HIGHWAY RESEARCH RECORD

Number 187

Transportation Impacts
and
Attitude Surveys

6 Reports

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Foreword

In attempting to forecast traffic patterns and highway usage, attitude surveys are being used as one indication of future highway use. This RECORD presents six papers dealing with attitude surveys and demographic impacts on highway usage.

The first paper, by Edmond L. Kanwit and Alma F. Eckartt, studies employment trends in large metropolitan areas during the past 15 years. It analyzes employment volume and proportion in the central city and suburbs. The paper shows the number of employees in manufacturing, selective services and wholesale and retail trade for the standard metropolitan census areas as a whole and by central city and ring. The study finds that employment trends in these four industries from the period of 1948 through 1963 showed generally a rapid growth in the suburbs and a rapid decline in employment in the central cities.

The second paper, by David K. Witheford, tends to substantiate the findings of the Kanwit-Eckartt paper and indicates that retail sales have shown a growth in suburban but not in downtown locations. Using the socioeconomic network data from the Niagara Frontier Transportation Study, the paper reports that gross family incomes total more in the shopping center market area than in the area within the same travel time from downtown. When highway improvements affecting the whole urban area are introduced, the relative advantage of the shopping center is enhanced.

H. Kirk Dansereau reports the results of four attitude surveys and four economic analyses pertaining to interchanges. Generally, attitudes toward planning and zoning were found to be favorable and were made even more so through exposure to literature favorable to those processes. Further, the economic analysis of actual and hypothetical data largely reveals beneficial highway impact.

The paper by Stuart L. Hill and Bamford Frankland examines the effect of freeway location on the configuration and continuity of a neighborhood. The research attempts to detect and measure the degree of population stability through a mobility index which is composed either from U.S. Census data or from city directories. The objective of the research is to test the validity of the mobility index as a describer of the socio-cultural processes of a neighborhood and to determine the effect of variations of freeway location on a neighborhood.

In his paper on living patterns and attitude surveys, Charles F. Barnes discusses the effectiveness of such surveys as a forecasting technique for use in planning. Three types of technique are evaluated. The survey investigated five areas of concern: (a) attitude toward housing, (b) attitude toward town, (c) attitude toward state, (d) leisure time and recreation, and (e) social characteristics of the respondent. The findings indicate that people from different

environments, even though within the same social strata, have different attitudes toward these five areas.

Margaret T. Shaffer points out that gaining citizen acceptance of highways is one of the most difficult problems for the highway administrator. In highway planning it is becoming increasingly apparent that social costs as well as construction costs must be taken into consideration in the location of highways. There are a variety of techniques currently available in the social science fields which could be utilized in determining community values. One of these is the use of projective tests. The paper advises that through the use of such projective tests, attitudes toward basic concepts within the community could be established.

The fact that there is increasing concern over measuring attitudes and general community values in consideration of highway planning is indicated by the fact that papers of this RECORD were sponsored by three departments: the Departments of Economics, Finance and Administration, Traffic and Operations and Urban Transportation Planning.

Contents

Transportation Implications of Employment Trends in Central Cities and Suburbs

EDMOND L. KANWIT and ALMA F. ECKARTT, U. S. Bureau of Public Roads

This paper reports the results of a study of employment trends in large metropolitan areas during the past fifteen years. It analyzes the volume and proportion of employment in the central city and suburbs, knowledge of which is necessary to forecast the degree of developing decentralization and to evaluate its highway implications.

The study conforms standard metropolitan statistical areas to a constant geographical area over time, according to the 1960 area definitions. Comparisons are drawn between types of employment derived from the Censuses of Business and Manufactures which are now becoming available from the 1963 Census. It shows in relative and absolute terms the number of employees in manufacturing, selected services, and whole-sale and retail trade for the SMSA as a whole and by central city and ring. The study includes all SMSA's with a population of 1 million or more in 1960.

The analysis of employment trends in these four industries, 1948-1963, shows rapid growth in the suburbs and progressive relative decline in employment in the central cities. Annexations to central cities complicate the analysis. Only a few central cities continue to report absolute increases in employment; most do not, a factor of major importance in transportation planning.

•IN the largest population concentrations of the United States—areas of 1 million inhabitants or more—almost 40 percent of the national population now live and work. In these urban agglomerations are the more intractable traffic problems, the only significant use of rail transit, and a tremendous variety of social, economic, financial, and political problems.

These complex urban areas consist of one or more central cities, secondary industrial and commercial centers, older suburbs of rising population density, and sprawling peripheral suburbs mainly of single-family detached homes. Almost without exception family income and automobile ownership rates are higher in the suburban ring than in the central cities, and dependence on the motor vehicle generally increases as the urban population extends outward from the central business district (CBD).

These urban areas have been changing steadily in structure for more than 40 years; both population and employment have been decentralizing; and despite repeated efforts to strengthen central cores in particular, and central cities in general, success has been limited. Growth of both suburban population and employment continues to be rapid, while relatively few large central cities are growing in either respect despite repeated annexations.

Employment has grown less rapidly than population during the postwar period, although rising rates of job holding and slowed population growth have brought the growth rates into close relation during the past several years.

United States urban growth is similar to the world phenomenon, but it possesses some distinctive characteristics. The ubiquity of the motor vehicle in the United States has produced a suburban role more substantial than in other countries. Almost universal dependence on the motor vehicle characterizes peripheral rural land and ex-urban and suburban areas where the heaviest growth rates are taking place. The Washington SMSA, for example, has a substantial belt around the area whose population increased more than 200 percent in a single decade.

Population growth is closely connected with economic growth; indeed, one without the other is hardly possible in the wage and salary-dependent United States. The intensive population and economic growth which has characterized this nation since its formation is altering its urban structure rather fundamentally because of the mobility provided by the motor vehicle, and this evolution is a dynamic process. The changes have not been limited to the United States, but they are more advanced here and probably indicate the direction that developments will take on a worldwide basis, modified by local planned policy and distinctive cultural preference.

RAPID GROWTH OF LARGE SMSA'S CONTINUES

Not only is the rate of population growth more rapid in metropolitan areas than outside, but a steadily increasing proportion of the population lives in metropolitan areas of 1 million or more inhabitants. Between April 1, 1960 and July 1, 1965, it is estimated by the Census that five additional metropolitan areas passed the 1 million mark: Anaheim-Santa Ana-Garden Grove, Calif.; Denver, Colo.; Miami, Fla.; San Bernardino-Riverside-Ontario, Calif.; and New Orleans, La. In addition, the Indianapolis, San Jose, Tampa-St. Petersburg, and Phoenix areas have passed, or are now close to, the 1 million mark (assuming continuation of their growth rates between 1960 and 1965).[1] By mid-1965, more than 72 million Americans lived in the metropolitan areas with more than 1 million people in 1960; this represents 37 percent of the total, in contrast to 61.6 million which comprised 34 percent of the population in 1960. The new areas would increase the proportion to about 40 percent.

Table 1 gives the proportion of the population and employment in the central city, and by implication outside for the 24 SMSA's which had 1 million population in 1960. The period covered extends over the years from 1948 to 1963, the same period for which employment in manufacturing, retail and wholesale trade, and selected services was studied from the Censuses of Manufactures and Business. The definitions for the areas conform to those of the 1960 Census. The areas used are consistent, but no estimates of the effect on employment of annexation to central cities has been made.

During the 15-yr period under study, population in the central cities declined from 61 percent of the metropolitan areas in 1948 to 48 percent in 1963 (Table 2), and the proportionate drop in employment was from 72 percent to 58 percent. In fact, the trend in decentralization between 1958 and 1963 appears to have accelerated somewhat in these four selected industries (Fig. 1).

EMPLOYMENT TRENDS

Figure 2 shows that in these four industries, which normally include about two-thirds of the BLS nonagricultural total (excluding fisheries, mining, construction, transportation, communication, finance, insurance, real estate, professional and public administration), central-city employment has remained on a plateau while the entire gain has been concentrated in the suburban areas and smaller cities outside the metropolitan centers. In these suburban areas, despite successive losses through central city annexations, which have been quite significant in many areas, employment

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[1]Omitted were sections of the consolidated New York and Chicago areas in New Jersey and Indiana.

TABLE 1

PROPORTION OF POPULATION AND EMPLOYMENT IN CENTRAL CITIES OF THE 24 LARGEST SMSA'S[a]
(1960 Definitions)

Central City	Pop. (%)		Employ. (%)[b]		Pop. Change 1948-63 (%)	Employ. Change 1948-63 (%)
	1948	1963	1948	1963		
New York, N. Y.	84	72	91	80	-12	-11
Los Angeles-Long Beach, Calif.	53	41	58	42	-12	-16
Chicago, Ill.	71	54	81	62	-17	-19
Philadelphia, Pa.-N. J.	57	45	66	53	-12	-13
Detroit, Mich.	63	42	67	49	-21	-18
San Francisco-Oakland, Calif.	57	37	70	52	-20	-18
Boston, Mass.	34	25	48	36	-9	-12
Pittsburgh, Pa.	31	24	37	34	-7	-3
St. Louis, Mo.-Ill.	52	33	72	52	-19	-20
Washington, D. C.-Md.-Va.	59	35	82	53	-24	-29
Cleveland, Ohio	64	48	84	61	-16	-23
Baltimore, Md.	70	52	77	61	-18	-16
Newark, N. J.	31	22	45	32	-9	-13
Minneapolis-St. Paul, Minn.	75	50	88	71	-25	-17
Buffalo, N. Y.	55	39	57	42	-16	-15
Houston, Tex.	73	75	82	85	+2	+3
Milwaukee, Wis.	68	63	77	66	-5	-11
Paterson-Clifton-Passaic, N. J.	31	23	52	31	-8	-21
Seattle, Wash.	57	48	81	68	-9	-13
Dallas, Tex.	57	64	84	78	-7	-6
Cincinnati, Ohio	57	46	75	57	-11	-18
Kansas City, Mo.-Kan.	57	49	72	62	-8	-10
San Diego, Calif.	63	57	81	70	-6	-11
Atlanta, Ga.	49	46	80	66	-3	-14
Average	61	48	72	58	-13	-14

[a]Sources: adapted from data in the U.S. Department of Commerce, Bureau of the Census, Censuses of Population 1950 and 1960, and Current Population Reports, Series P-25, No. 330; data for central cities, 1963, from Sales Management, Survey of Buying Power, 1964; Censuses of Business and Manufactures, 1947-1948, and 1963.
[b]Employment as represented by all employees in manufacturing, retail and wholesale trade and employees and proprietors in selected services.

TABLE 2

POPULATION FOR CENTRAL CITIES OF THE 24 LARGEST SMSA'S AND PROPORTION OF
SMSA POPULATION IN THE CENTRAL CITY[a]

Central City	Population (thousands)			Proportion of SMSA Population in the Central Cities (%)	
	1950	1960	1963	1948	1963
New York, N. Y.	7,892	7,782	7,932	84	72
Los Angeles-Long Beach, Calif.	2,221	2,823	3,039	53	41
Chicago, Ill.	3,621	3,550	3,534	71	54
Philadelphia, Pa.-N. J.	2,072	2,003	2,039	57	45
Detroit, Mich.	1,849	1,670	1,614	63	42
San Francisco-Oakland, Calif.	1,160	1,108	1,117	57	37
Boston, Mass.	801	697	660	34	25
Pittsburgh, Pa.	677	604	578	31	24
St. Louis, Mo.-Ill.	857	750	708	52	33
Washington, D.C.-Md.-Va.	802	764	792	59	35
Cleveland, Ohio	915	876	870	64	48
Baltimore, Md.	950	939	936	70	52
Newark, N. J.	439	405	392	31	22
Minneapolis-St. Paul, Minn.	833	796	787	75	50
Buffalo, N. Y.	580	533	516	55	39
Houston, Tex.	596	938	1,056	73	75
Milwaukee, Wis.	637	741	765	68	63
Paterson-Clifton-Passaic, N. J.	262	280	287	31	23
Seattle, Wash.	468	557	567	57	48
Dallas, Tex.	434	680	781	57	64
Cincinnati, Ohio	504	503	500	57	46
Kansas City, Mo.-Kan.	457	475	532	57	49
San Diego, Calif.	334	573	639	63	57
Atlanta, Ga.	331	487	510	49	46
Total	29,692	30,534	31,152		
Average				61	48

[a]Sources: U.S. Department of Commerce, Bureau of the Census, Censuses of Population 1950 and 1960, and Current Population Report, Series P-25, No. 330; data for central cities 1963 from Sales Management, Survey of Buying Power, 1964.
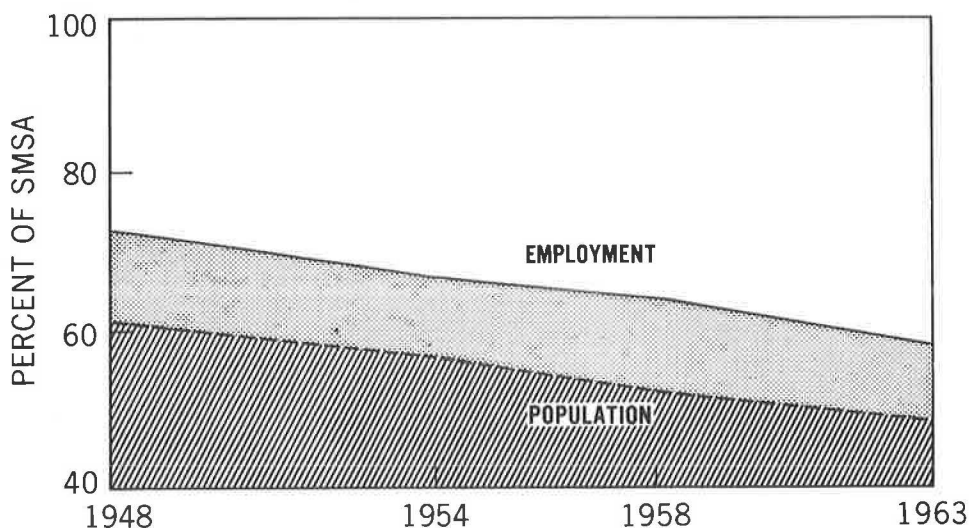
Figure 1. Percent of population and employment for selected industries.

has increased in 15 years by more than 2,500,000. The employment mix of the central cities has also changed considerably. Many specialized services not covered by census—government at all levels and many central office functions—have continued to add employment, while manufacturing, wholesale and retail trade, and the selected services covered by census have barely held their own level.

