after analysis and comparison of data from all areas is accomplished. Those findings will be described in other reports.

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Purpose and Objectives of Study

The near completion of the Interstate Highway System, the completion of many urban freeways, and the increasing shortage of funds for future highway construction have caused state highway agencies to turn to upgrading and expanding the vehicular capacity of existing streets and highways as a means of improving the transportation network. Much of the land use impact research conducted in the past investigated the effect of new location highway construction, while very little research was devoted to studying the impact of upgrading an existing facility in an urban area. In order to optimize public benefits, highway agencies need information concerning the effect of existing facility improvements to assist in making decisions on highway funding alternatives. The overall purpose of this report is to provide data to state highway agencies concerning the impact of improving existing highways on area environment.

One important factor in determining the impact of any highway construction is the changes that occur in adjacent land use. The specific task of this analysis is to investigate land use changes in areas where an existing street or highway has been upgraded. In conjunction, land use changes in the specified areas are compared to general land use plans and/or zoning maps to determine their importance to the evolution of area land use development. Traffic volume changes are also reviewed to ascertain the effects of various types of existing facility improvements. Many other economic and social factors are included in the study to assist in measuring the impact of existing street or highway improvement on urban land use.

Specifically, this report relates the findings of an investigation conducted in an area located in Houston, Texas, where a portion of West 43rd Avenue had been widened and repaved through a developed residential section of the city. The West 43rd Study Area is one of eighteen study sites located in different Texas cities. The study sites have experienced varying types of highway improvements and were in various stages of land development with differing predominant land uses prior to the roadway design changes. Reports of findings in those areas are available or will be forthcoming.

Objectives of this study are as follows:

(1) To determine the initial and long-range land use impacts of different highway design changes on existing highways with a minimum of data collection.

(2) To determine traffic volume changes resulting from various types of improvements.

Method of Study

A "before and after" study approach was employed in this analysis to identify land use changes in the West 43rd Study Area. Since land use changes may have been affected by the public's anticipation of a better roadway, data were collected for a time before formal planning for the specific project began as well as for the years since planning and construction through to the present (the applicable time periods are described in the Definitions section).

The amount of land (acres) in various uses was determined for the selected "before and after" years and, then; average annual rates of land use change were calculated for each of the time periods. In addition, changes in improved and unimproved properties' land use were established separately for each period. Finally, the differences in the annual rates of change

between periods were analyzed to indicate the affect of the improvement project on land use change and development.

The land in the Study Area was divided into abutting land and non-abutting properties to permit further analysis. Abutting properties are identified as those with frontage on West 43rd Avenue. On larger undeveloped tracts with frontage, an arbitrarily set section of land 300 feet back from the facility was designated as abutting property. The remaining properties in the Study Area are defined as nonabutting tracts (see Definition Section). These two categories of properties were studied separately to determine the differences in land uses and rates of development brought about by the improvement project.

In order to obtain background information about land use changes and development, several knowledgeable people were interviewed. Real estate people and area residents who were familiar with the area provided information on land sales and developments, and about past and present land use. These individuals also provided insight into considerations given to the street improvement in making land development decisions in the Study Area.

Various factors which might have influenced land use changes were also investigated to provide additional background data about the social, economic, and environmental make-up of the area studied. The factors are: traffic volume, population characteristics, area land use plans, and area growth statistics.

Location of Street Improvement

The improved portion of West 43rd Avenue is located within the incorporated city limits of Houston. Houston, the nation's fifth largest city and largest city in the South and Southwest, is the business and population center of a dynamic metropolitan area situated on the upper Gulf Coast of Texas, approximately 50 miles from the Gulf of Mexico. The growth of Houston, Harris County, and the Houston SMSA has been phenomenal in recent decades, as is illustrated in Table 1. The 1978 Houston population has been estimated at 1,623,000 by the Houston Chamber of Commerce, and when compared to the 1970 census figure of 1,232,000 represents an increase of 31.7%.

Several industries have contributed to the extraordinary growth of the Houston-Gulf Coast region, but the chemical and petrochemical industries have played an extremely important part in the city's growth. The discovery of oil and gas in Southeast Texas and the opening of the Houston Ship Channel in the early 1900's stimulated development of petroleum refining in the area to the extent that today over 50% of the nation's major petrochemical manufacturing capacity is located in the region. The Houston SMSA has long been the nation's leading producer of refined petroleum and petrochemicals, and, as a result, various allied industries have also located in the metroplex.

The Houston-Gulf Coast region possesses an excellent transportation network to both the international and national business market. The Port of Houston is the third largest seaport in the United States in total tonnage and ranks second in total dollars of foreign trade. The major import products are steel, petroleum, and passenger cars, while the port's leading export commodities are agricultural products, petroleum equipment, and

Table 1. Population Changes in Census Tract, Houston, and Harris County, 1960-1978.

	1960[1]	Change and % Change 1960-70	1970[1]	Change and % Change 1970-75	Dec. 31, 1975[2]	Change and % Change 1975-78	April 1978[3]
Census Tract 519 (Includes Study Area)	8,985	+4,617 +51.4%	13,602	+630 +4.6%	14,232	+135 +0.9%	14,367
Houston (Incorporated)	938,219	+294,574 +31.4%	1,232,793	+244,229 +19.8%	1,477,022	+140,216 +9.5%	1,617,238
Harris County	1,243,158	+498,754 +40.1%	1,741,912	+423,389 +24.3%	2,165,301	+253,384 11.7%	2,418,685

Sources:

(1) Bureau of the Census
(2) Houston Chamber of Commerce
(3) Derived from Houston Chamber of Commerce dwelling unit estimates

chemicals. Also serving the international market, air passenger and freight service is provided through two large airport terminals in the Houston area. The national business market is served well through a variety of transport modes. Low-cost barge transportation is available via the Intracoastal Waterway which connects Houston to the midcontinent regions of the Mississippi River and its tributary systems. Rail and motor freight operations are provided by six major railroad companies and a large number of common-carrier, specialty-carrier, and local-delivery trucking firms. Houston is also a major center of oil and gas transmission for pipeline companies which operate 13 crude oil and products pipelines and 21 gas pipelines which serve almost every section of the nation.

The favorable industrial, transportation, and energy environment of the Houston-Gulf Coast area has led to an increasingly diversified economic structure during the past 20 years. During the 1960's, Houston's growth as a corporate center expanded tremendously. Since 1970, over 200 major companies have moved their headquarters, divisions, or subsidiaries to Houston making the city an important center of international economic activity.

The substantial business activity and population growth and the subsequent growth of Houston as a marketing center has generated increasing amounts of traffic and has made greater demands on the street and highway system to provide adequate access to developed and developing urban areas. The improvement of West 43rd Avenue was accomplished to meet the traffic needs of an area (Census Tract 519) which experienced a 51.4% increase in population between 1960 and 1970, as shown in Table 1.

The Study Area, as shown in Figure 1, is situated about 5.25 miles from Houston's central business district (CBD) and is approximately 1 mile north of IH 610 (North Loop West), the closest freeway and major traffic carrier.