New York, Philadelphia, Boston, Los Angeles-Long Beach, San Francisco-Oakland, Washington, Chicago, Detroit, and Cincinnati show the same basic pattern of greater increase in the suburbs (Figs. 3, 4, and 5). In Los Angeles and Washington slight increases have also taken place in the central cities. There is some variation in trend from census to census. In Philadelphia, Cincinnati and Boston, for example, the central cities have lost employment steadily.
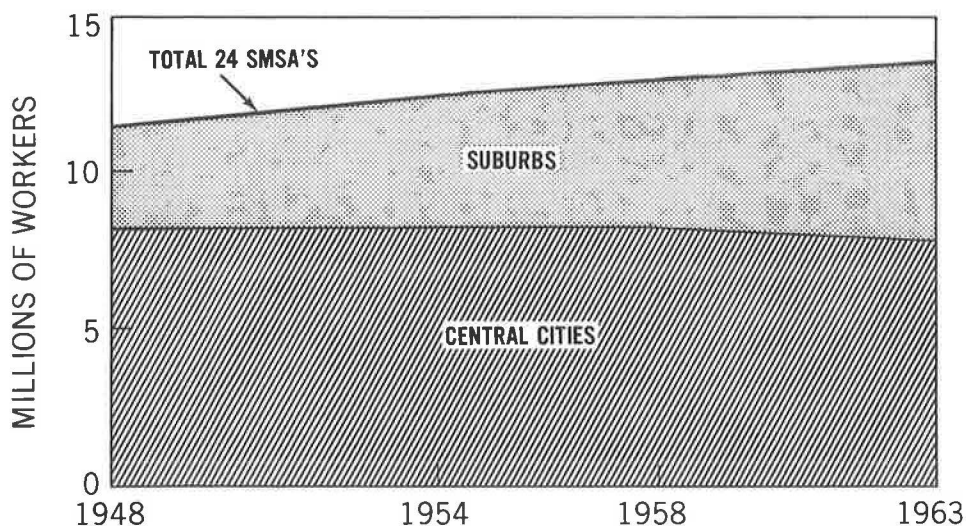
Figure 2. Number of workers in selected industries.
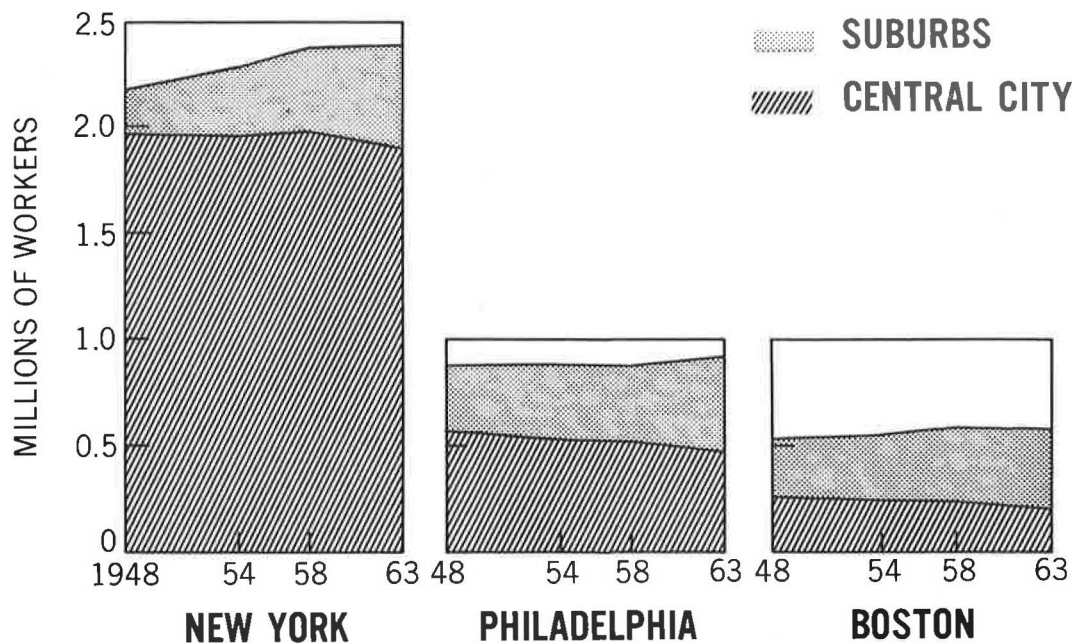
Figure 3. Employment in metropolitan areas.

The central city of Detroit shows some slackening in the rate of loss after 1958. The Detroit area as a whole, however, shows a gain in the most recent period, reflecting advances in the automotive industries after a preceding decline.
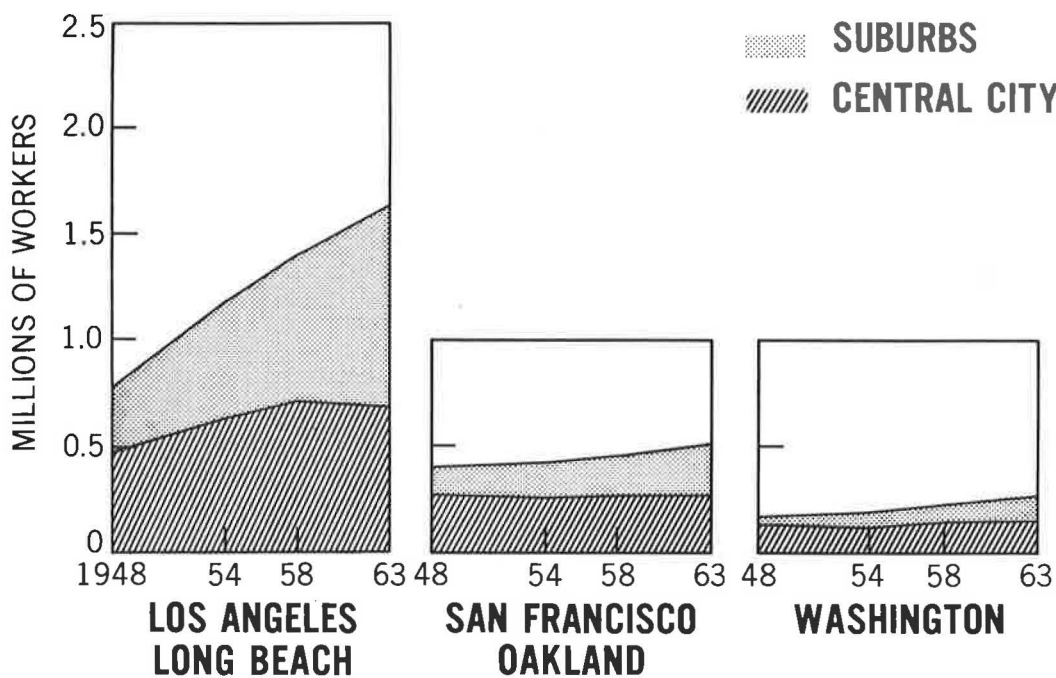
Figure 4. Employment in metropolitan areas.
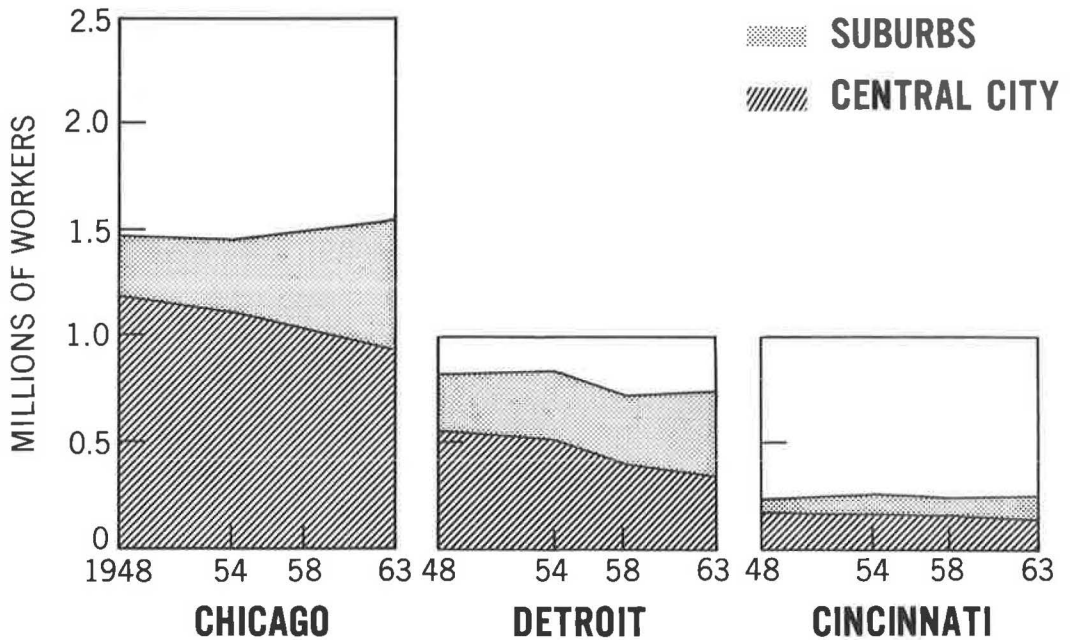
Figure 5. Employment in metropolitan areas.

The proportion of area employment in the central cities declined in the four industries studied (Fig. 6). Wholesale trade dropped from 90 percent to 72 percent from 1948 to 1963; retail trade from 74 percent to 55 percent; selected services from 80 percent to 67 percent; and manufacturing from 67 percent to about 53 percent.

Over the whole period the sharpest declines, therefore, have taken place in distribution; both wholesale and retail trade have dropped sharply and consistently over the entire period. The service industries covered by census, however, have continued to
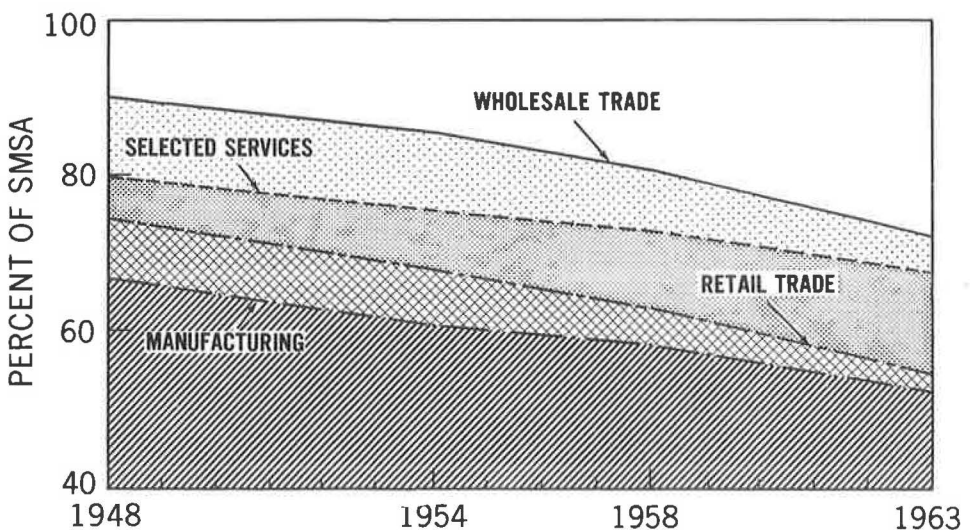
Figure 6. Percent of employment in central cities by industry.

show relatively more strength in their central city locations, and by 1963 were only a little less decentralized than retail trade. There is little doubt that gradual completion of Interstate highway networks, including circumferential belts, has played an important part in the steady decentralization of wholesale trade activity.

WHOLESALE TRADE EMPLOYMENT

In New York City, the major center of wholesale activity, wholesale trade dropped from 96 percent of the area's total to 87 percent. In the Los Angeles area, the pattern was different. An increase in wholesale trade of 24 percent in the city in contrast to the 6 percent New York City loss was insufficient to prevent the proportion in Los Angeles and Long Beach from falling from 75 percent to 55 percent of the SMSA total. Outside wholesaling activity more than tripled during the period. In fact, the percentage increases in wholesaling in suburban locations from small beginnings in 1948 exceeded 245 percent for the 24 areas as a whole and exceeded 400 percent in Cleveland, Atlanta, Paterson, Minneapolis-St. Paul, and Chicago. For the first time wholesaling became a major activity in suburban locations in 1958 and the growth since that time has accelerated. With this development, dependence on over-the-road trucking has greatly increased. Wholesalers in the suburbs employed almost 4 out of every 10 employees in 1963 in contrast to only 1 of 10 in 1948.

RETAIL EMPLOYMENT

Retail trade has been an important element of growth in large United States metropolitan areas accounting for an increase of over 550,000 in employment. Within the central cities, however, retail trade has fallen steadily in number of jobs—a loss of over 11 percent over the entire period. While retail trade was losing 230,000 workers over the 15-yr period, suburban locations doubled their retail employment, which jumped from 710,000 to 1,492,000. Those areas showing the largest proportional losses in retail trade in central cities were: Detroit, 37 percent; Pittsburgh, 34 percent; St. Louis, 34 percent; Cleveland, 32 percent; and Buffalo, 33 percent. Their losses were much greater than the loss in residential population.

A few central cities gained, such as Houston, San Diego, and Los Angeles. These gains generally reflected substantial annexations. High rates of retail trade increase in the suburbs characterized Washington, 249 percent; Baltimore, 238 percent; Minneapolis-St. Paul, 334 percent; and San Diego, 254 percent. As might be expected, these rapid rates of increase occurred in the areas which experienced the most rapid increases in population. The correlation between retail trade and residential shifts is very high.

INCREASE IN SERVICE EMPLOYMENT IN BOTH CENTRAL CITY AND SUBURBS

The picture regarding selected services covered by census[2] is similar in direction but less pronounced because specialized service activities remained strong in the

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[2]Kinds of business covered: of the 14 major groups of services, defined in the Standard Industrial Classification (SIC) Manual as establishments primarily engaged in rendering a wide variety of services to individuals and business establishments, seven are included in the 1963 Census of Business essentially in their entirety, as follows:

70. Hotels, rooming houses, camps, and other lodging places, except SIC industries 702, "rooming and boarding houses," and 704, "organization hotels and lodging houses, on membership basis."

72. Personal services.

73. Miscellaneous business services.

75. Automobile repair, automobile, services, and garages.

76. Miscellaneous repair services.

78. Motion pictures.

central cities. The service industries as a whole added about 701,000 employees; 311,000 in the central cities, a growth of 31 percent; and 390,000 in the suburbs, a gain of 155 percent. Service activities in suburban Washington jumped from 6,000 to 29,000, representing the largest relative gain of any area. The District of Columbia also added a little more than 10,000 workers to the service industries covered. Other large gains in suburban service activities of 200 percent or more occurred in Cleveland, Baltimore, Minneapolis-St. Paul, San Diego and Los Angeles-Long Beach.

The gain in service activities in the cities of Los Angeles-Long Beach was noteworthy; employment jumped from 69,000 to 134,000. Service activities in New York City also showed considerable strength, adding about 85,000 or 29 percent, which was more than twice the 13 percent relative gain shown in Chicago. Service gains in the central cities were weak in Detroit (4 percent), St. Louis (8 percent), Cleveland (5 percent), and Cincinnati (only 4 percent). Only one central city, Buffalo, actually reported a decline in service employment.

TREND IN MANUFACTURING

Manufacturing activity accounted for 6.1 million jobs in the 24 areas in 1947; the total was up in 1954 as a result of the impact of the Korean War, declined in 1958, and then increased slightly to 6.6 million in 1963.

The total for the central cities, however, continued to decrease in 1963; after adjustment for central office employees, the proportion continued to fall as previously indicated. Generally, the older central cities have lost heavily since 1948 in manufacturing employment—heavily enough to offset their suburban gains.

After adjustment, 15 central cities lost employment in manufacturing over the 15-yr period ranging from almost 194,000 in Chicago, about 153,000 in Detroit, and over 100,000 in New York City to under 20,000 in San Francisco-Oakland, Baltimore, Paterson-Clifton-Passaic and Milwaukee. A slight increase occurred in Washington where manufacturing is relatively unimportant. After adjustment for the 24 cities, as a whole, it is estimated that a gain of over 1,000,000 in manufacturing occurred in suburban locations and a loss in the neighborhood of 578,000 occurred in the central cities since 1948.

REGIONAL GROWTH PATTERNS

Table 3 indicates the pronounced difference in the rates of population growth which have occurred regionally in the United States since 1948. For the United States, as a whole, 10 of the 24 largest metropolitan areas have experienced slow growth—under 10 percent; 6, moderate growth—between 10 percent and 30 percent; and 8, relatively fast growth of at least 30 percent. Six of the areas of slow growth were located in the North Central states and four in the Northeast. None were in the West or South. Of

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79. Amusement and recreation services, except motion pictures. Symphony orchestras, ballet and opera companies, and similar services organized on a nonprofit basis are included. However, establishments in this group which are operated to provide recreation facilities for their own members and which are exempt from payment of Federal income tax under the provisions of Sec. 501 of the Internal Revenue Code are not included.

The following major groups of services defined in the SIC Manual are not included in the 1963 Census of Business:

80. Medical and other health services (except 8072, "dental laboratories").
81. Legal services.
82. Educational services.
84. Museums, art galleries, and botanical and zoological gardens.
86. Nonprofit membership organizations.
88. Private households.
89. Miscellaneous services.

TABLE 3

NUMBER OF SMSA'S, 1 MILLION POPULATION OR MORE, BY
POPULATION AND EMPLOYMENT GROWTH GROUPS,
U.S. AND BY REGION, 1948-1963[a]

Industry	Number of Areas by Growth Group			
	Slow Under 10%	Moderate 10-29.9%	Fast 30% and Over	All
(a) United States				
Manufacturing	13	2	9	24
Retail trade	8	8	8	24
Wholesale trade	4	10	10	24
Selected services	0	4	20	24
Total, 4 industries	10	6	8	24
Population	1	9	14	24
(b) Northeast				
Manufacturing	6	0	1	7
Retail trade	1	4	1	7
Wholesale trade	3	2	2	7
Selected services	0	1	6	7
Total, 4 industries	4	2	1	7
Population	1	5	1	7
(c) South				
Manufacturing	1	0	4	5
Retail trade	0	1	4	5
Wholesale trade	0	1	4	5
Selected services	0	1	4	5
Total, 4 industries	0	1	4	5
Population	0	0	5	5
(d) North Central				
Manufacturing	6	1	1	8
Retail trade	6	2	0	8
Wholesale trade	1	6	1	8
Selected services	0	2	6	8
Total, 4 industries	6	2	0	8
Population	0	4	4	8
(e) West				
Manufacturing	0	1	3	4
Retail trade	0	1	3	4
Wholesale trade	0	1	3	4
Selected services	0	0	4	4
Total, 4 industries	0	1	3	4
Population	0	0	4	4

[a]Sources: adapted from U.S. Bureau of the Census: Censuses of Business and
Manufactures, 1947-1948 and 1963; Census of Population, 1940, 1950, and 1960
and Current Population Report, Series P-25, No. 330.

the nine rapidly growing areas only one was located in the Northeast, none in the North Central region, four were in the South and three in the West. Of the nine metropolitan areas in the South and West, only two were areas of moderate growth; and seven were areas of rapid growth. The moderate growth areas were Baltimore and San Francisco-Oakland.

Viewed from another standpoint, employment in the four selected industries increased by 12 percent in the Northeast and by 7 percent in the North Central region, in contrast to a 52 percent gain in the South and a 79 percent gain in the West. The one area of rapid growth in the Northeast, Paterson-Clifton-Passaic, must be considered as a portion of the rapidly growing greater New York periphery. Buffalo and Pittsburgh suffered overall declines in employment. In the South the only area of moderate growth, Baltimore, is essentially a border area. In the North Central states the Min-

neapolis-St. Paul and Kansas City, Mo., areas showed moderate growth rates of 25 and 23 percent. All other areas were areas of slow growth except Detroit and Pittsburgh which lost growth in the four industries over the period. The most rapidly growing large areas (Tables 4 and 5) were as follows: San Diego (130 percent); Dallas (93 percent); Atlanta (67 percent); Houston (66.6 percent); and Washington (64.4 percent).

HOW INDICATIVE ARE THE FOUR INDUSTRIES OF TOTAL EMPLOYMENT?

It may be argued that the four industries are not typical of the employment trend. Analysis of the four industries for 22 of the 24 areas was compared with total nonagricultural employment for 1958 through 1963. Both the BLS four-industry total and the nonagricultural total increased at about the same rate: 8.0 percent for the four industries and 8.3 percent for the total. The census series, however, indicated a 4 percent gain. The difference was largely attributable to the broader coverage of the service industries in the BLS series which indicated almost 3.6 million employees in contrast to only 1.9 million in the census series for the 22 areas including 300,000 proprietors.

According to County Business Patterns, U.S. service industries SIC groups 80 through 89 not covered by Census added more than 500,000 workers between 1959 and

TABLE 4

EMPLOYMENT IN SELECTED INDUSTRIES FOR 24 LARGE SMSA'S AND NUMBER AND PERCENT CHANGE, 1948-1963

(Manufacturing, Retail Trade, Wholesale Trade, and Selected Services By Census Regions)[a]

Census Region	SMSA	Number (thousands)		Change	
		1947-1948	1963	Number	Percent
Northeast	New York, N. Y.	2,162.6	2,379.3	216.7	10.0
	Philadelphia, Pa.-N. J.	861.2	911.5	50.3	5.8
	Boston, Mass.	521.3	564.3	43.0	8.2
	Pittsburgh, Pa.	532.7	428.2	-104.5	-19.6
	Newark, N. J.	353.6	405.4	51.8	14.6
	Paterson-Clifton-Passaic, N. J.	184.9	286.2	101.3	54.8
	Buffalo, N. Y.	282.1	270.7	-11.4	-4.0
	Total	4,898.4	5,245.6	347.2	7.1
South	Baltimore, Md.	308.3	353.9	45.6	14.8
	Washington, D. C.-Md.-Va.	165.2	272.0	106.8	64.6
	Dallas, Tex.	131.6	254.4	122.8	93.3
	Houston, Tex.	143.9	239.7	95.8	66.6
	Atlanta, Ga.	136.4	227.6	91.2	66.9
	Total	885.4	1,347.6	462.2	52.2
North Central	Chicago, Ill.	1,477.1	1,533.2	56.1	3.8
	Detroit, Mich.	831.1	743.7	-87.4	-10.5
	Cleveland, Ohio	426.4	438.2	11.8	2.8
	St. Louis, Mo.-Ill.	432.6	440.3	7.7	1.8
	Minneapolis-St. Paul, Minn.	261.1	326.0	64.9	24.9
	Milwaukee, Wis.	282.6	299.0	16.4	5.8
	Cincinnati, Ohio-Ky.	232.2	244.6	12.4	5.3
	Kansas City, Mo.-Kan.	188.7	232.7	44.0	23.3
	Total	4,131.8	4,257.7	125.9	3.0
West	Los Angeles-Long Beach, Calif.	795.8	1,637.8	842.0	105.8
	San Francisco-Oakland, Calif.	401.2	501.6	100.4	25.0
	Seattle, Wash.	145.0	234.8	89.8	61.9
	San Diego, Calif.	62.4	143.7	81.3	130.3
	Total	1,404.4	2,517.9	1,113.5	79.3
	Total 24 SMSA's	11,320.0	13,368.8	2,048.8	18.1

[a]Source: U.S. Bureau of the Census, Censuses of Business and Manufactures 1947-48 and 1963. SMSA's are conformed to 1960 definitions.

TABLE 5

EMPLOYMENT IN 24 LARGE[a] SMSA'S BY SLOW, MODERATE, AND FAST-GROWING
CENSUS REGIONS FOR SELECTED INDUSTRIES[b] (1948 to 1963)

Slow (under 10%)	Moderate (10 to 29.9%)	Fast (30% and over)
(a) Northeast Region		
Philadelphia, Pa.-N. J. Pittsburgh, Pa. Buffalo, N. Y. Boston, Mass.	New York, N. Y. Newark, N. J.	Paterson-Clifton-Passaic, N. J.
(b) South Region		
None	Baltimore, Md.	Washington, D. C.-Md.-Va. Atlanta, Ga. Dallas, Tex. Houston, Tex.
(c) North Central Region		
Chicago, Ill. Detroit, Mich. Cleveland, Ohio Milwaukee, Wis. Cincinnati, Ohio-Ky. St. Louis, Mo.-Ill.	Kansas City, Mo.-Kan. Minneapolis-St. Paul, Minn.	None
(d) West Region		
None	San Francisco-Oakland, Calif.	Los Angeles-Long Beach, Calif. Seattle, Wash. San Diego, Calif.

[a]SMSA's over 1 million as defined in 1960.
[b]Source: adapted from the U.S. Bureau of the Census, Censuses of Business and Manufactures, 1948 and 1963.
Selected industries: manufacturing, retail trade, wholesale trade, and selected services.

1962 while census-reported industries added slightly over 300,000 in a similar United States base. These industries, therefore, were some element of strength in critical city employment but not enough to change the picture importantly. Longer-term comparisons cannot be made because of changes in OASI coverage.

Another source of central city strength were central office employees in manufacturing which tended to grow more rapidly than plant workers. BLS includes them and added 148,000 workers in manufacturing in contrast to the census increase of 59,000, excluding their administrative workers in the 22 areas. Adding them would have added about 60 additional workers and made the two series comparable. Striking differences in the distribution between central city and suburban central office employment occur, although about three-fifths of these workers are employed in the central cities. These workers were important, comprising 10 percent or more of all manufacturing workers in the following areas: Detroit, 14.5 percent; Pittsburgh, 12.9 percent; Newark, 10.3 percent; and New York, 9.9 percent.

More than 80 percent of these were employed in the central cities in New York and Pittsburgh, and more than 80 percent were in suburban Detroit and Newark. Thus, central office operations might be a factor in strengthening in some central cities but not in all. The character of manufacturing in the central city would have to be investigated.

In conclusion, the data may be considered indicative of continued long-range relative weakness of employment in large central cities, overstating the weakness largely because of non-reporting of certain service activities such as health, legal and educational services, and nonprofit organizations.

The effect of government would also vary. Regional centers of federal employment and state capitals such as Boston and Atlanta would have particular central city strength in state government employment. Of course, Washington is nontypical with its high

proportion of federal government workers, but state and local government tendencies to locate in central cities are largely offset by rapid growth of public school teachers in rapidly growing suburban areas.

WHAT OF THE CBD?

Unfortunately, the census does not process trend data on employment in the CBD. An indication of trends may be found in the Census of Business which reports retail sales in the CBD, a subject outside the scope of this paper. Studies of the role of the CBD, however, have shown a steady diminution of the relative importance of the retail business over the period in question. McMillan (1) showed for central cities between 1954 and 1958 a slight increase in the dollar volume of retail sales and a decrease in physical volume when the dollar volume is adjusted to allow for price increases and the entire increase in physical volume was located in the areas outside the central cities. Individual cities had varied experiences; for example, Atlanta and Nashville gained while Detroit and Flint lost heavily. Establishment sales data reflected a high mortality rate downtown in smaller metropolitan areas.

According to McMillan, the population shift was not the only factor responsible for the change; superior purchasing power, and increased mobility of the population because of the increased availability of automobiles must also be taken into consideration. In the years ahead, a more equitable income distribution among the population may arrest the trend of sales toward the suburbs but, inasmuch as most persons who can afford it apparently prefer suburban living, this trend must not be taken for granted. Despite efforts to resuscitate transit in the largest areas, it appears likely that in the future greater reliance will be placed on the family car or cars.

CBD's are not likely to attain their former dominant position, but they may be able at least to decelerate their losses. Factors which may aid this process include urban renewal, large luxury apartments, growing suburban congestion, and reaction to lengthening commuting trips. The success of downtown retailers will depend on a combination of private and public actions which are likely to bring varying results in different areas.

PROJECTIONS OF THE COMPREHENSIVE TRANSPORTATION STUDIES

Concerned with the future of the CBD, we reviewed the forecasts of 30 available comprehensive transportation surveys. These studies, with target year projections varying from 1975 through 1990, were generally centered on 1980. They indicated an increase of approximately 500,000 workers in all industries in the CBD, however defined, over approximately a 20-yr forecast period, a small absolute gain but a decline in relative importance. Only 5 of the 30 areas reviewed expect any gain in the relative position of the CBD in relation to the study area. However, only 3 areas actually expected absolute decreases. In general, the 30 areas anticipated a 3 percent period decline in the relative position of the CBD employment. It is clear that if these predictions prove correct considerable strengthening in CBD projections from the trends presented in this paper will have to take place. As previously indicated, the factors operating in both directions are strong, and it is likely that public policy will play a major role in determining the correctness of these forecasts (Table 6).

TRANSPORTATION IMPLICATIONS

Both the postwar employment trend in major metropolitan areas and the data from the transportation surveys portend, in general, a heavy increase in work travel in the suburbs and a relatively small increase in travel toward the CBD and central cities. Nevertheless, continuation of the trend toward private automotive travel would further increase the central city congestion.

As Meyer, Kain and Wohl have demonstrated (2), there is no reason to believe that the existence of a good transit system will delay the process of decentralization. Quite

TABLE 6

FORECAST TREND IN CBD EMPLOYMENT ACCORDING TO URBAN TRANSPORTATION STUDIES[a]

Study Area and Size Group[b]	Base Year	Workers in Study Area	Workers in CBD		Target Year	Workers in Study Area	Workers in CBD		Change in CBD	
			Percent	Number			Percent	Number	Percentage Points	Number
Over 1,000,000										
Los Angeles, Calif.	1961	3,046,975	4	130,000[c]	1980	4,706,759	6	282,407	+2	+152,407
Chicago, Ill.	1956	2,140,000	14	299,600	1980	3,250,000	8	260,000	-6	-39,600
Baltimore, Md.	1962	602,111	13	78,274	1980	833,603	11	91,696	-2	+13,422
Washington, D. C.	1955	736,000	43	316,480	1975	913,500	39	356,265	-4	+39,785
Houston, Tex.	1960	409,930	29	118,880	1980	797,000	25	199,250	-4	+80,370
Seattle, Wash.	1961	463,386	17	78,776	1985	795,911	18	143,264	+1	+64,488
Total		7,398,402	14	1,022,010		11,296,773	12	1,332,882	-2	+310,872
500,000 to 1,000,000										
Kansas City, Mo.	1957	340,052	19	64,610	1980	465,000	18	83,700	-1	+19,090
New Orleans, La.	1960	320,770	42	134,723	1980	502,889	32	160,924	-10	+26,201
Denver, Colo.	1959	254,000	22	55,880	1980	496,500	22	109,230	0	+53,350
Hartford, Conn.	1960	258,880	11	28,476	1990	517,645	8	41,411	-3	12,935
Total		1,173,702	24	283,689		1,982,034	20	395,265	-4	+111,576
250,000 to 500,000										
Nashville, Tenn.	1959	161,126	21	33,836	1980	214,576	19	40,769	-2	+6,933
Albuquerque, N. M.	1962	100,000	9	9,000	1985	300,000	1	3,000	-8	-6,000
El Paso, Tex.	1958	91,316	15	13,697	1980	149,500	14	20,930	-1	+7,233
Knoxville, Tenn.	1962	89,146	21	18,721	1982	117,598	22	25,871	+1	+7,150
Total		441,588	17	75,254		781,674	12	90,570	-4	126,892
100,000 to 250,000										
Tucson, Ariz.	1960	67,350	14	9,429	1980	203,000	7	14,210	-7	+4,781
Chattanooga, Tenn.	1960	96,981	17	16,487	1980	138,638	12	16,636	-5	+149
Austin, Tex.	1962	91,100	24	21,864	1982	174,400	24	41,856	0	+19,992
Waterbury, Conn.	1962	67,360	17	11,451	1990	97,672	12	11,720	-5	+269
Erie, Pa.	1962	64,987	16	10,398	1990	100,000	14	14,000	-2	+3,602
Madison, Wis.	1962	67,326	18	12,119	1985	137,919	22	30,342	+4	+18,223
Portland, Me.	1963	55,097	18	9,917	1985	64,996	13	8,449	-5	-1,468
Lexington, Ky.	1961	40,315	24	9,676	1980	76,670	13	9,967	-11	+291
Topeka, Kan.	1958	45,600	37	16,872	1980	73,291	35	25,651	-2	+8,779
Springfield, Mo.	1961	40,956	28	11,468	1980	75,785	22	16,673	-6	+5,205
Total		637,072	20	129,681		1,142,371	17	189,504	-3	59,823
Under 100,000										
St. Joseph, Mo.	1962	30,804	33	10,165	1982	36,731	31	11,386	-2	+1,221
Sioux Falls, S. D.	1963	28,863	27	7,793	1985	48,954	23	11,259	-4	+3,466
Great Falls, Mont.	1961	25,400	26	6,604	1981	37,500	25	9,375	-1	+2,771
Joplin, Mo.	1960	14,628	28	4,096	1980	17,209	28	4,818	0	+722
Pittsburg, Kan.	1961	6,400	33	2,112	1980	8,060	36	2,902	+3	+790
Gainesville, Fla.	1960	12,762	23	2,935	1980	16,886	26	4,390	+3	+1,455
Total		118,857	28	33,705		165,340	27	44,130	-1	+10,425
Grand Total		9,769,621	16	1,544,339		15,368,192	13	2,052,351	-3	508,012

[a]Source: Office of Planning—Urban Transportation Studies.
[b]Ranked by population in the study area in the base year.
[c]Estimates from Parking in City Center, Wilbur Smith and Associates.

the reverse, the areas with the best transit appear to have experienced the most rapid losses in their central cities with the possible exception of New York (4).