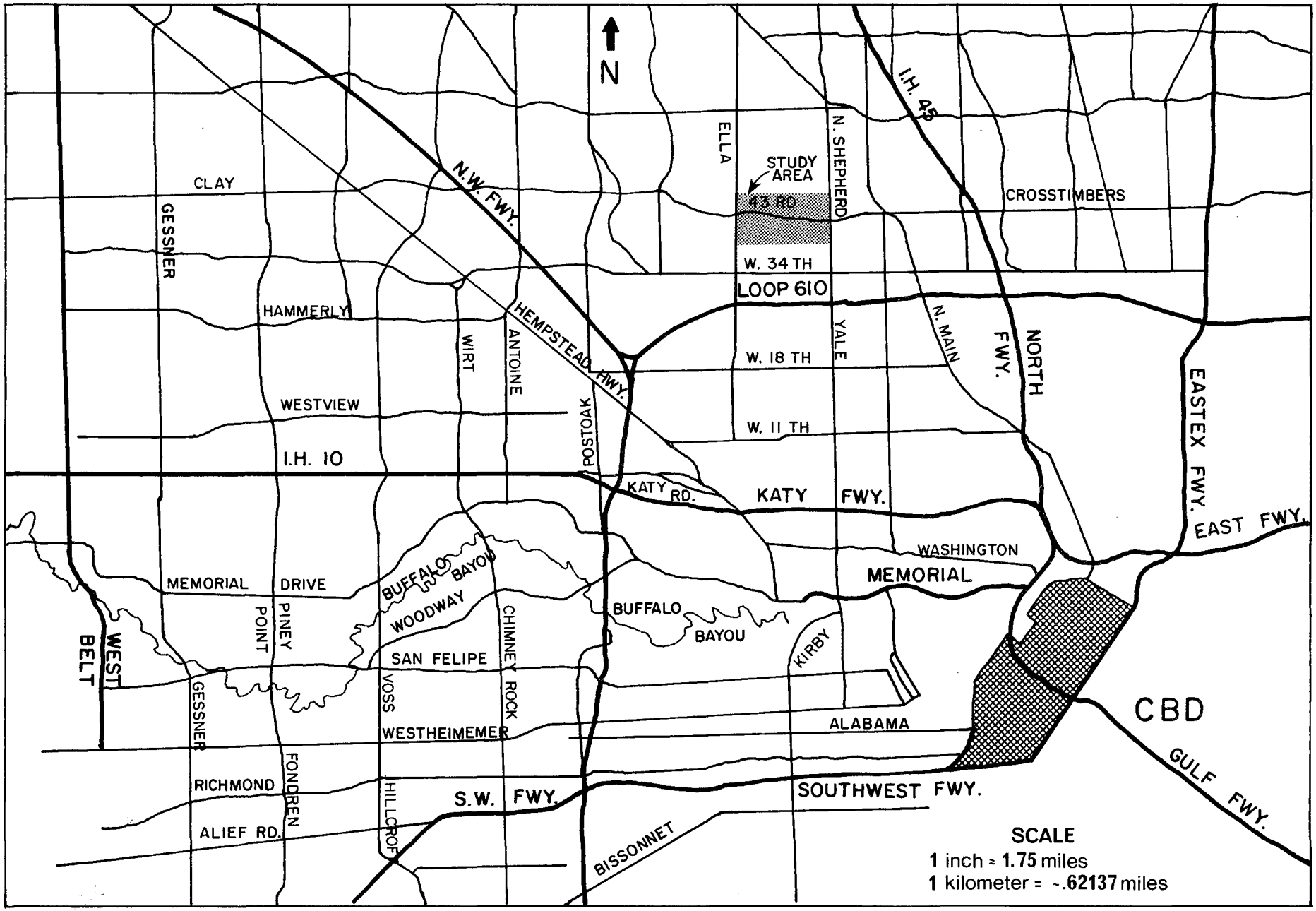


Figure 1. Map of the Northwest Houston Area Showing the Location of West 43rd Study Area.

The Study Area is located in a section of Houston described as low density residential, i.e. composed of primarily single-family residential. Most of the residences are 20 to 30 years old and are of brick-veneer or wood frame construction. The housing is in good condition.

Key Characteristics of Street Improvement

The West 43rd Avenue Study Area is one of eighteen sites chosen for analysis of land use changes relative to street improvements. The study areas were chosen according to the following characteristics:

(1) The stage of area development,

(2) Type of highway or street,

(3) The predominant land use, and

(4) The type of setting (urban or suburban).

These factors were determined during the period of time prior to the beginning of the street improvement project. Using these characteristics, different types of study sites have been selected that will permit analyses of various design changes and the resulting impact on land use changes.

The stage of development for the West 43rd area during the "before" period was determined to be developed and the predominant study area land use was classified as single-family residential. The "before" street design was described as a two-lane, undivided street without curb and gutter. Very little change in land use was expected to occur as a result of the street improvement due to the lack of available unimproved land and due to the type of developments existing in the study area.

Sources of Data

The major source of information for planning the widening of West 43rd was the Houston City Planning Department, while construction and street design data were collected from the Houston Public Works Department, Paving Division.

Land use data were available through several sources, but the most applicable information was provided by the City Planning Department (CPD). Other sources of valuable land use data were the District Office of the State Department of Highways and Public Transportation (SDHPT), Harris County Agricultural Stabilization and Conservation Service Office, and Houston-Galveston Regional Transportation Study (H-GRTS). Most of the land use data were collected from colored (Lambert) maps, aerial photographs, and on-site inspections of the area.

Background land use information was collected from city directories of Houston, from Sanborn (fire insurance) maps, from subdivision platting records maintained by Harris County, and from personal interviews with real estate developers and brokers, city planners and officials, and property owners and area residents. Information about city-wide and regional land use plans was obtained from CPD reports and Houston-Harris County Metropolitan Transportation Study publications.

Traffic volume data were provided by the Houston Traffic and Transportation Department for city streets and relevant state and federal highways. H-GRTS was also a source of traffic volume information. The Houston Chamber of Commerce provided historical U.S. census and population projections along with housing information for Houston and its metropolitan area. Socio-economic data were collected from U.S. Bureau of the Census publications found in the City of Houston's Public Library.

Definitions

The following land use categories and time periods were used to identify properties in the study area:

Abutting Properties - improved tracts with frontage along West 43rd Avenue; and for large unimproved tracts, a section of land 300 feet back from the street.

Nonabutting Properties - all tracts in an arbitarily defined study area not defined as abutting West 43rd Avenue; i.e. improved tracts without frontage along West 43rd Avenue and unimproved tracts over 300 feet from the upgraded street.

Single-Family Residential - tract improved with occupiable house for one family.

Multiple-Family Residential - tract improved with duplex or apartment complexes designed to house two or more families.

Commercial - tract improved with a commercial business.

Educational - tract improved with an elementary, middle or high school, or property owned by a school district.

Public-Governmental - tract improved with a governmental office, park, public owned utility, etc.

Semi-Public-Nonprofit - tract with improvements such as churches, non-profit clubs, or other non-profit organizations.

Industrial - tract improved for manufacturing, product storage, etc.

Streets and Roads - land improved with a street or road; includes land dedicated as right-of-way.

Unimproved - land which has not been developed for any particular use; also includes previously developed land that is presently vacant or unused and land used for agricultural purposes.

Before Period - the time period which ends the year prior to the initiation of formal planning and construction. For West 43rd Avenue, the "before" period includes the years 1960 to 1965.

Construction Period - the time period in which final planning, funding and construction processes occur. In the report, the years 1965 through 1975 make up the "construction" period.

After Period - the time period which includes the first full year after the improvement is complete up to the present, or specifically, 1976 to 1978.

CHARACTERISTICS OF AREA ROADS BEFORE AND AFTER IMPROVEMENT OF WEST 43RD AVENUE

West 43rd Avenue

West 43rd Avenue is a major east-west arterial located approximately 5.5 miles north-northwest of Houston's central business district. The subject facility is part of an east-west thoroughfare which includes (from east to west) Ley Road, Crosstimbers, West 43rd, and Clay Road and extends across most of Harris County. The overall length of West 43rd Avenue is about 6 miles and is located between North Shepherd Drive and U.S. 290.

The Houston City Planning Commission placed West 43rd Avenue on its first major street plan in 1942, and on that plan the subject facility was "scheduled to be widened" to meet future transportation needs. In 1953, the City of Houston began preliminary action to obtain the necessary rights-of-way by establishing "building lines" for improvement. Building lines were established by motion before the Houston City Council, and property owners were restricted from improving any land within those established lines without the city's permission. Building lines were approved for a 1.05 mile section of West 43rd Avenue situated between North Shepherd Drive and Ella Boulevard. In 1962, right-of-way cost estimates were done by the city's real estate department; and in 1965, because of citizen opposition to the city acquiring additional right-of-way , the proposed facility's design was changed from a four-lane divided curb and gutter roadway with a raised median to a four-lane undivided curb and gutter roadway without a raised median.

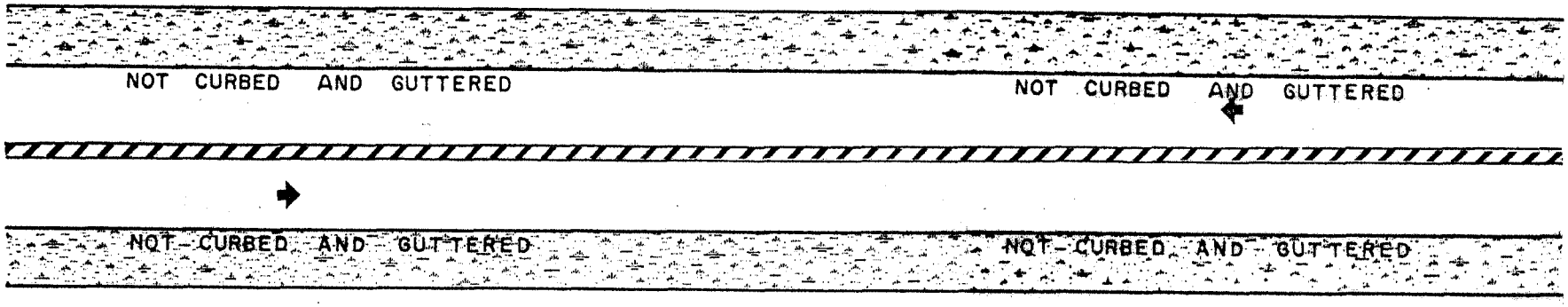
Construction funds were allocated for the project under the Public Works Department's 1966-1967 Capital Improvement Program. However, further delays occurred on the project as city officials discussed the design requirements of the improvement project.

Finally, an initiation order was given in November 1973, and public hearings were held in December of 1973. The contract was awarded in August 1974, and a work order was approved in September of the same year. Construction actually began in November 1974 and was completed and accepted by the city in December of 1975. The entire length of the 1.05 mile improvement is included in this report's analysis.