However, in the future the heaviest increases in traffic are likely to occur in the older suburbs where highway planners have generally been unable to keep pace with demand. A survey of satellite communities in the Washington-Baltimore region, for example, indicates bumper-to-bumper traffic in far-out Prince William County (Va.) along US 1 in the Woodbridge area. Commuters have been experiencing difficulty in getting through densely populated suburbs such as Silver Spring and Bethesda, Md., and Seven Corners, Arlington, and Alexandria, Va., for some time.

The extent to which satellite cities such as Columbia, Md., and Reston, Va., may provide relief by providing jobs close to residence remains to be demonstrated. The growing interest in the satellite city concept by large American corporations such as General Electric, Goodyear, and Humble Oil, to mention a few, may represent a major new development, but it is still far too early to hazard an educated guess. The devel-

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opment will bear watching, especially in the rapidly growing Los Angeles and Washington areas.

In any case, it appears likely that both downtown and suburban traffic will increase, and over-concentration on the problems of either area would be a mistake. At the present time, observed trends indicate that perhaps further attention to the rapidly mounting traffic problem of the suburbs is the priority problem.[3]

REFERENCES

1. McMillan, Samuel C. Recent Trends in the Decentralization of Retail Trade. Traffic Quarterly, June 1962.
2. Meyer, J. R., Kain, J. F., and Wohl, M. The Urban Transportation Problem. Harvard Univ. Press, Cambridge, Mass., pp. 47-54, 1965.

[3]The original manuscript of this paper included an Appendix containing detailed statistics concerning the 24 largest SMSA's (Appendix Tables 2-6). Copies may be obtained from the Highway Research Board at cost of reproduction and handling—Supplement XS-9 (Highway Research Record 187), approximately 10 pages.

Highway Impacts on Downtown and Suburban Shopping

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Growth in urban area retail sales occurs in suburban but not in downtown locations, according to most recent surveys. This study, developed from NCHRP research into travel characteristics associated with shopping centers, airports, and manufacturing plants, was aimed at assessing the role played by highways, if any, in this development.

The characteristics of market areas within a fixed travel time from a hypothetical CBD and shopping center are compared. Then it is assumed that urban area-wide highway improvements take place, bringing about an increase in average travel speeds and thus enlarging the market areas accessible within the same travel time as before. A test case, using socioeconomic and network data from the Niagara Frontier Transportation Study, was used to demonstrate the conclusions of these hypothetical cases. For values of travel time coincident with a typical market area boundary for the shopping center, it was found that gross family incomes totaled more in the shopping center market area than in the area within the same travel time from downtown. When highway improvements affecting the whole urban area are introduced, the relative advantage of the shopping center is enhanced.

Implications with respect to downtown redevelopment activities are briefly discussed. The condition described is likely to have its greatest impact where the traditional community retail center is not truly central but somewhat removed from the present and future centroids of urban population and income.

●STUDIES in most metropolitan areas show that retail sales growth in recent years has occurred primarily in suburban fringes while downtown sales have remained static or have declined. The reason, of course, is the shopping center development that has taken place with suburban population expansion. The fivefold increase in listings between 1957 and 1965 in the Directory of Shopping Centers is one measure of this development. The preface to the 1965 edition notes that "There will be many new advances in the new shopping centers. . . in almost every way conceivable, shopping centers will transplant all of the services and activities of the central city core to the new centers of population in the suburbs." Whether or not this transplanting will happen, it seems that the effect of urban highway programs will inevitably assist rather than hinder the dispersion of core area activities. The purpose here is to test this conclusion, first with a hypothetical example and then with a case study of one shopping center in Buffalo, N. Y. It is hoped that the evidence may stimulate further fact-finding concerning other suburban retail examples and other activities subject to similar influences.

Easier parking, more pleasing environments, and greater accessibility to potential customers have all contributed to the success of shopping centers. Weighing the importance of each factor is difficult, but some of the values accruing from urban highway programs were investigated in recent research. Land use-travel pattern relationships for shopping centers were studied in a research project (1) which used data from urban transportation studies. One of the studies represented was the Niagara Frontier Transportation Study, whose data on network travel times and socioeconomic characteristics were employed to analyze the actual situation presented here.

HYPOTHETICAL CASE

Demonstration of a theoretical situation requires certain assumptions about metropolitan area development. In the following case, residential densities are assumed to decline regularly with increasing distance from the core, and highway travel speeds to increase correspondingly. This is a normal pattern, as high-rise apartments and low-income high-density housing give way to garden apartments and single-family homes with succeeding distance from downtown. Because of increasing highway speeds, lines connecting points of equal travel time to a shopping center enclose an area of different size and shape from the circle described by the same time line around the CBD. The use of travel time rather than distance is essential because of the varying speeds which create this size and shape variation. Research has shown that shopping-center trip-generation rates at the residential origin zones are more sensitive to time than distance. Figure 1a shows the large eggshaped area circumscribed around the shopping center by a line connecting points of equal travel time, compared to the smaller circle around the CBD for the same time value. Inasmuch as the two areas touch, the time value shown is half the travel time between the shopping center and downtown. The area shapes, however, are valid for other time values.

Within the larger suburban area surrounding the shopping center, it is likely that the population typically possesses not only greater income per capita, but, because higher income families show higher levels of car ownership, also more mobility. Thus, even though population density is lower, the purchasing power within reach of the center may equal or exceed that of the area surrounding the CBD.
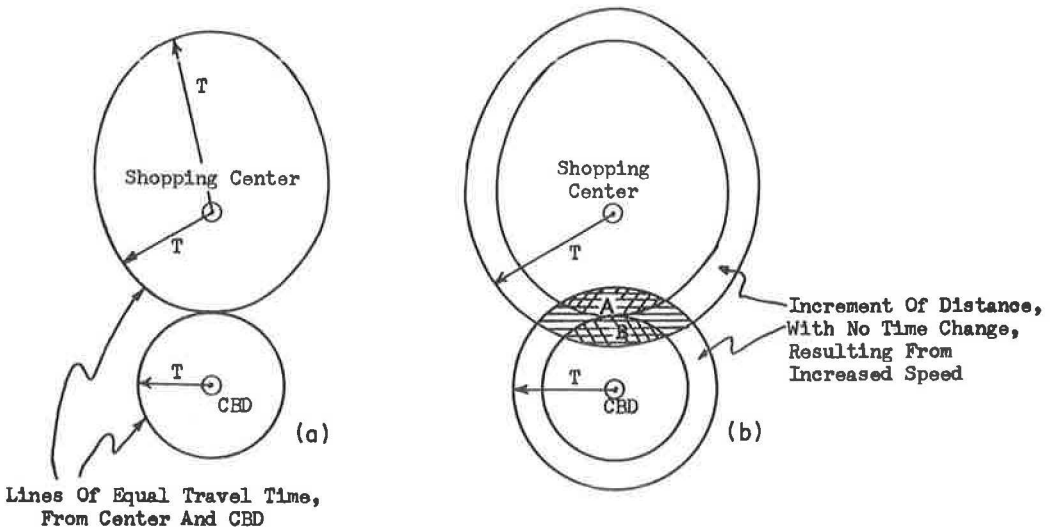

Figure 1. Influence of highway improvements on CBD and shopping center market areas: (a) lines of equal travel time; and (b) increment of distance, showing market area overlap resulting from a uniform speed increase (area A denotes penetration of original shopping center market area, within time T, by CBD; area B is that portion of original CBD market area now reached from shopping center).

Figure 1b shows the effect of highway improvements on the two market areas. A band of uniform width, added to each area, represents the increase in market areas within the same travel time resulting from uniform numerical increase in travel speeds. Such a result might be achieved by an urban freeway network, or even by improved traffic operations on a major arterial street system. For example, a uniform increase of 5 mph would add a bandwidth of 1 mi to each area if the selected travel time value were 12 min. Such a gain, of probably 10 to 15 percent in suburban speeds and 30 to 40 percent in core area speeds, represents a possible goal for urban highway system planning. Its impact, therefore, is worth examination.

First, the increment added to the shopping center market area is much larger than that added to the downtown market area. Even allowing for lower densities, it is still quite likely that the incremental accessible purchasing power is greater for the shopping center. Second, there is now an area of market overlap within the travel time that previously established abutting areas. The proportion of the original shopping center market area now within reach of the CBD is smaller than the proportion of the original CBD market area now within reach of the shopping center. This may also be true in terms of purchasing power. If so, the shopping center has benefited more from the newly created shared market area than has the downtown. In other words, at the given travel time, the downtown now has a greater proportion of its market area penetrable by competition than the shopping center. Therefore, uniform improvement in highway speeds not only improves on the initial area advantage of the shopping center, but also enhances its power to attract shoppers from market areas shared with the CBD. This is extremely significant, because typical shopping center travel patterns show generally that more than half the trips to shopping centers originate in areas lying between the shopping center and the CBD.

Where the CBD is off-center in the urban area, the typical shopping center position is even more strongly bolstered by highway improvement. Many cities fall into this non-central category: for example, port, lake and river cities, such as Boston, Chicago, Cleveland and Memphis; cities with topographic and other developmental restrictions, such as Pittsburgh and Tucson; and many state-line communities where taxation or other public policy differentials frequently produce uneven development patterns. In such instances, the centroids of present population are removed from the historic and traditional focal points of the community. Even where population distribution may be more uniform, such as in many Midwestern cities, the distribution of total income may result in purchasing power centroids not coincident with the CBD's. Shopping centers, located with judicious regard to such development patterns, cannot help but benefit more than the CBD from generalized highway improvement programs.

ACTUAL CASE

Examination of a Buffalo, N. Y., shopping center demonstrates the locational advantage of one shopping center in that community. Area characteristics germane to the problem are first, that the CBD is located virtually on a waterfront, with the result that surrounding development encompasses only about 200 deg instead of a full 360 deg, and second, that the selected shopping center is less than 1 mi from an interchange of the New York Thruway, which in this area is toll-free for many short trips.

Data on households, income, and travel times were made available by the New
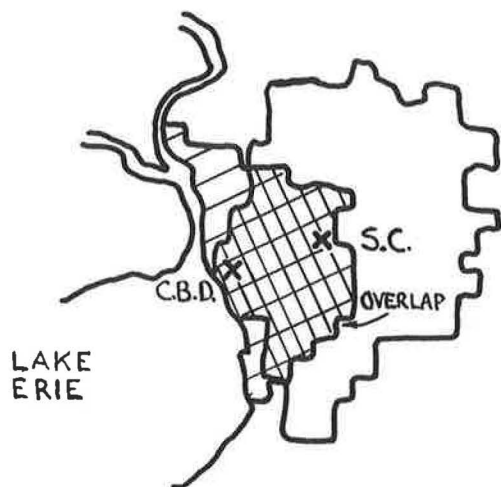
Figure 2. Market areas within 14 min from CBD and shopping center, Buffalo, N. Y.

Time Increment (min)	Family Income ($ million)				Cumulative Difference
	CBD		Center		
	Income	Cumulative	Income	Cumulative	
0-2	37.4	37.4	34.1	34.1	-3.1
2-4	80.5	117.9	74.4	108.5	-8.4
4-6	136.0	253.9	196.1	304.6	50.7
6-8	132.0	385.9	179.9	484.5	98.6
8-10	192.8	578.7	276.9	761.4	182.7
10-12	232.9	811.6	251.7	1013.1	201.5
12-14	265.9	1077.5	315.4	1328.5	251.5

York State Department of Public Works, from the files of the Niagara Frontier Transportation Study, for this and other use (1). In the present evaluation, survey zone household and income data were arrayed by minutes of travel time from both downtown Buffalo and the shopping center, the travel times being obtained from computer-built "trees" based on the 1961 highway network. In the following tables, time increments are carried to a 14-min maximum, which accounts for about 75 percent of the tripmaking to the center, and which, because it represents completely unrestricted flow, is equivalent to at least 20 min normal over-the-road trip and terminal time. This limiting time value defines an approximate but reasonable boundary to the prime market area of the center.

Figure 2 shows the areas within 14 min of both the shopping center and downtown. The most significant characteristic is that most of the downtown area is also within 14 min of the shopping center. Only a very small area is not. However, the shared market area represents less than one-third of the total shopping center market area. The total family income reported by 2-min time groups within each area is given in Table 1. Except for the two initial time bands, the center consistently leads. Generally, the center can tap almost 25 percent more income than the CBD within their respective areas designated in Figure 2.

Differences between the two market areas are evident when incomes are stratified by level. Table 2 gives the accumulative number of households with over $5,000 and $8,000 income for both market areas. There are 23 percent more families with over $5,000 income, and 77 percent more with over $8,000 in the shopping market area. In either income group comparison, the shopping center has an edge at every time increment. Car ownership, the best indicator of mobility, follows a similar pattern. There are 29 percent more cars within 14 min of the shopping center.

Within the overlapping trade areas (Fig. 2) are 21,570 households with over $5,000 income. This represents 24.2 percent of the downtown market area share, but only 19.6 percent of the shopping center's market area households with $5,000 income. The total income in the overlap area is $821 million, or 76 percent of the downtown

Time Accumulation	No. of Households, Over $5,000 Income		No. of Households, Over $8,000 Income	
	CBD	Center	CBD	Center
0-2	2,120	3,125	673	695
2-4	7,096	10,419	1,676	3,045
4-6	18,412	26,878	8,230	9,990
6-8	30,158	41,819	11,542	16,034
8-10	45,614	63,555	16,222	24,643
10-12	64,554	83,012	23,599	32,468
12-14	89,140	109,992	24,629	43,616

TABLE 3
EXPANDED MARKET AREA CHARACTERISTICS

Item	CBD	Center
Increment characteristics:		
Added households with over $5,000 income	22,468	24,796
Added total income ($ million)	248.4	288.9
Added income in overlap increment ($ million)	206.2	220.9
Added income in non-overlap increment ($ million)	42.2	68.0
Overall characteristics:		
Total non-overlapping area income ($ million)	77.9	369.4
Percent of income within total non-overlapping area	5.9	32.8
Total income in new 14-min area	1325.9	1617.4
Total households with over $5,000 income	111,608	134,788

total, and 62 percent of the shopping center total. Thus, a greater part of the downtown market area income can be tapped by the shopping center within 14 min than that of the shopping center from downtown.