Prior to the improvement, the study portion of West 43rd was a two-lane, 22-foot wide concrete roadway with 60-foot right-of-way. The facility did not have a curb or gutter and was described as being in good condition. As Figure 2 shows, the road is now a four-lane, 48-foot wide concrete roadway with a curb and gutter. The new street design has no left-turn provisions.

Table 2 illustrates that West 43rd had a 1976 24-hour traffic count of 9,257 just west of its intersection with North Shepherd Drive. The March 1976 traffic count (the most recent data available) is difficult to interpret due to the fact that construction was completed only a few months earlier in December of 1975. But, the historical data does indicate that the improvement did not have a profound effect on the volume of traffic as shown by the 1959 traffic count of 10,911 and the 1976 traffic count of 9,257. The decline in traffic volume may be attributed to the addition of new streets and the improvement of existing streets in the general area.

Before Period Design



After Period Design

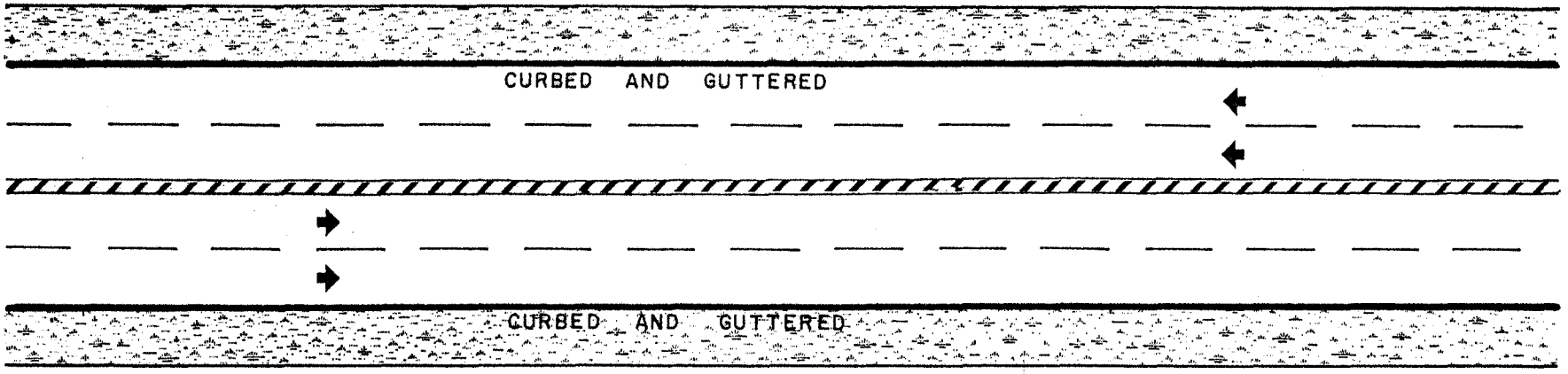


Figure 2. Design of West 43rd Avenue Before and After Improvement

Table 2. Twenty-Four Hour Traffic Counts on West 43rd Street and Other Associated Parallel and Intersecting Streets

Location of Traffic Counts	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
STUDY ROUTE																			
West 43rd																			
West of N. Shepherd	10,911		11,126		16,360		10,095		10,433		8,304		8,884		10,779	11,652		9,257	
East of Oak Forest	11,102	13,412		7,265	13,412		13,320		14,225		9,669		13,279	11,102	15,262	15,631	13,522	17,437	15,762
PARALLEL STREETS																			
West 34th Street																			
West of N. Shepherd														7,498	8,109	7,950	10,069	8,970	7,840
West of Oak Forest																		9,828	
Pinemont																			
West of N. Shepherd	6,688			8,190		7,249		7,205		6,957		9,117		9,6958		11,094	12,189	13,627	12,220
West of Ella Boulevard																11,275	11,117	13,759	
INTERSECTING STREETS																			
North Shepherd																			
North of West 43rd	16,592			17,074	17,247		19,885		22,875		22,182		22,851		26,732		24,940		26,525
South of West 34th	24,489		25,981		17,915		19,906		23,276		22,695		24,007		28,391	26,952	26,032	27,882	26,712
North of Pinemont													21,180	22,709	26,342	24,202	23,615	26,580	
Ella Boulevard																			
South of West 34th				11,221	12,579	15,423			18,487	21,452		23,153		22,909		26,717	25,834	32,236	33,921
North of Overhill		4,239		7,105		8,738			10,340	14,048		15,914		16,722	4,239	17,584	7,105	20,874	21,373
South of Pinemont														7,207		7,720			
Oak Forest																			
South of West 43rd																			6,092

Source: Traffic and Transportation Division, City of Houston

Parallel Streets

The two major east-west traffic arterials parallel to West 43rd Avenue are: Pinemont Street to the north; and West 34th Avenue to the south. Pinemont Street, located about 0.9 miles north of the subject facility, is a two-lane open ditch facility which provides an alternate route for the subject facility. The property abutting Pinemont between Ella Boulevard and North Shepherd can be described as a developed stable residential area similar to the West 43rd Study Area along the eastern third near North Shepherd Drive, while the remaining two-thirds is predominantly unimproved. Pinemont Street had a 1977 traffic count of 12,220 just west of its intersection with North Shepherd, as illustrated in Table 2, which is a 82.7% increase from a 1959 count of 6,688.

The comparable section of West 34th Avenue between Ella and North Shepherd is also a two-lane open ditch city street (except for the intersection of Ella which is a four-lane city street with raised median, curb, and gutter). Most of the abutting properties have been developed into strip commercial uses such as auto repair shops, lounges and service companies. The adjacent properties near North Shpeherd Drive have been developed for either multiple-family or single-family residential uses. Like Pinemont, West 34th may be considered an alternate route because it too connects North Shepherd Drive and Ella Boulevard. Referring to Table 2, the traffic count along West 34th in 1977 was 7,840 or 4.6% more than the 1972 count of 7,498 at a point just west of the intersection of West 43rd and North Shepherd.

Intersection Streets

The eastern border of the Study Area is formed by North Shepherd Drive, a major traffic arterial in Houston's transportation network. In 1965, a section of North Shepherd Drive extending south from West 43rd Avenue to West 34th was improved under a project funded by the city. Under this project, the two-lane facility was upgraded to a four-lane facility with raised median, curb, and gutter. In 1976-1977, the state contracted for a construction project to upgrade the design of a section of North Shepherd Drive from a two-lane facility to a four-lane, undivided, open ditch facility with a continuous left-turn lane. North Shepherd Drive provides access to IH Loop 610 to the south and IH 45 to the north, which are two of the major freeways in the metropolitan area.

At the intersection of West 43rd and North Shepherd, the 24-hour traffic count has shown an overall increase from 16,592 in 1959 to 24,799 in 1977, a 49.5% increase in volume. The increase is less dramatic at the intersection of West 34th and North Shepherd for a similar time period. The 1959 and 1977 traffic volumes were 24,489 and 26,172, respectively, which calculates to be an increase of only 6.9% (Table 2).

Ella Boulevard, the western boundary of the Study Area, is a four-lane city street with raised median, curbs, and gutters which was improved from IH Loop 610 to West 43rd in 1966-67. Ella Boulevard, which previously was a two-lane, undivided, open ditch facility, was also improved under a city contract in 1974-75 from West 43rd to Pinemont. This section of Ella Boulevard was upgraded to a four-lane, curbed, and guttered street with a raised median.

Represented by a location just south of its intersection with West 43th, the portion of Ella Boulevard improved in 1966-67 has shown an annual rate of increase in traffic volume of 13.5% from 1962 (11,221) to 1977 (33,921). The section upgraded under the 1974-75 improvement project also has illustrated significant growth in traffic volume. As indicated in Table 2, the twenty-hour traffic count at the intersection of Ella and Overhill was 4,239 in 1960 and 21,373 in 1977, an average annual increase of approximately 23.8% per year.

CHARACTERISTICS OF THE STUDY AREA BEFORE AND AFTER THE IMPROVEMENT OF WEST 43RD AVENUE

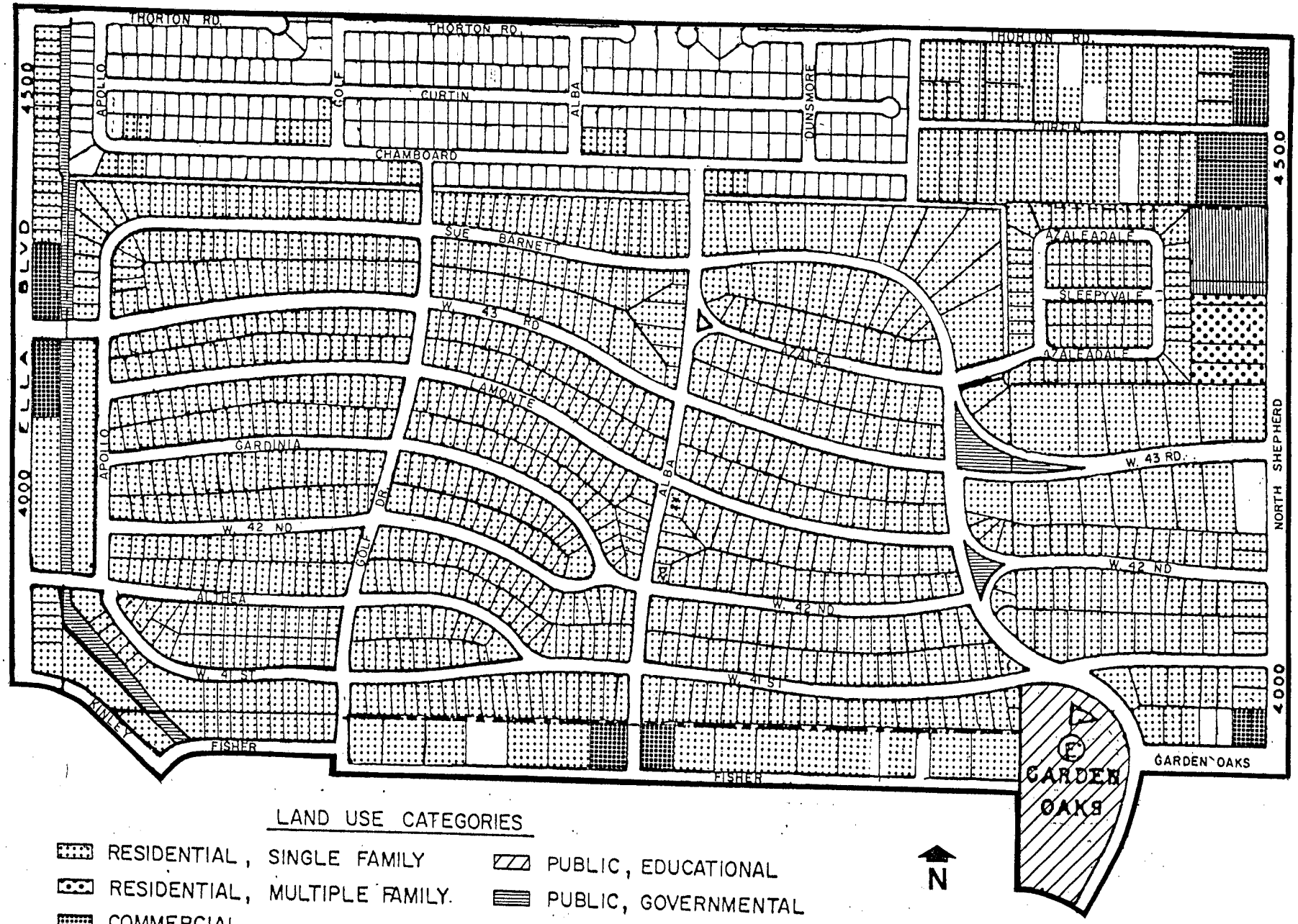
Size and Boundaries of Study Area

An area approximately 3,600 feet wide and 6,000 feet long, bisected by West 43rd Avenue, was delineated for land use change analysis. The study area, which encompasses approximately 495 acres, was designed to include a minimum of three blocks of developed land on either side of West 43rd. The northern section reaches about 1,650 feet to Thorton Road and the southern section extends some 1,800 feet to Fisher Street. North Shepherd Drive and Ella Boulevard form the east and west boundaries, respectively. As stated previously, the Study Area is located in northern Houston about 5.5 miles from the central business district and almost one mile north of the North Loop 610.

Land Use Characteristics

An analysis of the overall land use indicated that single-family residential was the predominant type of land use in both the "before" and "after" time periods. Figures 3 and 4 show the "before" or 1960 and 1965 land use, while Figures 5 and 6 illustrate the "after" land use or 1975 and August 1978, respectively. The actual acreages of land devoted to each use of abutting and nonabutting property for the study years 1960 through 1978 is listed in Table 3.

In 1960, the year designated as the first "before" year, the Study Area was in the "developed" stage of land development. As shown in Table 3, there were 364.34 acres (147.4 hectares) of improved land and 78.89 acres (31.9 hectares) of streets and right-of-way. The remaining land, about



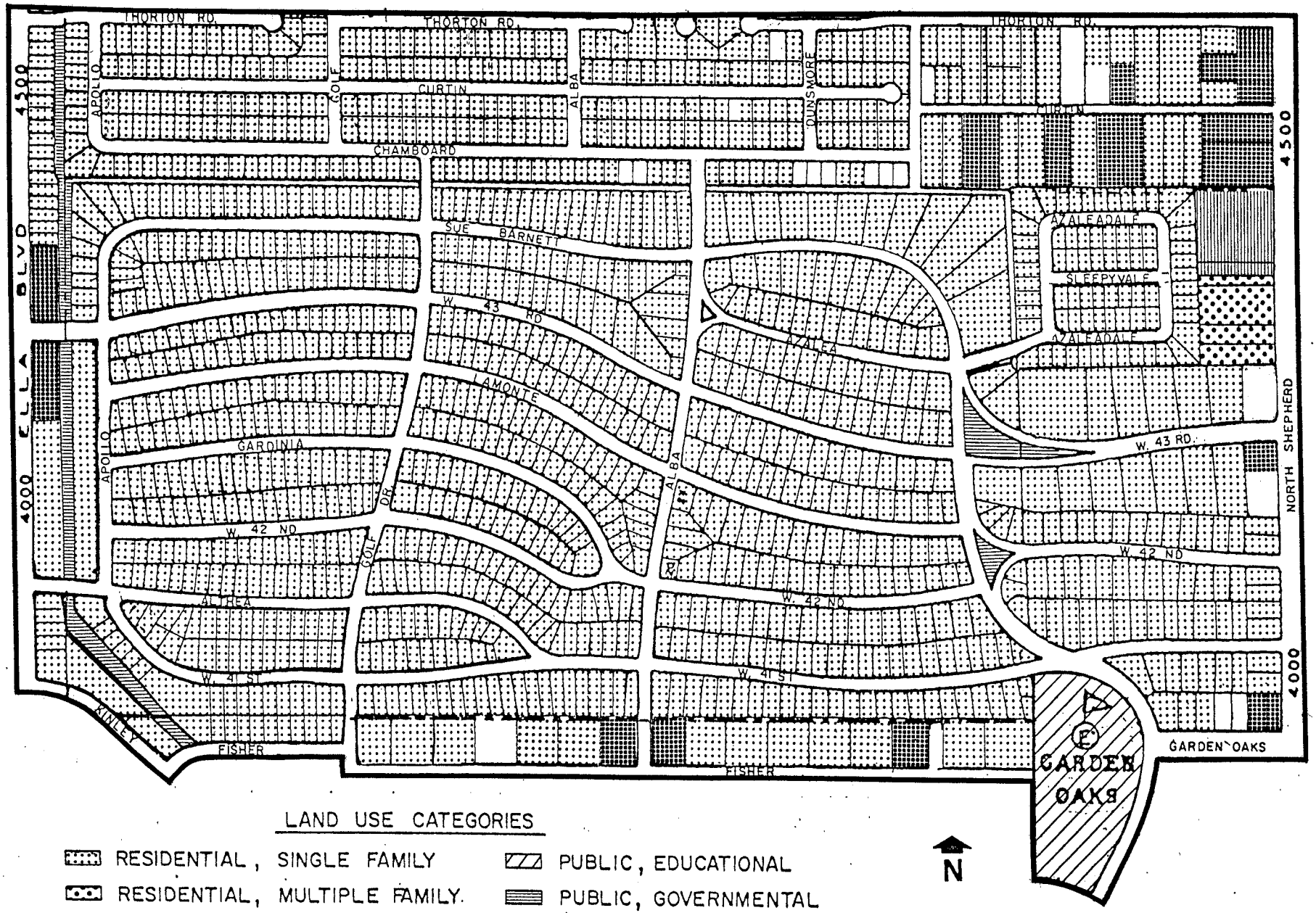
LAND USE CATEGORIES

- RESIDENTIAL, SINGLE FAMILY
- RESIDENTIAL, MULTIPLE FAMILY
- COMMERCIAL
- UNIMPROVED
- PUBLIC, EDUCATIONAL
- PUBLIC, GOVERNMENTAL
- SEMI-PUBLIC, NON-PROFIT

Scale: 1 inch = 720 feet or 220 meters

Figure 3. Map of Land Use in the West 43rd Study Area in 1960.

Figure 3



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Scale: 1 inch = 720 feet or 220 meters

Figure 4. Map of Land Use in the West 43rd Study Area in 1965.