What happens if a 1-mi band is added to each of the two market areas? If the travel time to the new periphery remains at 14 min, this is roughly equivalent to the effect of a uniform increase in urban travel speeds of 4 mph—not an unrealistic benefit of a completed transportation plan. Table 3 summarizes the result.

The shopping center has not only added more households and more income to its market area than downtown, it has also added more income in the non-overlapping areas. Adding the mile-wide bands considerably increased the shared market area, the income of which increased from $821 to $1,248 million. This means a change from 76 to 94 percent of the downtown market area being shared with the center, but from only 62 to 77 percent of the center market area being shared with downtown.

The tendency for the gap between center and downtown purchasing potentials to widen cannot continue indefinitely. The outer boundaries of the shopping center market area reach the rural boundaries of urban development before those of downtown. But the disparity between cumulative income totals in Table 1 increased with increasing time values, and the tendency continued at least through the addition of the mile-wide band to each market area. And this despite the fact that the incremental speed gain proportionally aided downtown speeds more than those of the suburbs. There is no question, in this instance, that general highway improvements strengthened the position of the shopping center more than that of downtown.

OTHER CONSIDERATIONS

There are, obviously, many other influences affecting suburban and downtown shopping and the relative balance between them. Downtown shopping has been treated here as if market areas within relatively short travel times were the only consideration. Downtown shopping trips by office workers and nonresident visitors (tourists and convention-goers) are unaffected by such considerations. Downtown generally has the benefit of a transport mode not available to the shopping center. For example, Pittsburgh's Golden Triangle drew 18,000 daily shoppers by transit in 1958 compared to only 8,000 as auto drivers and passengers.

However, shopping centers usually locate in growing market areas, and stand to gain more from upward trends in real family income. More income means more cars owned, and more cars owned means growing pressure for highway improvements. Furthermore, the effect of different merchandising policies and practices, such as telephone and mail-order shopping, suburban discount store developments, and changing trends in shopping center size, clearly cannot be evaluated here. These may very much outweigh the impact of highway improvement programs.

SIGNIFICANCE OF THE HIGHWAY IMPACT

The indication that urban highway improvements do more for suburban than for downtown shopping, even though biased to favor downtown speeds, may not be new. However, demonstrated measures of the effect may be. As suburban growth can be related in part to rises in family income, so can pressures for highway improvements. Both developments strengthen the competitive position of the shopping center with respect to downtown.

Redevelopment schemes or other improvements to downtown, consequently, must significantly overshadow the shopping center improvements being designed to entice downtown services and facilities out to the suburbs. Improvements must be made not only in CBD facilities but also in the means of getting there. Inasmuch as even downtown-oriented highway improvements tend to favor the shopping centers, it is easy to conclude that transit is the answer, especially when statistics such as "70 percent of downtown shoppers use transit" can be cited. Undoubtedly, downtown merchants' associations and similar organizations see transit as a beneficial factor in maintaining or stimulating their economic health. But the characteristics of transit shoppers need to be checked to see if they represent significant buying power. To use the Pittsburgh example again, less than 1 out of 8 shopping trips went to the CBD, and transit was not the favored mode when all urban area shopping trips were considered. Improved CBD attractiveness must, therefore, overcome both the lesser attractiveness of the transit mode and the advantage given to shopping centers by highway improvements.

Finally, where growing urban development is tending to shift population and income centroids away from the traditional commercial center of the community, it may be wise to consider a public policy of redirecting development patterns rather than merely propping up the old center as a countermeasure. Uniformity of development by direction from the CBD may provide more hope for continued downtown vitality than massive revitalization of a location no longer in the mainstream of retail accessibility. Awareness of such factors, and of the total effect of improved transportation on retail activities, should be part of all studies aimed at preserving the existing values and functions of central business areas.

REFERENCE

1. Keefer, Louis E. Urban Travel Patterns for Airports, Shopping Centers, and Industrial Plants. NCHRP Report 24, Highway Research Board, 1966.

Highway Development:
Attitudes and Economic Climate

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The paper presents some recent findings of the highway impact research conducted at the Pennsylvania State University. The broader research aims at the prediction of economic development, the design of alternative land-use plans for highway protection, and the determination of factors conducive to adoption of protective measures at interchange sites. Some earlier findings are summarized as a background for reporting the results of four attitude studies and four economic analyses pertaining to interchanges.

Generally, attitudes toward planning and zoning were found to have been favorable and made even more so through exposure to literature favorable to those processes. Further, the economic analyses of actual and hypothetical data largely reveal beneficial highway impact. It is suggested that these latter findings are important to any interpretation of the attitudes found favorable both toward highway development and toward the practices of planning and zoning which could lead to highway protection.

There is brief comment on the researchers' continuing efforts to assess the effectiveness of simulated land-use models and to determine community willingness to adopt reasonable land-use control. The paper concludes with an expression of continual need for mutual understanding as the academician and sponsor cooperate in applied research.

•FOR some time, the highway impact research staff of Pennsylvania State University's Institute for Research on Land and Water Resources has been engaged in a three-pronged approach to the study of highway-community relationships. The facets involve efforts to predict economic development at selected interchanges, to design alternative land-use plans for interchange protection, and to determine the factors conducive to community adoption of reasonable protective regulation. Toward this last end, attitude study appears useful; it assumes that citizen acceptance of local highway changes is related to acceptance of rational controls and ultimately to implementation of the necessary protective practices. Three types of attitude study have been undertaken: (a) attitudes toward local highway developments; (b) attitudes toward planning and zoning practices; and (c) attitude change toward both developments and practices.

It is recognized, however, that attitudes are not self-created, nor do they stand alone. They are largely the product of the combined effects of history, frequently recent history, and of the present setting in which they are found. The focus of this paper is on attitudes and on some of the economic considerations which have probably influenced the findings of the attitude research. The economic analyses are also of three types: (a) land use and land value, (b) predictors of interchange development, and (c) economic impact of interchange development. The evidence presented is drawn from more

than a dozen papers and reports prepared by the highway impact research staff within the past four years.

ATTITUDE STUDIES

The research staff began its gathering of attitude data in late 1958 and continued to do so for the next six years.

Highway Related Attitudes

First analysis of these data was a two community comparison (1), followed by comparison of attitudes reported in six communities (2). These studies also treated intracommunity attitudes as reported by two samples, one of community leaders and the other of "rank-and-file" citizens. Subsequently, follow-up interviews were conducted in four interchange areas, thus providing some opportunity for a look at attitude change through time (3).

The findings may be summarized as follows. Generally, highway change took place in a relatively favorable atmosphere. Whether the change was one of highway widening, bypass, or interchange construction, majorities expressed approval. Many who stated that they had not approved at the time of the construction later reported satisfaction. Most felt that the construction had been beneficial, that the amount of money spent had been "about right, " and that the location of the change had been reasonable. The average citizen was quite in accord with the opinions expressed by the community leader.

Concurrent research revealed something of the characteristics of the local users of the new highway facilities (4). Among other variables, occupation, income, and education were found to be postively related to degree of highway use. New arrivals in the study communities ranked somewhat higher on these variables and were also somewhat more likely to use the new facilities. Moreover, along with population increase, community social stratification ranking related to the actual adoption of certain practices which could lead to interchange protection. With this knowledge, the researchers were able, for the first time, to select a research site in which interchange construction was not already a fait accompli. It was here that systematic study of attitudes toward rational controls was initiated.

Attitudes Toward Planning and Zoning

In all, four specific recent studies have dealt with attitudes toward planning and zoning. The attempt was to determine the receptivity of the community to land-use control for highway protection and, further, to learn whether attitudes toward control are influenced by exposure to the planner's literature.

One effort was carried on in two interchange townships, one of which, Farmville Township (a pseudonym), had recently voted down zoning controls. The other, Pleasant Township (also a pseudonym), was actively considering the formation of a planning commission. The researchers sought within these contexts to delve more thoroughly into attitudes toward control of land use and their relationship to socioeconomic status as measured by occupation and education.

Another survey concerning planning and zoning was conducted with the cooperation of 84 elected officials in 15 townships and 7 boroughs widely distributed throughout the State. It was felt that, since leadership attitudes had been found not to differ appreciably from those of other citizens, perhaps direct approach to formal leaders could be an adequate indicator of community sentiment. The latter idea is no doubt more questionable in larger civil divisions.

The other two investigations attempted the use of standard experimental design to assess the impact of planning literature on attitudes toward adoption of land-use controls. Each experiment sought to assess the respondents' evaluations of planning and zoning mechanisms and to elicit from the individuals how they would be likely to act if confronted with planning and zoning proposals. In each case the materials used were provided by the State Planning Board (5, 16). The last study expressly questioned whether initially unfavorable attitudes would be influenced by a rather detailed presentation of the consequences of unregulated community growth.

TABLE 1

PLEASANT AND FARMVILLE TOWNSHIPS—STATED DEGREE OF NECESSITY FOR
COMMUNITY PLANNING BY EDUCATIONAL LEVEL[a]

Degree of Necessity	Percentage									
	Educational Level Pleasant Township						Educational Level Farmville Township			
	1&2	3	4	5	6&7	All	1&2	4&5	6&7	All
Highly necessary	100	88	68	67	53	71	50	50	32	39
Somewhat necessary		12	23	18	16	16	50	50	38	44
Neither necessary nor unnecessary				6	5	3			12	7
Unnecessary			5	9		4			12	7
Do not know			3		5	2				
No response			1		21	4			6	3
Total	100	100	100	100	100	100	100	100	100	100

[a]Data derived from Ref. 6, p. 29.

TABLE 2

PLEASANT AND FARMVILLE TOWNSHIPS—STATED DEGREE OF NECESSITY FOR
ZONING ORDINANCES BY EDUCATIONAL LEVEL[a]

Degree of Necessity	Percentage									
	Educational Level Pleasant Township						Educational Level Farmville Township			
	1&2	3	4	5	6&7	All[b]	1&2	4&5	6&7	All[c]
Highly necessary	88	75	63	57	37	61	50	20	6	15
Somewhat necessary	6	13	30	21	21	22	50	20	6	15
Neither necessary nor unncessary					11	2			19	10
Unnecessary		13	8	15	16	10		60	69	61
Do not know					11	2				
No response	6			7	5	3				
Total	100	101	101	100	101	100	100	100	100	101

[a]Data derived from Ref. 6, p. 29.
[b]N = 116 person-responses.
[c]N = 28 person-responses.

TABLE 3

OPINIONS TOWARD GOVERNMENT PARTICIPATION
IN DECISIONS AFFECTING GROWTH[a]

Response Categories	Township Leaders		Borough Leaders		All Leaders	
	No.	Percent	No.	Percent	No.	Percent
Agree	44	83.0	29	93.6	73	86.9
Neutral	4	7.5	1	3.2	5	5.9
Disagree	5	9.5	0	0.0	5	5.9
No response	0	0.0	1	3.2	1	1.3
Total	53	100.0	31	100.0	84	100.0

[a]Data derived from Ref. 7, p. 8.

TABLE 4

OPINIONS TOWARD THE NECESSITY OF COMMUNITY PLANNING[a]

Response Categories	Township Leaders		Borough Leaders		All Leaders	
	No.	Percent	No.	Percent	No.	Percent
Necessary	49	92.6	30	96.8	79	94.0
Neutral	1	1.8	0	0.0	1	1.2
Unnecessary	2	3.8	1	3.2	3	3.6
No response	1	1.8	0	0.0	1	1.2
Total	53	100.0	31	100.0	84	100.0

[a]Data derived from Ref. 7, pp. 10 and 11.

TABLE 5

OPINIONS TOWARD NECESSITY OF ZONING ORDINANCES[a]

Response Categories	Township Leaders		Borough Leaders		All Leaders	
	No.	Percent	No.	Percent	No.	Percent
Necessary	46	86.8	29	93.5	75	89.3
Neutral	2	3.8	0	0.0	2	2.4
Unnecessary	5	9.4	2	6.5	7	8.3
Total	53	100.0	31	100.0	84	100.0

[a]Data derived from Ref. 7, pp. 10 and 11.

TABLE 6

REPORTED PUBLIC EXPRESSION OF OPINIONS ON PLANNING

Response Categories	Township Leaders		Borough Leaders		All Leaders	
	No.	Percent	No.	Percent	No.	Percent
Favorable	14	26.4	15	48.4	29	34.5
No public expression	37	69.8	16	51.6	53	63.1
Unfavorable	1	1.9	0	0.0	1	1.2
No response	1	1.9	0	0.0	1	1.2
Total	53	100.0	31	100.0	84	100.0

TABLE 7

REPORTED PUBLIC EXPRESSION OF OPINION FOR OR AGAINST
ESTABLISHMENT OF ZONING COMMISSION

Response Categories	Township Leaders		Borough Leaders		All Leaders	
	No.	Percent	No.	Percent	No.	Percent
Favorable	23	43.4	19	61.3	42	50.0
No public expression	29	54.7	11	35.5	40	47.6
Unfavorable	1	1.9	1	3.2	2	2.4
Total	53	100.0	31	100.0	84	100.0

TABLE 8

MEAN SCORES ON THE EVALUATIVE INDEX BEFORE AND AFTER
EXPOSURE TO BOOKLET—EXPERIMENTAL VS CONTROL GROUPS[a]

Group	Mean Index Scores[b]		Significant Difference Within Each Group
	T_1	T_2	
Experimental group	24.09	27.38	Yes $\left(\begin{array}{l} t = 3.48 \\ p < 0.01 \end{array} \right)$
Control group	24.20	23.15	No
Significant difference between the groups	No	Yes $\left(\begin{array}{l} t = 3.67 \\ p < 0.01 \end{array} \right)$	

[a] Data derived from Ref. 8, p. 22.
[b] T_1 = measurement before reading A New Front Door for Your Community (16).
T_2 = measurement after reading A New Front Door for Your Community (16).

There is little question of the positive relationship between socioeconomic status and attitudes toward planning and zoning. Tables 1 and 2 indicate, respectively, the positive relationship between amount of education and a feeling that planning and zoning are necessary to orderly community growth. The findings for occupational level differ very little. Citizens on the whole expressed more favor for "planning" than for "zoning." Persons of higher socioeconomic level appear to have shown relatively less fear for loss of individual liberty in face of such practices. Feeling against government participation in guiding community growth was especially widespread in Farmville Township where zoning had recently been voted down. Sixty-three percent of the responses were that such involvement was "likely to result in an improper restriction of individual rights and liberties." The percentage was twice that found for Pleasant Township (6, p. 37). The study of borough and township officials indicates, as one could readily expect, that they considered it advisable to have more governmental involvement in community development (Table 3). Community leaders overwhelmingly expressed the feeling that community planning and zoning ordinances are necessary (Tables 4 and 5). However, township officials were reluctant to be as outspoken in favor of planning or establishment of a zoning commission (Tables 6 and 7). A finding no doubt somewhat attractive to highway planners is that these same local government officials were largely in favor of regulation to enhance community appearance and to prevent traffic congestion. The regulation suggested included that of business growth along highways. The research further indicates that the literature used did influence the attitudes of community residents. Those exposed to the literature expressed increased favor for zoning as a means to development (Tables 8 and 9). More favorable attitudes occurred even among those who had originally been unfavorable (Tables 10 and 11). These latter findings refer to attitude change as measured by an "evaluative index," i.e., favor or disfavor toward zoning. Perhaps more pertinent to the needs of the action oriented highway administrator is the knowledge that, along with increased expression of favor for zoning, these citizens, following exposure to the planning literature expressed increased propensity to support zoning measures.