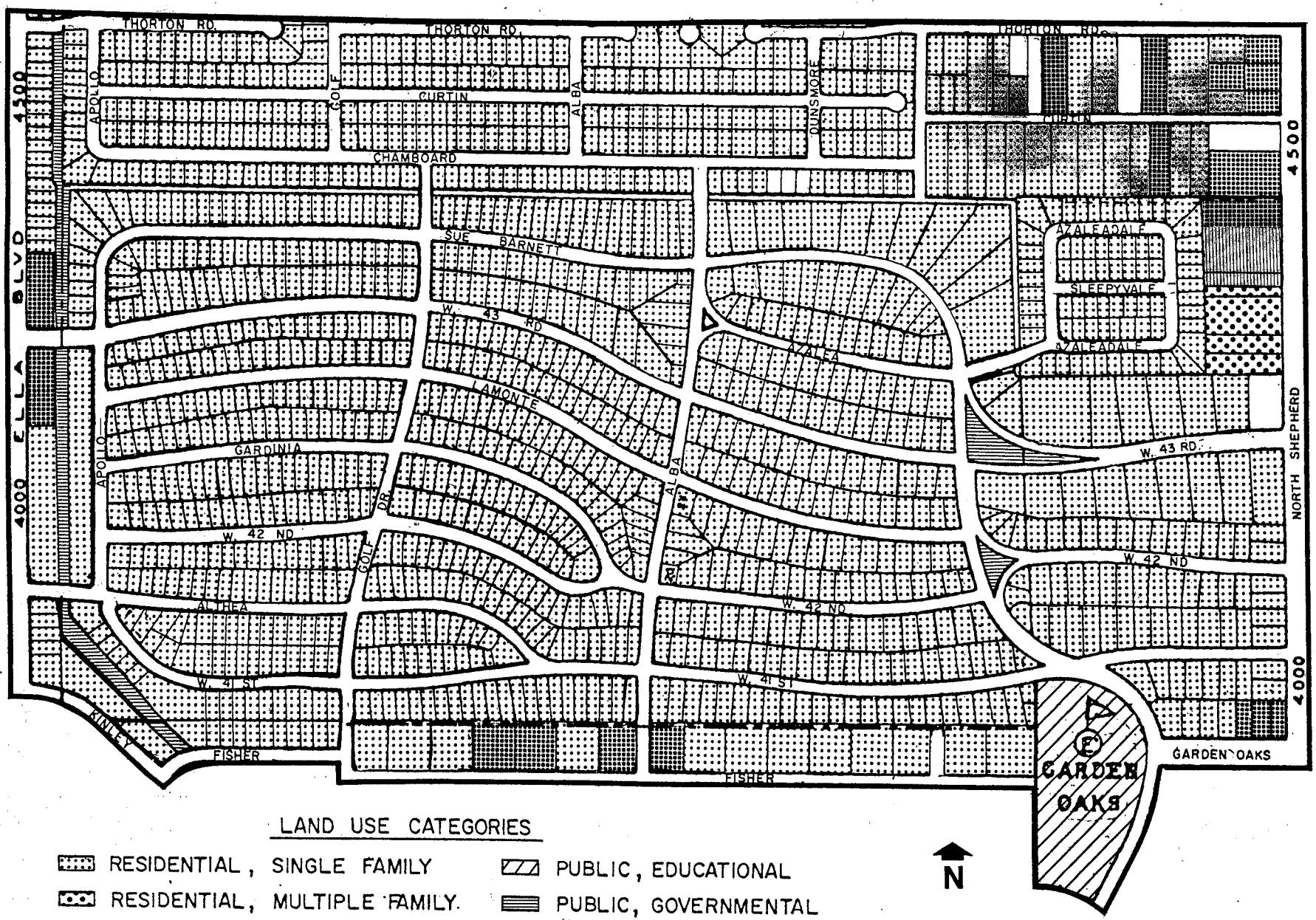

Figure 5. Map of Land Use in the West 43rd Study Area in 1975.

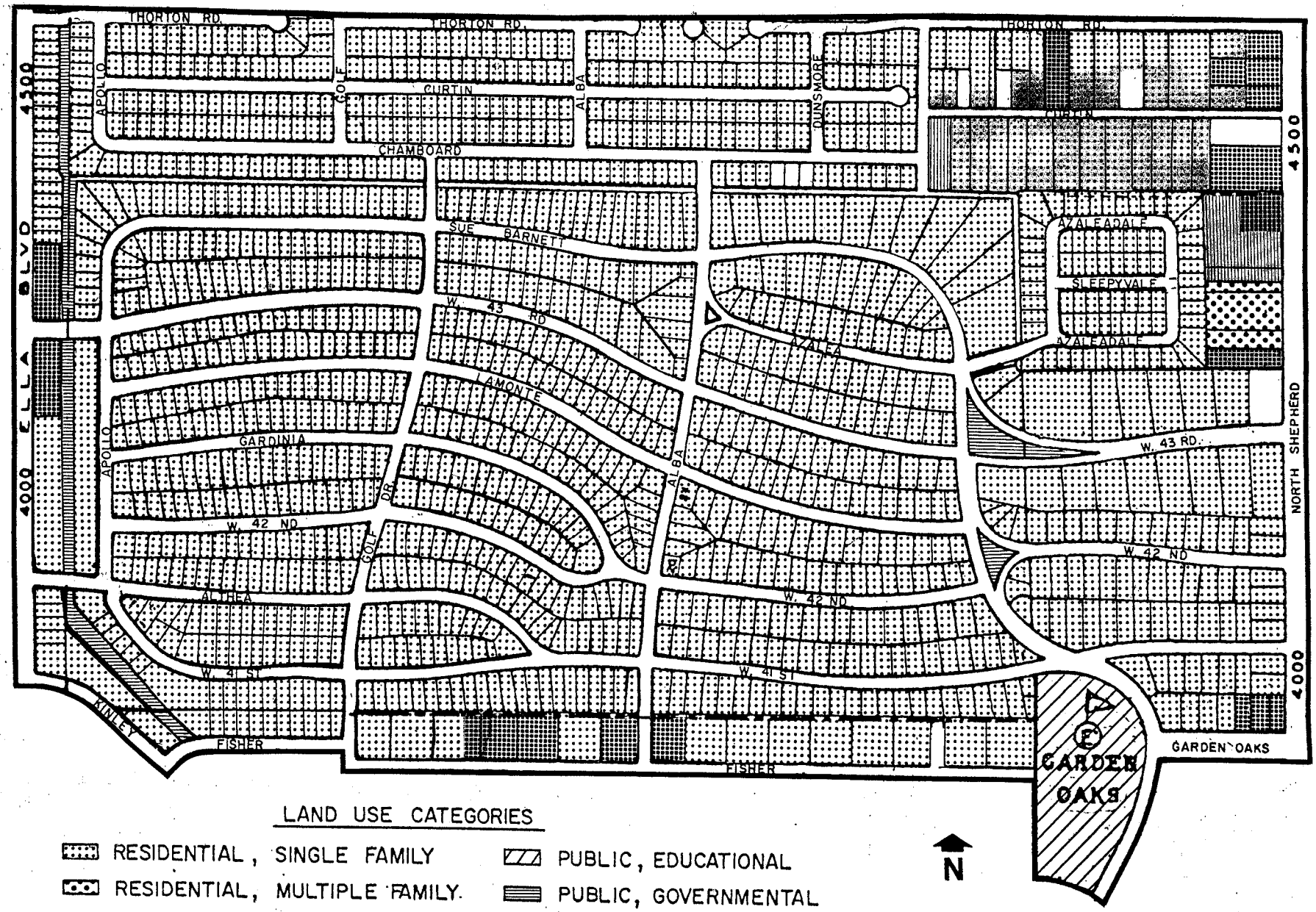

Figure 6. Map of Land Use in the West 43rd Study Area in 1978.

51.77 acres (20.9 hectares), was unimproved. The percentage breakdown of land developments in the 495 acre area are as follows: improved land, 73.6%; streets and right-of-way, 15.9%; and, unimproved land, 10.5%. The dominant land use in the Study Area in 1960 was single-family residential as illustrated by the 326.47 acres (132.1 hectares) devoted to that use. Single-family residential accounted for approximately 98.6% of the overall area's improved acreage and 65.9% of the total Study Area.

The dominant land use for the total Study Area in 1978, the last "after" year, remained single-family residential. In fact, single-family residential had increased to 371.75 acres (150.4 hectares) or about 75.1% of the entire area.

Land Use Changes

During the 18 year analysis period, very few land use changes have occurred in the West 43rd Study Area. Table 3 shows that the Study Area properties experienced very small amounts of land use changes. The analysis of land use change is discussed first on an overall area basis and second in terms of the proximity of property to West 43rd in the subsequent paragraphs.

Overall Study Area

The only major land development was a new residential subdivision in the northwestern section of the Study Area. The majority of the available unimproved land changed to single-family residential use during the "before" period, 1960-1965. Unimproved land decreased from 51.77 acres to 6.84 acres, some 44.93 acres, while the number of single-family residences increased from 1,129 to 1,314 (Figures 3 and 4).