TABLE 9

DISTRIBUTION OF RESPONSES TO THE QUESTION ABOUT FAVORING ZONING—EXPERIMENTAL VS CONTROL GROUPS[a]

Responses	Experimental Group[b]		Control Group	
	T_1	T_2	T_1	T_2
Strongly favor	10	18	9	8
Other responses	15	7	11	12
Total	25	25	20	20
	$\chi^2 = 6.12$		$\chi^2 = 0.00$	
	$0.02 > p > 0.01$		$p = 1.00$	
Significant differences between the changes in the experimental and the control groups	$0.01 > p > 0.001$			

[a] Data derived from Ref. 8, p. 22.
[b] T_1 = measurement before reading A New Front Door for Your Community (16).
T_2 = measurement after reading A New Front Door for Your Community (16).

TABLE 10

MEAN SCORES ON THE EVALUATIVE INDEX BEFORE AND AFTER
EXPOSURE TO BOOKLET—EXPERIMENTAL VS CONTROL GROUPS[a]

Group	Mean Index Scores[b]		Significant Difference Within Each Group
	T_1	T_2	
Experimental group	15.48	22.66	Yes $\left(\begin{array}{l} t = 7.48 \\ p < 0.001 \end{array}\right)$
Control group	17.24	17.14	No
Significant difference between the groups	No	Yes $\left(\begin{array}{l} t = 5.14 \\ p < 0.001 \end{array}\right)$	

[a]Data derived from Ref. 8, pp. 29 and 30.
[b]T_1 = measurement before reading A Manual for Interchange Area Planning (5).
 T_2 = measurement after reading A Manual for Interchange Area Planning (5).

Thus, attitudes toward both highway development and toward rational land-use controls are for the most part favorable or can be influenced toward favor; yet what is the milieu in which such favor is likely to exist? Without doubt, numerous aspects of everyday existence coalesce to provide the matrix in which attitudes are initiated and develop. General satisfaction with such affairs as local government activity, local social life and friendships, local physical environment, and local school system can affect expression of the attitudes studied. However, the satisfactions suggested are unlikely under unsatisfactory economic conditions and are seemingly impossible under conditions of abject poverty. The economist may take issue, but it seems safe to state that the highway impact areas under study are not primarily among the economically disadvantaged, and that since the inception of the study the economy of the state, with minor fluctuation, has shown general improvement. Studies emphasizing the economic facets of highway impact cannot be allowed to go unnoticed if one intends to understand attitudes toward highway change and toward highway protection through local action.

TABLE 11

DISTRIBUTION OF RESPONSES BY
EXPERIMENTAL AND CONTROL GROUPS TO
THE QUESTION ABOUT FAVORING ZONING[a]

Responses	Experimental Group[b]		Control Group[b]	
	T_1	T_2	T_1	T_2
Favor	12	28	13	16
Neutral	13	8	17	10
Disfavor	17	6	7	11
Total	42	42	37	37
	$x^2 = 10.00$ 0.01 > p > 0.001		$x^2 = 1.33$ 0.30 > p > 0.20	
Significant differences between and changes in the experimental and control groups	0.003 > p > 0.002			

[a]Data derived from Ref. 8, pp. 29 and 30.
[b]T_1 = measurement before reading A Manual for Interchange Area Planning (5).
 T_2 = measurement after reading A Manual for Interchange Area Planning (5).

ECONOMIC ANALYSES

As expected, the study of the economic impact of highway development has received foremost consideration, and study of land use and land value were among the earliest concerns of the research group. The question of what a highway does to a community was soon joined, however, by that of what a community may do to a highway. This second question was to lead eventually to studies of planned vs unplanned development, development of protective alternative land-use plans, and factors relating to adoption of protective control practices. The following are brief sketches of four of the Institute's most recent economic analyses. These researches were conducted independently and, to an extent, simultaneously. They are therefore not seen as having the temporal continuity and cumulation found in the attitude studies. For these reasons each analysis is presented as a unit and there is no summary of findings after comment about all four studies.

TABLE 12

PREDICTION EQUATIONS DERIVED FROM A MULTIPLE REGRESSION ANALYSIS—FIRST CLASS TOWNSHIPS[a]

	Equations[b]	Coefficient of Determination
I	$Y_2 = 3,332,310 + 3,600X_{56} + 5,550X_{50} - 67.2X_{65} + 196,000X_{23} - 3,570,000X_7 - 198,000X_{24} + 1,710X_{68}$	$R^2 = 0.868$
II	$Y_2 = 2,888,080 + 3,330X_{56} + 5,430X_{50} - 51.9X_{65} + 172,000X_{23} - 3,340,000X_7 - 103,000X_{24}$	$R^2 = 0.859$
III	$Y_2 = 819,160 + 3,330X_{56} + 5,440X_{50} - 49.8X_{65} + 136,000X_{23} - 2,670,000X_7$	$R^2 = 0.855$
IV	$Y_2 = 9,772,280 + 3,580X_{56} + 5,340X_{50} - 40.1X_{65} + 241,000X_{23}$	$R^2 = 0.839$
V	$Y_2 = 393,920 + 3,710X_{56} + 5,260X_{50} - 35.4X_{65}$	$R^2 = 0.834$
VI	$Y_2 = 253,330 + 3,170X_{56} + 3,630X_{50}$	$R^2 = 0.766$
VII	$Y_2 = 843,280 + 3,320X_{56}$	$R^2 = 0.694$

[a]Data derived from Ref. 9, p. 65.
[b]Y_2 = real estate value per sq. mi,

X_{50} = number of industrial employees per sq mi,

X_{56} = population per sq mi,

X_{65} = interaction term between population and distance from first order cities,

X_{23} = interaction between miles of state maintained roads and average width,

X_7 = miles of state maintained roads per sq mi,

X_{24} = average width of state roads, and

X_{68} = interaction between average width and distance from first order cities.

TABLE 13

PREDICTION EQUATIONS DERIVED FROM A MULTIPLE REGRESSION ANALYSIS—SECOND CLASS TOWNSHIPS[a]

	Equations[b]	Coefficient of Determination
I	$Y_2 = 8,970 + 1,984X_{56} + 16,937X_{50} - 296.4X_{74} + 47.3X_{62} - 1.84X_{72} - 192,283X_{36} + 12,856,570X_9$	$R^2 = 0.955$
II	$Y_2 = -22,812 + 1,792X_{56} + 25,170X_{50} - 420.0X_{74} + 42.0X_{62} - 1.55X_{72} - 166,609X_{36}$	$R^2 = 0.953$
III	$Y_2 = -140,172 + 1,590X_{56} + 25,733X_{50} - 431.5X_{74} + 39.3X_{62} - 1.48X_{72}$	$R^2 = 0.949$
IV	$Y_2 = -128,016 + 1,764X_{56} + 20,730X_{50} - 374.3X_{74} + 12.6X_{62}$	$R^2 = 0.938$
V	$Y_2 = -30,724 + 1,992X_{56} + 22,600X_{50} - 386.4X_{74}$	$R^2 = 0.920$
VI	$Y_2 = 7,853 + 2,009X_{56} + 13,042X_{50}$	$R^2 = 0.899$
VII	$Y_2 = -9,550 + 2,805X_{56}$	$R^2 = 0.777$

[a]Data derived from Ref. 9, p. 91.
[b]X_{56} = population per sq mi,

X_{50} = number of industrial employees per sq mi,

X_{74} = number of industrial employees per sq mi times distance from first order cities,

X_{62} = 10-mi proximity index,

X_{72} = average width of state maintained roads times the 10-mi proximity index,

X_{36} = miles of improved state roads per sq mi, and

X_9 = miles of limited access roads per sq mi.

TABLE 14

NUMBER OF PROPERTIES WITHIN INTERCHANGE COMMUNITIES[a]

Interchange Community	1961	1962		1963		1964		1965	
	No.	No.	Percent Change	No.	Percent Change	No.	Percent Change	No.	Percent Change
A	564	573	+1.60	584	+1.92	607	+3.94	627	+3.30
B	2,023	2,079	+2.77	2,123	+2.12	2,168	+2.12	2,215	+2.17
C	1,488	1,521	+2.22	1,545	+1.58	1,578	+2.14	1,628	+3.17
D	693	707	+2.02	717	+1.41	753	+5.02	770	+2.26
Total	4,768	4,880	+2.35	4,969	+1.82	5,106	+2.76	5,240	+2.62

[a]Data derived from Ref. 10, p. 5.

TABLE 15

DISTRIBUTION OF REAL ESTATE VALUES OF INTERCHANGE COMMUNITIES BY PERCENTAGES
ATTRIBUTABLE TO LAND AND TO IMPROVEMENTS[a]

Interchange Community	Land					Improvements				
	1961	1962	1963	1964	1965	1961	1962	1963	1964	1965
A	17.31	17.03	17.00	16.81	16.53	82.69	82.97	83.00	83.19	83.47
B	20.20	19.84	19.33	19.12	18.70	79.80	80.16	80.67	80.88	81.30
C	21.76	21.15	20.90	20.32	20.46	78.24	78.85	79.10	79.68	79.54
D	22.42	22.33	22.25	22.33	22.10	77.58	77.67	77.75	77.67	77.90
Avg.	20.59	20.18	19.85	19.56	19.35	79.41	79.82	80.15	80.44	80.65

[a]Data derived from Ref. 10, p. 14.

TABLE 16

LAND VALUES IN INTERCHANGE COMMUNITIES AND SURROUNDING AREAS[a]

Interchange Community	Year	Interchange Communities		Surrounding Areas	
		Value ($)	Change (%)	Value ($)	Change (%)
A and B	1961	6,218,500		21,024,475	
	1962	6,406,850	3.03	21,263,600	1.14
	1963	6,549,000	2.22	21,558,450	1.39
	1964	6,636,800	1.34	21,888,050	1.53
	1965	6,818,150	2.73	22,126,350	1.09
C and D	1961	5,242,300		22,752,135	
	1962	5,286,300	0.84	23,351,100	2.63
	1963	5,337,250	0.96	24,069,600	3.08
	1964	5,502,850	3.10	24,787,200	2.98
	1965	5,699,440	3.57	25,241,660	1.83
Totals	1961	11,460,800		43,776,610	
	1962	11,693,150	2.03	44,614,700	1.91
	1963	11,886,250	1.65	45,628,050	2.27
	1964	12,139,650	2.13	46,675,250	2.30
	1965	12,517,590	3.11	47,368,010	1.48

[a]Data derived from Ref. 10, p. 19.

TABLE 17

IMPROVEMENT VALUES IN INTERCHANGE COMMUNITIES
AND SURROUNDING AREAS[a]

Interchange Community	Year	Interchange Communities		Surrounding Areas	
		Value ($)	Change (%)	Value ($)	Change (%)
A and B	1961	25,512,450		77,768,775	
	1962	26,844,300	5.22	80,130,675	3.04
	1963	28,164,800	4.92	83,492,100	4.19
	1964	28,913,700	2.66	85,989,650	2.99
	1965	30,488,750	5.45	87,699,450	1.99
C and D	1961	18,675,300		79,875,750	
	1962	19,394,100	3.85	83,296,800	4.28
	1963	19,828,350	2.24	88,725,650	6.52
	1964	21,008,100	5.95	99,452,400	12.09
	1965	21,682,000	3.21	104,289,500	4.86
Totals	1961	44,187,750		157,644,525	
	1962	46,238,400	4.64	163,427,475	3.67
	1963	47,993,150	3.80	172,217,750	5.38
	1964	49,921,800	4.02	185,442,050	7.68
	1965	52,170,750	4.50	191,988,950	3.53

[a]Data derived from Ref. 10, p. 23.

TABLE 18

CORRELATIONS OF VARIABLES WITH TOTAL
HIGHWAY-ORIENTED DEVELOPMENT[a]

Variable	Corr. Coeff.	Proportion of Variation Explained (%)
Cross-route average daily traffic (ADT)	0.514[b]	26.4
Topography (avg. slope)	-0.388[c]	15.1
Distance from nearest urban area	-0.360[c]	13.0
County population change	0.333[c]	11.0
Local municipal market value change	0.320	10.2
Local municipal population change	0.305	9.3
Nearest urban area population	0.289	8.4
Nearest urban area population change	0.235	5.5
Age of interchange	-0.195	3.8
County population	0.188	3.5
Interstate average daily traffic (ADT)	0.174	3.0
Local municipal market value	0.135	1.8
Local municipal population	0.099	1.0

[a]Data derived from Ref. 11, p. 34. Total units include only service stations, restaurants, and motels; only complete interchanges were considered.
[b]The correlation coefficient is significant at the 1 percent level.
[c]The correlation coefficient is significant at the 5 percent level.

The first economic analysis attempted to investigate the extent to which highway improvement contributes to community economic development as indicated by market value of real property (9). Data were gathered from a statewide sample of more than 250 Pennsylvania civil divisions, including third-class cities, boroughs, and first and second-class townships. Although the selected measures of highway development exhibited little relationship to real estate values in third-class cities and boroughs, the measures are revealed as important to such values in townships of both classes. Along with industrial employment and population, miles of state maintained roads, average width of state roads, and distance from first-order cities accounted for almost 87 percent of the total variation in the real estate values in first-class townships. Table 12 gives the pertinent equations derived from multiple regression analysis. Population sizes and industrial employment and distance from first-order cities joined with the highway improvement measures of miles of improved roads and miles of limited-access roads to account for over 95 percent of the total variation in the real estate values of second-class townships. Table 13 gives the relevant data.

A second analysis undertook to learn the extent to which changes in land use and value were associated with recent highway development (10). This analysis dealt with all properties within 2 mi of four different interchanges. The data on land use and tax valuation were gathered continuously for the years 1961 through 1965, and the latter included both land value and the value of improvements. In the interchange areas new properties were formed at the rate of 2.4 percent per year (Table 14). Overall value

TABLE 19

ANTICIPATED EXTERNAL INCOME—HIGHWAY IMPACT
OVER 5-YR PERIOD[a]
($1,000 units)

Sector	No. of Units	Income ($)
Service stations[b]	4	800
Motel[b]	1	455
Restaurants[b]	2	850
Auto dealers		20
Department and variety stores		25
Furniture and appliances		15
Clothing stores		15
All other retail		15
Total		2,195

[a]Data derived from Ref. 12, p. 13.
[b]Businesses resulting from interstate highway construction.

of real estate in the interchange areas increased at 3.8 percent per year as compared to 4.4 percent in the surrounding areas (Table 15). Land value at the interchanges increased at 2.2 percent as compared to 2.0 percent in the adjacent areas (Table 16), but the respective rates of increase for improvements to real property were 4.2 and 5.1 percent (Table 17). As late as 1965, business uses occupied least acreage in the study area; residential uses accounted for one-tenth of the land area; open-space uses such as farming and forestry utilized nearly four-fifths of the total area. Therefore, it seems especially profitable to study alternative land-use plans for these interchanges.

The third analysis was a study of economic development at 36 interchanges on five different interstate routes (11). The factors considered as independent included: type of interchange, average daily traffic on the interstate and cross route, distance to nearest urban center, age of the interchange, average slope within the interchange community, population, and market value of real property (Table 18). The ultimate goals of this analysis are to determine what factors influence economic growth and eventually to predict economic change within $\frac{1}{2}$ mi of an interchange facility. The study reports that highway-oriented commercial development accounted for more than two-thirds of the total development, with service stations, restaurants and motels in a 6:4:3 ratio (11, p. 43); industrial, residential, and recreational development took place on land somewhat removed from the interchange. The survey also suggests that average daily traffic on the cross route, interchange community topography, and distance from nearest urban center are important variables in the prediction of interchange economic development.