Table 3. Total Land Uses and Land-Use Changes by Time Period and Selected Years

Land Use and Change by Periods	Before Planning		Construction		After
	1960	1965	1973	1975	1978
Single-Family Residential					
Total Acres	326.47	367.10	366.01	370.81	371.75
Absolute Change		+40.63	-1.09	+4.80	+0.94
Percent Change		+12.45	-0.03	+1.31	+0.25
Multiple Family Residential					
Total Acres	3.87	3.87	3.87	3.87	4.28
Absolute Change		0	0	0	+0.41
Percent Change		0	0	0	+10.59
Commercial					
Total Acres	12.33	16.93	19.53	14.81	14.28
Absolute Change		+4.60	+2.60	-4.72	-0.53
Percent Change		+37.31	+15.36	-24.17	-3.58
Educational					
Total Acres	9.82	9.82	9.82	9.82	9.82
Absolute Change		0	0	0	0
Percent Change		0	0	0	0
Public-Government					
Total Acres	8.00	8.00	8.00	8.00	8.00
Absolute Change		0	0	0	0
Percent Change		0	0	0	0
Semi-Public Nonprofit					
Total Acres	3.85	3.55	3.55	3.55	3.55
Absolute Change		-0.30	0	0	0
Percent Change		-7.79	0	0	0
Streets and Roads					
Total Acres	78.89	78.89	78.89	78.89	78.89
Absolute Change		0	0	0	0
Percent Change		0	0	0	0
Unimproved					
Total Acres	51.77	6.84	5.33	5.25	4.43
Absolute Change		-44.93	-1.51	-0.08	-0.82
Percent Change		-86.79			
TOTAL ACRES	495.0	495.0	495.0	495.0	495.0

Since the last "before" year, 1965, very little acreage in the Study Area has changed land use. As evidenced in Table 3, about 8.75 acres changed uses during the period from 1965 to 1978. The above information indicates that the improvement of West 43rd has had little effect on land use in this stable residential Study Area.

Proximity to West 43rd Avenue

The Study Area properties were separated into two categories according to their location relative to West 43rd Avenue. The first category, "abutting" properties, includes those area tracts with frontage on West 43rd Avenue. In some cases, entire developed tracts were included so that single land use developments would not be divided arbitrarily. For example, an office building or apartment house complex with frontage on West 43rd might have property lines extending back several hundred feet from the right-of-way; but, since the building complex is a single development, it would be classified as abutting. For the undeveloped (unimproved properties) portions of the area, a section 300 feet (91.44 meters) back from the West 43rd right-of-way was considered abutting property. In this analysis, the entire Study Area had either been platted and subdivided for single-family residences or had been developed prior to this investigation; therefore, unimproved property does not play an important role in assessing the impact of improving West 43rd. Property not defined as abutting is classified as "nonabutting" property.

Dividing the properties into these two categories permitted a comparative analysis to be done in an effort to determine the influence of the improvement project on the location of land use changes. Although the improved facility could have influenced changes in the use of nonabutting properties, abutting properties could be expected to be the most affected.

However, several factors exist that may alter these anticipated results; therefore, an analysis of the land use changes occurring in each category will confirm or reject the expected results.

Abutting properties. As illustrated in Table 4, almost 97% of the 66.16 abutting acres was improved in 1960. Single-family residences composed over 74% of the abutting developments, while streets and roads, commercial, and public-government land uses made up the remainder of abutting development in 1960.

The only changes in abutting land uses occurred when there was a 0.52 acre change from unimproved to commercial and back to unimproved between 1960 and 1973. Another change occurred between 1965 and 1973 when one acre of unimproved and commercial property was developed as a single-family residence. The overall change in land use was an increase of one acre in single-family residential acreage, which is only 1.51%. The abutting area was classified as stable residential in 1960 and remained so throughout the 18 year period of analysis. Figure 7 illustrates the changes in abutting acreage over time by type of use.

Nonabutting properties. In 1960, over 88% of the 429 nonabutting acres were developed, and, of that improved acreage, approximately 74% was classified as single-family residential. Except for streets and roads, only 8% of the developed nonabutting properties were devoted to the five other improved land use categories (see Table 5).

The "before" period, 1960 through 1965, experienced the largest amount of land use change of the various time periods. Unimproved acreage decreased by almost 88%, while single-family residential and commercial acreage increased

Table 4. Abutting Land Uses and Land Use Changes by Time Periods

Land Use and Changes by Period	Before		Planning		Construction		After
	1960		1965		1973		1975		1978
Single Family Residential									
Total Acres	47.71		47.71		48.71		48.71		48.71
Absolute Change		0		+1.00		0		0	
Percent Change		0		+2.10		0		0	
Commercial									
Total Acres	2.50		3.02		2.50		2.50		2.50
Absolute Change		+0.52		-0.52		0		0	
Percent Change		+20.80		-17.22		0		0	
Public-Government									
Total Acres	3.00		3.00		3.00		3.00		3.00
Absolute Change		0		0		0		0	
Percent Change		0		0		0		0	
Streets and Roads									
Total Acres	10.95		10.95		10.95		10.95		10.95
Absolute Change		0		0		0		0	
Percent Change		0		0		0		0	
Unimproved									
Total Acres	2.00		1.48		1.00		1.00		1.00
Absolute Change		-.52		-.48		0		0	
Percent Change		-26.00		-32.43		0		0	
Total Abutting Acres	66.16		66.16		66.16		66.16		66.16

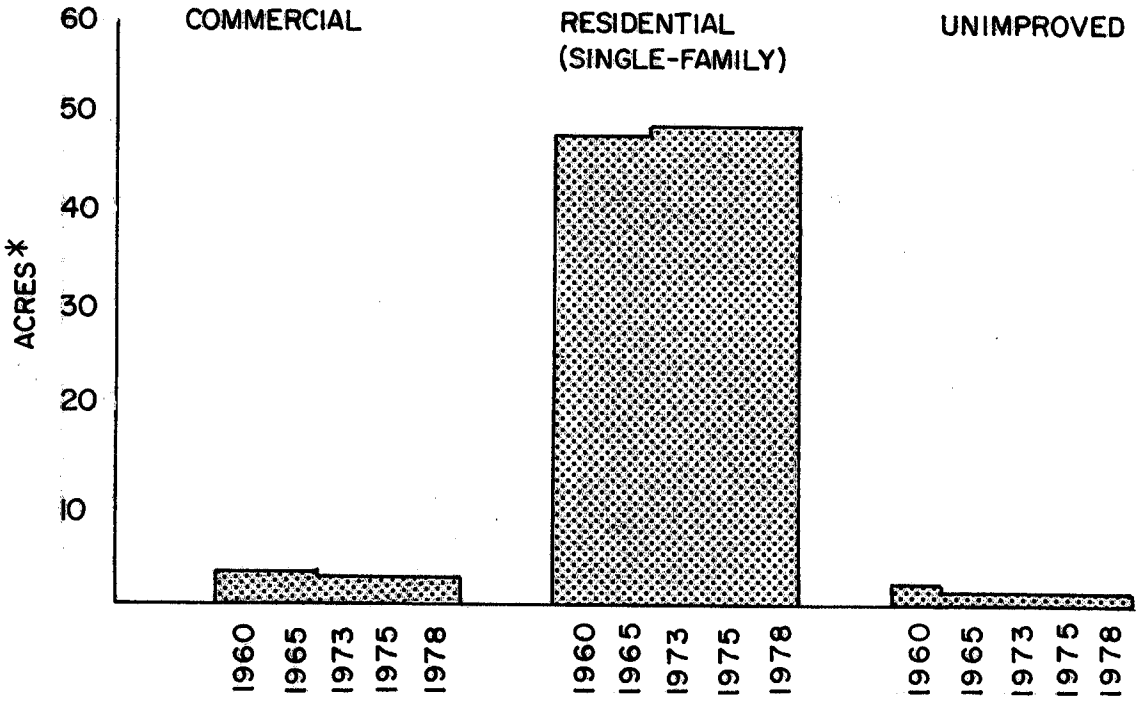

Figure 7. Changes in Abutting Land Uses in the West 43rd Avenue Study Area.

*One acre equals 0.4046856 hectares.