The final economic analysis employs the input-output techniques of the regional analyst (12). In this case study the "region" is a county within which the last section of an interstate route is being constructed. Efforts to predict economic development at interchanges within the county were based on engineering plans of the proposed section of the highway, economic development data from public sources, site inspection for topographic detail and state of existing development, and projection of average daily traffic figures. Analysis of these variables led to the "reasonable expectation" that, within 5 yr of completion of the highway, economic development would include addition of one trucking terminal, one 100-unit motel, two restaurants, and four service stations. Table 19 gives anticipated external income within the 5-yr period. The analysts foresee a subsequent annual increase in economic activity amounting to $5,000,000, of which net income to households will amount to nearly $780,000 and $230,000 will be added to government income (12, p. vi). The foregoing values assumed the stability of the national economy at the 1963 level.

The results of these economic analyses suggest an economic climate conducive to the fostering of attitudes which are favorable to highway development and perhaps also toward protection of the highway facility. The actualities of the first three analyses and the forecasting of the fourth all point to local highway construction as advantageous. It is not difficult to accept the idea that although citizens cannot quote the specifics of economic change, they are aware that it is taking place; and if it is favorable, they do not wish to stifle it. Development of appropriate protective land-use plans may be the solution they seek.

PROTECTION MODEL AND IMPLEMENTATION

The first efforts of this highway impact research staff to develop a computerized simulation model for interchange land-use planning suggested some community variables which appeared related to community acceptance of any proposed plan (13). A simplified general model has since been developed, and analysis of its recent application to a suburban "dormitory" interchange community is now under way (14). The likelihood of community acceptance of land-use regulation has also received additional attention (15). Locally initiated zoning, for example, tends to occur when county planning exists, when local behavior is affected by the thinking of new arrivals to the community, and when strongly favorable attitudes toward zoning are expressed. Some people would argue the futility of attempts to seek indicators of willingness to accept land-use regulation in face of the local power of economic interests. However,

education focusing on the permissive rather than the prohibitive aspects of planning and zoning may very well begin with those interests which are so largely a part of the economic climate in which their own and others' attitudes exist.

UTILIZATION OF FINDINGS

This paper has touched on three interrelated phases of applied highway impact research: the prediction of interchange community growth, the development of land-use plans intended to protect the highway facility from succumbing to unplanned obsolescence, and the search for indications of community willingness to adopt such plans. These are highly exoteric goals, but the tentative nature of the reported findings may surely lead the "practical man" to question their usefulness. This condition is one which is invariably faced by the researcher who, by the nature of his discipline, must deal in abstractions.

These findings cannot be as visible as those of the researcher who reports, in pounds per square inch, the results of having crushed concrete objects of various sizes, shapes, and composition. True, attitudes may be difficult to measure, and conceptual models may be difficult to comprehend. Even the more measurable economic variables are often related to appraisal and projection. Yet much of the abstruseness may be overcome and utilization enhanced by continual communication and cooperation between researcher and sponsor. The need for mutual understanding of attitude study may become paramount if highway officials and academicians are to continue their relationship. Yielding only to economic climate, attitudes can hardly be supplanted as the major independent variable throughout the highway's involvement in a program of national beautification.

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Mobility as a Measure of Neighborhood

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This project is devoted to a study of the effect of freeway loca-
tion on the configuration and continuity of neighborhood; the
terms "configuration" and "continuity" are used as descriptors
of the sociocultural processes or functions of neighborhood.

Neighborhood performs a function in the transmission or
change of culture. Cultural continuity tends to be maximized
where population turnover in a neighborhood is minimum and,
the contrary, the processes of acculturation tend to be maxi-
mized where population turnover is maximum. This research
attempts to detect and measure the degree of sociocultural sta-
bility or change through a mobility index which is composed
either from U. S. Census data or from city directories.

The neighborhood's function in the transmission or change of
culture is described by its position on the relative scale of the
mobility index. The research is designed to test: (a) the va-
lidity of the mobility index as a descriptor of the sociocultural
processes of neighborhood, and (b) the effect of variations in
freeway location on neighborhood.

The effect of variations in freeway location on neighborhood
will be analyzed by the comparative method. We expect the re-
sults of this analysis to show that where a freeway segments a
neighborhood the mobility index will reflect an increase in cul-
tural change, and where a freeway is built along neighborhood
boundaries the mobility index will either remain stable or re-
flect a decrease in cultural change. Hence, a freeway will
stimulate acculturation and the movement of people except in
those neighborhoods where its location provides a buffer to
change.

Thus, freeway planning may be more closely correlated with
community planning and community goals. The mobility index
may provide a device to predict and direct freeway influence on
the residential neighborhood.

●THE CONCEPT of "weaving a freeway into the fabric of the community" gained prom-
inence in connection with plans for the San Francisco Panhandle Parkway (1), but the
concepts advanced in that report have not been realized to any significant degree any-
where. Freeway planning in urban areas is becoming increasingly mired in conflict,
especially where transportation goals and community goals seem contradictory.

Both Congress and the U.S. Bureau of Public Roads have recently advanced the con-
cept of an "urban corridor." The concept envisions multiple development of the urban
freeway corridor such as the use of air space for redevelopment housing. A by-product
would be the creation of an urban environment which is compatible with the freeway.

Low (2) proposes complexes of buildings, freeways, parks, and moving pedestrian
belts in a "simultaneous redevelopment of a linear swath across intensively developed

urban areas." But despite such phrases as "producing an organic whole," most such schemes are primarily visual. That is, they deal with the physical manifestations of the urban scene.

Design is certainly an essential component in relating the freeway to the urban environment, but, as Rainwater (3) pointed out, design must be related to life styles to be functional. In fact, good design which is unrelated to the social environment can produce disastrous results. Montgomery's (4) comment on the Rainwater article pointed out:

> In Cleveland some years ago a slum area project, full of award winning street furniture and undifferentiated open space, and designed by a distinguished private developer-architect team, was vandalized by teenagers. Practically next door a development, inferior by accepted architectural standards, with little decorative open space and no art work, seems to have functioned effectively as a shelter for lower class life.

Montgomery quotes an article in the St. Louis Post Dispatch concerning a $7 million remodeling to correct deficiencies in the 10-yr old Pruitt-Igoe housing project. The enclosed, glassed gallery-corridors of the project applauded by Architectural Forum as a "close, safe playground" had become what the tenants called "the gauntlet," an unpoliceable turf for violent youth and crime.

Design, alone, failed. More than an attractive format is needed. The development of the "urban corridor" concept must be based on a real social need and the functional integration of the project into the community.

There are also practical reasons why we should learn more about the effects of the freeway on urban environment. The quality of that enviornment affects the production rate.

It has long been recognized that the output of labor is subject to its working environment. Improvement of the working environment can increase productivity.

Recently, production engineers have also become attracted to the home environment. They have reasoned that a man who enters the labor force at age 17 and works a 40-hr week will spend only about 14 percent of his total lifetime at his place of work, but an even greater share of time will be spent at home. Burns (5) asserted that "it follows then that if output can be regulated by changes in the work environment, output is no less susceptible to control by varying the quality of the home environment."

Burns' point was that "the concentration of capital in industry and primary production, to the exclusion of social overhead (e. g., housing), can actually retard growth rates by overlooking the bare fact that labor's efficiency is very much a product of its environment."

The location of a new highway or freeway affects a change in environment; if that change affects the home environment in a negative fashion, this could have a negative result on production. Of course, no such neat, clear-cut relationship exists; the point is that freeway location may affect production in unexpected ways.

Thus, it is becoming increasingly recognized that ancillary investments are required to make high-ranking alternatives pay off—regardless of whether the ancillary investments are productive by orthodox economic measures.

In the analysis of highway benefits ancillary investment or costs are equally important to make the highway investment pay off. In fact, as Newcomb (6) suggested, highway investment might more logically be analyzed as a component for increasing production rather than for strict savings in transport cost.

Our desire to "weave the freeway into the urban fabric" is not currently matched by an ability to do so, because, in addition to practical administrative and financial problems, neither the urban planner nor the freeway planner has much hard knowledge about the nature of the urban fabric. That is, we have a hard time trying to distinguish "warp from weft."

Successful planning of the urban freeway requires understanding of the relationship of freeways to the urban environment. We need more information concerning the effect of freeways on the community and community goals. The most logical place to look for such information is the smallest community unit, the neighborhood.

Urban planners frequently exhort freeway planners to avoid cutting neighborhoods in two. The rationale for such an exhortation is subjective; it implies that a freeway "slashing" through a neighborhood creates some drastic negative effect. The terminology used to describe this effect is designed to create a vivid, subjective impression of the relationship between freeway and the urban residential neighborhood. Terms such as "slashing," "knifing," and "rending" are common; they imply that some violence is done in the separation and that some permanent damage occurs.

These subjective terms are used because there are almost no objective data available either to confirm or to deny the subjective and popular impression.

The problem is twofold. First, there is no real agreement about the concept of neighborhood. There are many operational definitions peculiar to a given community and descriptive of the unique neighborhoods of that community. But these hardly apply to other communities. Neighborhood is one of the most elusive concepts in modern planning. Everyone "knows" what a neighborhood is, i.e., they know, approximately, where their own begins and ends. But only fiction writers can describe a neighborhood with sufficient accuracy to convey "knowledge" to a third party. Without some agreement on the nature of neighborhood, it is difficult to evaluate "effect."

The second part of the problem involves the nature of the effect.

One component of freeway effect has been widely studied, i.e., the effect of freeway and freeway proximity on adjacent property values. In fact, a fairly extensive volume of information has been collected about the effect of freeways on values of single-family homes adjacent to freeways. It is assumed that if some rending does occur, this drastic effect would reduce value. There is no evidence to indicate that such a situation has ever occurred. The analysis of sales of homes adjacent to or near a freeway indicates little or no negative effect on relative sales price.

However, the sales data collected so far are subject to the following two shortcomings.

1. To our knowledge, none of the data collections and analyses have made any attempt to relate to a concept of neighborhood. There is no indication that any data collection and analysis has been made of a situation in which a neighborhood has been split by a freeway.

2. The sales data collection is essentially in a vacuum; few data are available about the relative effect of a freeway on the whole neighborhood. Furthermore, there is rarely any information about the effect on the neighborhood in relation to the community at large. In other words, most of the sales data collections and analyses show that an adjacent home or group of homes have not decreased in price since the freeway, but they do not indicate the condition of the real estate market for similar homes, for instance, six blocks or more from the freeway. Thus, whereas adjacent homes, and even neighborhoods, may have maintained a constant value since the construction of a freeway, comparable homes in the rest of the community may have increased in value at a rate of 5 percent per year. Although many such studies adjust values based on trend information, accepted real estate appraisal practice would preclude comparison with the community in general.

Thus, we have little or no direct knowledge about the nature of freeway effect on the residential neighborhood, as measured by value. (Several recent California Division of Highways studies deal with the value component of "effect," using neighborhood and community as control (7, 8), and a forthcoming study deals with residential neighborhoods along the Santa Monica Freeway; but the concept of neighborhood is not sufficiently developed in these studies.)

Other measures may provide us with more information concerning both the nature of neighborhood and the effect of the freeway.

Sawhill's (9) study indicated that the North Broadway area of Seattle, cut into three parts by two expressways, is tending to become three separate neighborhoods rather

than remaining one homogeneous residential area. However, the limited scope of the study precluded any extensive consideration of change; there is no clear-cut indication of the nature, area, and dynamics of the neighborhood before the expressways. Until change is more fully understood, generalizations and predictions will be fruitless.

California has devised a "mobility index" which we hypothesize to be a measure of neighborhood and change. And through a Federally sponsored research project we propose to test the validity of the mobility index in measuring freeway effect on neighborhood.

THE NATURE OF NEIGHBORHOOD

In devising the mobility index we had to make many assumptions about the nature of neighborhood; many of these assumptions are tested, or will be tested, in the process of testing the index. Other assumptions are not capable of testing at the present time.

A neighborhood is the smallest subcultural cluster of primary families. Selection of neighborhood location by the resident is based on cultural considerations. A neighborhood, as an entity, can assume a sociocultural function, or role, by reinforcing the family's ability to transmit its culture from generation to generation; hence, the family selects that neighborhood in which the behavior pattern of the residents is most like its own. The result can be the creation of clusters of subcultures with some degree of cultural continuity.

Tryon (10) asserted that "... persons having the same general social attributes, beliefs, and actions share a 'feeling of belongingness' and easy communication. They mutually support each other and foster easy interaction by locating homes together." He indicated that another factor "... is the force of 'role expectation.' Persons of a given occupation group, income and culture are expected as part of their social role to live together in certain areas."

Neighborhood, then, is a geographical area in which certain patterns of behavior are common or predominate. The boundaries of neighborhood are not fixed, but fluid. In some instances, physical or zoning features provide a sharp line of demarcation for neighborhood. More often, however, no sharp distinction exists. Consequently, residents tend to define neighborhood boundaries in terms of major streets and highways. And the neighborhood's role in the transmission of culture is frequently reinforced by the neighborhood elementary school, which usually sets its boundaries at major streets and highways.

As a result, the "wall" around any neighborhood consists of the major streets which isolate and insulate the neighborhood from the "alien" influences of other neighborhoods.

However, not all people live in such neighborhoods. Many live in neighborhoods of great cultural diversity, where no pattern of behavior either dominates or is most common. This is the neighborhood where many cultures and subcultures meet, react and change, the neighborhood of acculturation rather than cultural continuity.

In fact, most neighborhoods probably fall on a continuum somewhere between these extremes.

Neighborhood, then, is a device for both the transmission and change of culture. Different kinds of neighborhoods might be discriminated by the degree of cultural change which occurs.

One way to measure that change might be with demographic factors. Tryon's (10) cluster analysis indicated that demographic variables isolate demographic social areas and that a demographic social area is also a psychosocial area; hence, an area homogeneous in demographic features will also be homogeneous in psychosocial ways.

Behavior tends to be organized into patterns that are predictable, recurrent, and dependable. Farley's (11) study of suburban persistence revealed that suburban socioeconomic characteristics persisted despite rapid population growth in the suburbs. He showed that "... a sound prediction of 1960 socioeconomic characteristics of a particular suburb could be made merely by knowing that suburb's characteristics in 1920. When the shorter time span, 1940 to 1960, is used there is even greater evidence of persistence of suburban characteristics." He concluded that "... the characteristics of a suburb may be fixed relatively early in that suburb's history and subsequent growth reinforces existing socioeconomic residential patterns."

Hence, our hypothesis: to the degree that population in a neighborhood is stable, the cultural patterns of that neighborhood can be expected to be continuous, persistent and enduring.

MOBILITY INDEX

The U. S. Census Tract reports, PHC(1), record several items relating to population stability. One item measures population mobility (the converse of stability) directly: the number of persons 5 years old and over who occupy the same residence in 1960 as in 1955. This item alone was tested to determine if the percentage of total population in the same residence would describe neighborhood.

Alone, this figure is not valid. For instance, in California new subdivisions less than 5 years old register zero; older neighborhoods, fringed by apartment buildings may register very low percentages, i.e., a high turnover, but actually be very stable because the population which is turning over is the fringe apartment dwellers. Also, many neighborhoods which are culturally discrete and persistent have grown significantly in recent times, but in terms of pure mobility the number of new residents (in the context of an expanding population) would show high mobility in the last five years. The latter two cases are quite common in California.