Table 5. Nonabutting Land Uses and Land Use Changes by Time Periods and Selected Years

Land Use and Changes by Periods	Before		Planning		Construction		After	
	1960		1965		1973		1975	1978
Single Family Residential								
Total Acres	278.76		319.39		317.30		322.10	323.04
Absolute Change		+40.63		-2.09		+4.80	+0.94	
Percent Change		+14.58		-0.65		+1.51	+0.29	
Multiple Family Residential								
Total Acres	3.87		3.87		3.87		3.87	4.28
Absolute Change		0		0		0	+0.41	
Percent Change		0		0		0	+10.59	
Commercial								
Total Acres	9.83		13.91		17.03		12.31	11.78
Absolute Change		+4.08		+3.12		-4.72	-0.53	
Percent Change		+41.51		+22.43		-27.72	-4.31	
Educational								
Total Acres	9.82		9.82		9.82		9.82	9.82
Absolute Change		0		0		0	0	
Percent Change		0		0		0	0	
Public-Government								
Total Acres	5.00		5.00		5.00		5.00	5.00
Absolute Change		0		0		0	0	
Percent Change		0		0		0	0	
Semi-Public Nonprofit								
Total Acres	3.85		3.55		3.55		3.55	3.55
Absolute Change		-0.30		0		0	0	
Percent Change		-7.79		0		0	0	
Streets and Roads								
Total Acres	67.94		67.94		67.94		67.94	67.94
Absolute Change		0		0		0	0	
Percent Change		0		0		0	0	
Unimproved								
Total Acres	49.77		5.36		4.33		4.25	3.43
Absolute Change		-44.41		-1.51		-0.08	-0.82	
Percent Change		-89.23		-25.86		-1.85	-19.29	
Total Nonabutting Acres	428.84		428.84		428.84		428.84	428.84

by 15% and 42%, respectively. The largest absolute change in acreage occurred when almost 41 acres of unimproved land were developed to single-family residential in a new subdivision in the Study Area.

During the years 1965 to 1978, the amount of nonabutting unimproved acreage continued to decrease while single-family residential acreage increased, but these changes were slight. Multiple-family residential acreage increased by about 11% between 1975 and 1978. The fluctuation of commercial acreage during each time period may be attributed to difficulties in determining the relative proportion of commercial-residential subdivision lots in certain parts of the Study Area. As in the abutting area, the nonabutting area continued to be described as stable residential acreage throughout the study period. Changes in nonabutting acreages by type of land use are charted in Figure 8.

Land Use Impediments

In an effort to investigate thoroughly the factors which could have influenced land use development, land use impediments were researched. Zoning, subdivision restrictions, and urban land use plans were investigated to determine whether the type of developments which took place were dictated by any of these factors. Other impediments such as regional land developments and public property ownership were also investigated.

Subdivision Restrictions

Houston is unique in that it is one of few large U.S. metropolitan areas that does not have a zoning ordinance to enforce land use controls. Instead of zoning, the only legal method of controlling land use is via subdivision or deed restrictions. Although subdivision restrictions have not been used extensively in the Houston area, the residents of the

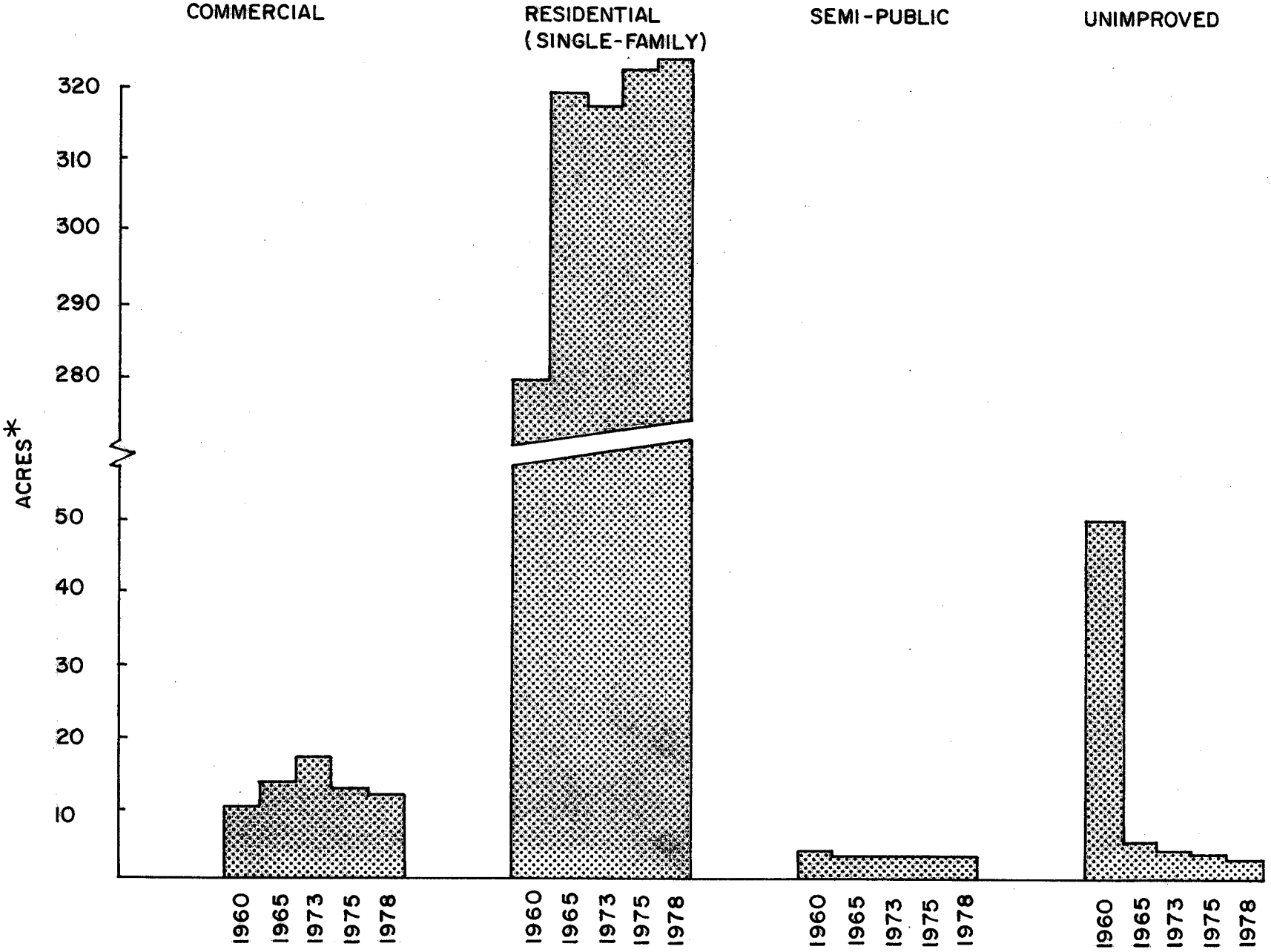

Figure 8. Changes in Nonabutting Land Use in the West 43rd Avenue Study Area.

*One acre equals 0.4046856 hectares.

West 43rd Avenue Study Area have been very effective in controlling land use in their residential subdivision. Over the past 20 years, land use changes have been avoided by enforcing deed restrictions by organized property owners living in the Study Area.

The local residents also exerted pressure on city officials to change the proposed design of the improvement of West 43rd from a four-lane street with raised median, curbs and gutters, and an 80-foot right-of-way to a four-lane facility with curbs and gutters on the existing 60-foot right-of-way. Although city traffic engineers opposed any change in the original design of the improvement project, the area's civic organizations applied pressure on city politicians and forced a change in the design of West 43rd Avenue.

Civic groups in the West 43rd Avenue Study Area have effectively influenced land use development and area street design improvements through enforcement of deed restrictions and application of political pressure. The actions of the local residents have definitely affected the impact of the improvement on land use changes.

Other Factors Influencing Land Use Change

Commercial development in the Study Area may have been influenced by the existence of a major shopping center immediately adjacent to the area's eastern border. The availability of commercial property in an existing shopping center probably caused developers to locate in the established center rather than trying to redevelop any property within the Study Area.

Land Use Controls And Plans

Houston does not have zoning laws and has no legal means of controlling land use. Perhaps the only way the city can control land use is through approving plats that are required for new developments or redevelopment in a manner which does not utilize the lots as previously approved. When approving proposed plats, the city has the authority to impose certain restrictions, e.g., location and number of access points to major thoroughfares, type and width of local streets, and the set-back distance of buildings from the street; but the city can not dictate the type of development. As previously stated, deed restrictions are the only legal method of controlling land use in Houston, and area property owners, not the city, must instigate the action to prevent a nonconforming land use.

Although Houston area land use planners have no enforcement power general or comprehensive land use plans have been formulated that reflect trends in land developments. A projected 1980 land use plan, published in 1960 by the Houston Metropolitan Area Transportation Study, forecasted that the Study Area would remain single-family residential. The Houston City Planning Department in the General Study Plan for 1990 done in 1972 projected that the West 43rd Study Area would be entirely low density residential. Other area land use plans were also investigated, and these plans agreed with the projection that the area would remain single-family residential.

These land use plans are predictions based on existing land use, land development trends, age of existing improvements, and amenities offered for various types of developments. Basically, the land use development in the Study Area has conformed with the various land use predictions.

The only exception seems to have been the joint commercial-residential and commercial developments that have occurred along the southern edge and north-eastern portions of the area. Perhaps the reason for these slight differences is that the land use plans are too general to account for block by block land uses. In general, the Houston area land use plans have been able to forecast land use development trends effectively.

Socio-economic Characteristics

The socio-economic characteristics of an area can have a significant impact on the region's general land use. Important factors such as median family income, educational level, and labor force characteristics were investigated to determine their possible significance to land use development in the West 43rd area.

In order to reveal any significant differences between the Study Area's characteristics and those of Houston, Harris County, and the eight-county SMSA (Standard Metropolitan Statistical Area), the 1970 census data were analyzed. Since Census Tract 519 encompasses the entire 495 acre Study Area, a comparative analysis may be implemented. Although census tract data are available for other years, the 1970 data are the most applicable to the area's project improvement dates.

As listed in Table 6, the median school years completed and the percent of high school graduates in Census Tract 519 were almost identical to those in Houston and the SMSA. The median family income of the census tract was approximately 11.8% higher than Houston's and some 8.3% higher than the SMSA's reported family income. The percentage of families below the poverty level was lower in Census Tract 519 than in the other three larger areas.

Table 6 . Comparison of 1970 Socio-Economic Characteristics of Census Tract 519 to Houston-Harris County

	Houston SMSA 8-County Area	Harris County	Houston	Census Tract 519
Population	1,985,031	1,741,912	1,232,793	13,602
Median School Years Completed	12.1	12.1	12.1	12.1
Percent High School Graduates	51.7	52.7	51.8	51.6
Median Family Income	$10,191	$10,348	$ 9,876	$11,038
Median Income of Families and Unrelated Individuals	$ 8,686	$ 8,742	$ 8,055	$ 9,935
Median Value Owner Occupied Residences	$14,500	$14,800	$14,400	$16,200
Median Rent Paid by Tenants	$ 93	$ 98	$96	$ 107
Percent Families Below Poverty Level	9.8	9.3	10.7	6.3
Occupations				
Total Employed, 16 Years +	797,421	711,749	515,619	5,924
Percent Professional, Technical, and Kindred Workers	16.50	16.88	16.53	16.34
Percent Managers and Administrators, except farm	8.79	8.87	8.78	9.37
Percent Sales Workers	8.35	8.71	8.97	12.46
Percent Clerical and Kindred Workers	18.80	19.54	20.09	21.57
Percent Craftsmen, Foremen, and Kindred Workers	15.15	14.57	13.10	16.85
Percent Operatives, except transport	10.01	9.64	9.29	7.82
Percent Transport Equipment Operatives	4.06	4.03	4.24	3.61
Percent Laborers, except farm	5.06	4.88	5.19	2.68
Percent Farm Workers	0.75	0.38	0.24	0.20
Percent Service Workers	10.45	10.47	11.14	7.65
Percent Private Household	2.09	2.03	2.09	1.45

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population and Housing: 1970 Census Tracts--Houston, Texas SMSA.

Reviewing labor force characteristics, Census Tract 519 contains a higher percentage of managers and administrative, sales, clerical, and craftsmen and foremen workers than each of the other areas. Further comparative analysis of the percentage breakdown reveals that a smaller percentage of operative, laborers, service, and private household workers characterize the census tract labor force. These differences in the labor force suggest that although the educational level of the population is similar in the other four areas, the higher income level and lower percent of families below the poverty level in Census Tract 519 may be explained by the higher percentage of workers employed in higher paid jobs during 1970.

IMPACT OF THE STREET IMPROVEMENT ON LAND USE IN THE STUDY AREA

In an attempt to reach a reasonable estimate as to the extent of the influence of the West 43rd Avenue improvement on land use in the Study Area, two approaches were utilized. The two types of data analyzed to indicate the probable impact were: (1) actual land use changes in the area by location, and (2) the opinions of knowledgeable people.

Actual Land Use Changes

During the time period from 1960 to 1978, only 47.34 acres (19.16 hectares) of the previously unimproved land was developed in the West 43rd Avenue Study Area (Table 3). There was no new acreage added to the 78.89 acres (31.93 hectares) of streets and roads which were in existence in 1960. Very little overall change in land use occurred in the area during the selected period.

Of the approximately 495 acres in the Study Area, 66.16 acres (26.77 hectares) are defined as property abutting the West 43rd improvement while the 428.84 acres (173.55 hectares) are designated as nonabutting property. During the 18-year study period, the abutting property experienced a slight increase of 1.5 percent in land development, and the nonabutting property experienced a 10.8 percent increase between 1960 and 1978. Of the increases in property development, about 50 percent of the abutting development and about 90 percent of the nonabutting development occurred before funding of the improvement.

These findings indicate that the street improvement's impact on both abutting and nonabutting property was minimal. Perhaps the major factor contributing to the minimal land use change, especially on abutting property, was the small amount of unimproved property available for development

Prior to the street improvement, only three percent of the abutting property and just 12 percent of the nonabutting property was still unimproved in 1960.

Other factors contributing to the small amount of land use change are: (1) the predominant land use--single-family residential, (2) the age and condition of the residences, and (3) the local residents active resistance to land use change. In 1960, about 74 percent of the developed Study Area land was single-family residences that were built in the late 1940's and 1950's and described as being in good condition. Also, considerable resistance to land use change was exhibited by local residents who controlled land use change and development through deed restrictions. The combination of these factors resulted in virtually no change in land use of abutting property and only a limited amount of change in nonabutting property.

Table 7 summarizes the percentage change in both the previously improved property and previously unimproved property by time period and location. There were a few changes in land use of previously improved property in both the abutting and nonabutting locations. Previously unimproved property percentage changes are also illustrated in Table 7. The greatest percentage change by location and time period occurred on nonabutting previously unimproved property between 1960 and 1965. This percentage change can be attributed to the completion of a new residential subdivision located in the Study Area.

Opinions of Knowledgeable People

Interviews were conducted with area real estate personnel and property owners along with city government officials in order to obtain relevant background data that would provide additional insight as to the significance

Table 7.. Percentage Change in Abutting and Nonabutting Acres by Period and Type of Land Use

Type of Land Use	Before Period 1960-1965		Planning Period 1965-1973		Construction Period 1973-1975		After Period 1975-1978	
	Abutting	Nonabutting	Abutting	Nonabutting	Abutting	Nonabutting	Abutting	Nonabutting
Previously Improved Land	0	0.53%	0.79%	0.72%	0	1.10%	0	0.53%
Yearly Rate of Change	0	0.11%	0.10%	0.09%	0	0.55%	0	0.18%
Previously Unimproved Land	0.79%	10.47%	0.72%	0.35%	0	0.02%	0	0.19%
Yearly Rate of Change	0.16%	2.10%	0.09%	0.04%	0	0.01%	0	0.06%
Total	0.79%	11.01%	1.51%	1.07%	0	1.12%	0	0.73%
Yearly Rate of Change	0.16%	2.20%	0.19%	0.13%	0	0.56%	0	0.24%

of the West 43rd improvement project on land use change and development in the Study Area. In general, the people interviewed felt that the project had very little effect on land use and development in the general area of West 43rd Avenue.

Property owners and real estate personnel indicated that adding lanes and providing a new concrete facility with a curb and gutter had improved access but had little or no effect on land use change and/or development. Reasons given most often for the small amount of change were the lack of available unimproved land and the predominant type of development (single-family residential) in the area. Other factors cited were the degree of commercial development along other nearby streets, the availability of unimproved land elsewhere in the general region, and the enforcement of subdivision restrictions by local civic groups.

The opinion of city planning officials was that the improvement had little or no effect on the area's land use. They felt that the area was a developed, stable residential portion of town that was basically resistant to extensive land use changes. Officials also stated that the improvement of West 43rd was accomplished to provide better access to and from the area residential subdivisions and to provide a major east-west thoroughfare for businessmen and residents in the northern portion of Houston.

The opinions of real estate personnel, property owners, and city officials agree with the findings of the land use analysis, i.e. the street improvement of West 43rd Avenue had very little impact on land use change and development in the Study Area.

CONCLUSIONS

The West 43rd Avenue Study Area has experienced very small amounts of land use change during the 1960 to 1978 period. The improvement of West 43rd between North Shepherd Drive east to Ella Boulevard from a two-lane, open ditch facility to a four-lane, undivided curb and gutter thoroughfare has had little impact on area land uses or development. The area's stage of development has remained developed and the predominant type of land use is still single-family residential. Considering the number of acres devoted to each land use category, very little change has occurred except for the unimproved category.

Abutting properties were virtually unaffected by the street improvement. Only 1.5 percent abutting acreage of land changed uses--from unimproved to single-family residential. The predominant abutting land use remained single-family residential. Only 10.8 percent of the nonabutting acreage changed uses over the 18-year study period. Most of such acreage changed from unimproved to single-family residential; and, therefore, the predominant land use has remained single-family residential.

Several important factors have contributed to the lack of land use change and development that has occurred in the Study Area relative to the street improvement. First, the most important factor was the lack of unimproved property available for development. Another factor was the predominant type of land use development in the Study Area--single-family residential--which causes resistance to extensive land use changes. Finally, unimproved lands and commercial developments that could be utilized by developers were available in close proximity to the Study Area.

In summary, the West 43rd Avenue improvement project has had little effect on land use change and development in the Study Area. Due to its predominant land use, quality of the buildings, and lack of unimproved property, the Study Area has little or no potential for extensive amounts of land use change or development in the foreseeable future.