Thus, in addition to population mobility information which can be obtained from the census, two factors which would indicate the propensity for culture change were added. These are home ownership and single-family dwelling units.

Cohen's (12) study of the relationship between home ownership and the social characteristics of the family revealed that "...homeowner families are more inclined than are tenant families to have those characteristics which are generally regarded as 'stable'." Her study finds that homeowners "move about less;" only about one in three homeowners had moved in a 5-yr period, compared to three out of four tenant families.

Sullenger (13) found that "...there is greater stability among homeowners than among renters. One out of every six homeowners moved out of his dwelling, as compared to one out of every two renters." Furthermore, he found a "...far greater stability among the families in rented, individual family houses than among those who reside in apartments."

Thus, there is evidence that the components of home ownership and single-family dwelling show stability and a propensity to cultural continuity.

The mobility index (MI) was therefore designed to provide some information about neighborhood stability; it is composed of the following factors available from the 1960 Census.

1. Two factors measure population mobility: (a) the percent of persons 5 years old and over who occupy the same residence in 1960 as 1955; and (b) of the units built in 1939 or earlier, the percent occupied by the same household since that time.

2. Two factors which measure propensity to change: (a) the percent of units which are single-family residences; and (b) the percent of units which are owner-occupied.

The MI is the summation of those four factors for the smallest geographical unit possible. A high sum (maximum 400) is a "high MI" and means a very stable neighborhood; a high MI might be equated with low "population mobility" or "turnover."

However, a very low sum (minimum 0) is a "low MI" and means an unstable neighborhood or possibly high "population mobility" or "turnover."

The four MI factors combined yield a relative measure of existing stability plus some measure of future tendencies, i.e., it yields some measure of predictability.

Table 1 gives a summation of the MI for an area in Los Angeles affected by the then proposed Beverly Hills Freeway. Additional socioeconomic data are reported for each census tract. The MI as devised is a test of cultural continuity—not "class." Thus there is no correlation between median family income, home value or rent, and the MI (Table 1). Middle-class neighborhoods can be, and are, just as stable as upper-class neighborhoods. In fact, the area known as Watts has a relatively high MI.

A partial explanation for this is that another kind of mobility is introduced by insertion of the "class" concept, i.e., the vertical mobility from class to class. Sullenger (13)

TABLE 1

MOBILITY INDEX FOR AREA IN LOS ANGELES AFFECTED BY PROPOSED BEVERLY HILLS FREEWAY[a]

Area	Census Tract	Code	Population	Housing Units	Median Family Income ($)	Median Value, Owner Occupied Units ($)	Median Rent ($)	Percent Pop. Same as 1955	Percent Owner Occupied	Percent SFR's	Percent Same as 1939	Mobility Index
West Los Angeles (green line)	2672	LA-1	3261	1425	8,516	21,300	97	47.5	53.0	65.8	16.6	182.9
	2671	LA-2	4665	2096	9,405	25,000+	116	44.8	48.6	56.7	19.8	169.9
Westwood (blue line)	2655	WW-1	4237	2206	8,591	25,000+	113	36.2	26.6	14.8	11.3	88.9
	2656	WW-2	3920	1966	10,655	25,000+	136	47.0	35.0	35.0	15.9	132.9
	2657	WW-3	3937	1919	12,464	25,000+	135	42.0	33.1	33.8	12.4	121.2
Bel-Air (red line)	2622	BA-1	3358	1174	22,706	25,000+	165	45.8	69.2	77.3	8.9	201.2
	2621	BA-2	3835	1134	20,273	25,000+	—	48.8	91.0	97.4	21.3	258.5
	2612	BA-3	2155	851	14,500	25,000+	—	32.0	72.4	95.2	10.6	210.2
Beverly Hills ("Northside")	7007	BH-1	4034	1168	25,000+	25,000+	—	54.2	86.4	95.5	16.8	252.9
	7006	BH-2	5425	1593	25,000+	25,000+	—	51.5	88.0	100.0	18.4	258.9
West Hollywood	7005	WH-1	5187	2969	7,648	20,200	117	32.5	18.4	31.4	13.6	95.9
	7004	WH-2	5018	2357	7,123	19,000	97	40.2	37.4	50.5	15.6	143.7
	7003	WH-3	3981	2265	7,857	—	127	20.2	7.3	7.5	6.3	41.3
Hollywood (red line)	1944	HR-1	5321	2229	6,711	21,200	97	44.8	39.4	40.1	11.2	135.5
	1922	HR-2	4376	1839	6,078	18,000	89	44.5	45.3	46.5	12.3	148.6
	1921	HR-3	1696	760	5,843	18,900	79	35.0	34.4	43.0	11.9	124.3
	1919	HR-4	4990	2285	6,710	20,100	90	39.8	35.7	56.0	11.4	142.9
	1918	HR-5	4475	2309	5,857	17,300	79	28.2	14.7	37.8	9.9	90.6
Wilshire (blue line)	1945	WB-1	2669	927	7,420	22,700	97	47.6	62.5	66.5	13.0	189.6
	2144	WB-2	4293	1797	5,034	—	91	36.2	14.7	2.9	4.5	58.3
	2143	WB-3	2182	752	9,063	25,000+	108	53.0	61.2	58.0	11.2	183.4
	2142	WB-4	2097	688	11,695	25,000+	115	50.8	64.0	60.0	12.4	187.2
	2141	WB-5	4475	1840	11,809	25,000+	115	53.2	42.3	28.1	11.6	135.2
	1923	WB-6	2331	1313	9,878	23,500	130	48.0	33.0	37.5	12.8	131.3
Wilshire—tracts common to both red and blue	1924	WC-1	5429	2772	6,846	18,600	82	39.6	30.8	36.7	13.8	120.9
	1925	WC-2	3802	2014	6,256	16,300	79	41.2	25.7	48.4	10.5	124.8
City of Los Angeles	—		2,479,015	935,507	6,896	17,300	78	38.8	43.1	59.8	11.0	152.7
County of Los Angeles	—		6,038,771	2,142,139	7,046	15,900	81	39.5	51.1	70.2	12.5	173.3

[a]Source: U. S. Census.

found some correlation between vertical mobility and horizontal mobility, but when
"...horizontal mobility is accompanied by ... vertical mobility, stability generally
follows; for the majority of those who rise on the vertical scale are [become] home-
owners."

Goldstein and Mayer (14) noticed that "migrants, compared to non-movers, tend to
be more heavily concentrated in the higher socioeconomic groups, as measured by
occupation, education, and income."

On the other end of the class scale, Sullenger indicated that the mobility rate among
Negroes and foreign-born whites was lower than the rate of mobility among whites. A
concentration of foreign-born whites or Negroes produces an island of cultural continu-
ity with less mobility. In California the MI measures this stability because of the wide
prevalence of single-family dwellings; even in Watts most of the land area is devoted to
single-family dwellings.

Thus, the MI is not a measure of "status"; it is not designed to distinguish the best
neighborhoods from the worst. It is a device to discriminate culturally homogeneous
areas within a community without regard to notions of status. (There is some bias
toward middle economic groups with the concept of home ownership, but if the index is
used as a relative rather than an absolute measure, this bias is eliminated by the com-
parison of similar neighborhoods within the community.)

FREEWAY EFFECT

When the MI is computed and plotted on a census tract map, the ordering by prox-
imity is evident. The nature of culture is such that cultural groups cluster. If the MI
does measure a relative degree of cultural continuity, then we would expect that it
would tend to cluster. Our preliminary examinations indicate that this is the case.
The higher indexes tend to cluster around individual, and localized, maximums, where-
as the lower indexes tend to cluster around lows.

If our concept of neighborhood is valid, the effect of a freeway impinging on a neigh-
borhood would be to disrupt the cultural continuity. The effect would manifest itself
in terms of many persons leaving the neighborhood, replaced by others with different
patterns of behavior. This phenomena would be detected by the reduction of the MI.

However, the term "disrupt" may not accurately describe the events which occur.
The phenomena which may occur is "acculturation"—an increase in the degree of cul-
tural mix and, hence, change.

Thus, we would expect the testing of the MI to reveal that where a freeway segments
a neighborhood the MI tends to decrease, and where the freeway is built along neigh-
borhood boundaries, the MI tends to remain the same or even increase. We would ex-
pect a freeway to stimulate acculturation and the movement of people, except in those
neighborhoods where location of the freeway provides a buffer to change.

The MI was first used in the route planning stages of the Beverly Hills Freeway (15).
The various route proposals affected diverse residential neighborhoods in Hollywood,
Beverly Hills, Bel-Air and Westwood. Some of the route proposals affected the homes
of some famous persons. The conventional economic measures associated with this
route were enormous. Cost of the 9-mi route varied from $205 to $225 million, and
more with special design features. This amounted to more than $23 million per mile.
Right-of-way accounted for 75 percent of the total cost or more than $17 million per
mile. The size of this investment made it absolutely essential that sound information
about community and community effects be provided for the route decision. Each line
had equally vociferous proponents and opponents.

To compare the various proposed lines, the MI was accumulated and averaged along
each line. This process simply involved the addition of each index for an affected tract
and then division by the number of tracts. This was possible on these routes because
the census tracts were small, they closely approximated neighborhoods, and only two
census tracts were common to the two major lines. No attempt was made, however,
to weight the index based either on affected population or area of the census tract. The
results are indicated in Table 2. The line finally selected is a modification.

TABLE 2

MOBILITY INDEX

VARIOUS LINES, COMBINATIONS AND SEGMENTS

Designation	1960 Index
Segments	
Red line—Doheny to Sepulveda	236.3
Green line—Sepulveda to Century City	176.4
Blue line—Ardmore to West Hollywood	141.3
Red line—Ardmore to West Hollywood	126.8
Blue line—Sepulveda to Century City	114.3
Lines and Combinations	
Green-blue	164.5
Dash green-blue	162.4
Red	157.6
Blue	152.1
Green-blue-brown(A)-red	149.0
Green-dash blue-blue	147.9
Green-blue-brown(B)-red	145.3
Dash green-blue-brown(A)-red	144.0
Dash green-dash blue-blue	141.6
Dash green-blue-brown(B)-red	139.7
Blue-brown(A)-red	137.7
Blue-dash blue-blue	134.8
Blue-brown(B)-red	134.3
Green-dash blue-brown(A)-red	129.6
Green-dash blue-brown(B)-red	125.2[a]
Dash green-dash blue-brown(A)-red	119.1
Blue-dash blue-brown(A)-red	117.9
Blue-dash blue-brown(B)-red	114.0
Dash green-dash blue-brown(B)-red	113.9

[a]Modified line selected.

In the case of the Beverly Hills Freeway, the MI proved to be a useful tool in the route selection process. Subsequent experiments and tests with the index have not proven as successful, for the following reasons.

1. The census tract is normally too large; variations of only one block in freeway proposals cannot be discriminated by the MI. Block reports do not record population mobility information.

2. The year 1960 is becoming increasingly remote. Up-to-date information is necessary because of tremendous growth.

3. To test our concept of freeway effect we must have some information about the change of the MI over time. The 1950 census did not report the same information as the 1960 census and the MI cannot be compiled from 1950 data. The 1950 census reported moves between 1949 and 1950, rather than between 1945 and 1950.

To test the index adequately and apply it to other areas, it became necessary to approximate the MI from other information sources. The California Division of Highways is conducting a study sponsored by the U.S. Bureau of Public Roads to test other sources.

The most promising source, other than a field survey, seems to be the city directory. With the use of the city directory, components of the MI can be compiled on a block-by-block basis. Home ownership is reported; single-family dwelling units can be discriminated; by comparing names in directories for various years, mobility can be calculated. However, there is some variation.

The street index of the city directory normally reports only the head of household, and would thus reveal only a move on the part of the entire household. The census, however, records moves of the entire population in the last five years.

In California, city limits have changed significantly since 1939. Thus, using city directories, 1939 data are not readily comparable to 1960 data.

Generally, however, city directories should be a reliable source of data. They have been used before to test mobility. Goldstein's (16) Norristown study was based on city directory information. In addition, Goldstein mentioned several other studies which tested the validity of city directory data. For example, he indicated that:

> Dr. Norman Lawrence of the United States Bureau of the Census made an intensive analysis of the directories of Washington, D.C. to determine their value for estimating the population of Washington in intercensal years. He found that both the 1930 and 1940 directories contained over 99 percent of the comparable census population of those respective years. On the basis of these findings, Dr. Lawrence concluded that the. . ."use of directory listings as a datum for the estimate of the population aged eighteen and over is warranted (17)."

To organize our data geographically, however, our study uses street index information rather than the name index. The street index lists only the head of household. It is assumed, however, that if the name index is valid, the street index is equally valid.

The initial test of the MI derived from city directories used only three factors: (a) household head listed in both 1955 and 1960 directory—household head was counted as the same if the last name was the same for the same address in 1955 and 1960; (b) owner-occupied; (c) single-family dwelling (1939 data are not considered comparable to the census).

The three-factor index was tested in several census tracts in Sacramento. Table 3 compares the three-factor index derived from the census with that derived from the city directory. The correlation of the two indexes is 0.9726. It would seem that the three-factor index derived from a city directory reasonably approximates a three-factor index derived from the census.

The second test of the MI involved the three-factor concept. Because of difficulty in obtaining comparable California data for 1939, we deleted this portion of the index as derived from the city directory. We next asked if the three-factor index is comparable to the four-factor index, and if it provides the necessary information about neighborhood and neighborhood boundaries.

The first analysis of the comparability of the three-factor to the four-factor index produced negative results. The indexes are not sufficiently comparable. The elimination of the 1939 factor created too strong an emphasis on factors designed to show propensity to stability, i.e., home ownership and single-family dwelling. To minimize this effect these two factors were averaged, producing a two-factor index with a maximum of 200:

$$MI = \text{percent household same in 1960 as 1955} + \frac{\text{ownership} + \text{single res.}}{2}$$

Then, to determine the comparability of this two-factor index, every tenth census tract in the city of Los Angeles was tabulated and the two-factor census index was compared with the four-factor census index. The result was a correlation of 0.9775. Hence, for further testing of our concepts of neighborhood and freeway effects on neighborhood, we feel that the two-factor index derived from the city directories reasonably approximates the four-factor index derived from the U.S. Census. We are now in a position to refine the MI on a block-by-block basis to analyze neighborhood in more recent years than the last census.

The next steps in the study, to be completed during 1967, will consist of the following.

1. Compiling the MI on a block-by-block basis for various communities in California and some other western states.
2. Plot MI and analyze clusters.
3. Compare and evaluate 1960 and 1965 data.
4. Compare 1960 MI to 1965 MI for neighborhoods where a new freeway has been introduced in the interim. Compare changes to other neighborhoods and clusters.

TABLE 3

SACRAMENTO (Portion)
COMPARISON OF MOBILITY INDEX SOURCES—THREE-FACTOR INDEX

Census Tract	Same Residence, 1955-1960 (%)		Owner Occupancy (%)		Single-Family Residence (%)		Mobility Index (three-factor)	
	Census	City Directory	Census	City Directory	Census	City Directory	Census	City Directory
18	50.7	41.6	52.8	53.5	71.0	76.1	174.5	171.2
22	49.5	40.9	50.0	50.3	77.0	60.8	176.5	152.0
23	64.8	58.2	76.7	73.5	96.1	97.9	237.6	229.6
24	67.9	65.4	81.0	81.8	88.9	95.1	237.8	242.3
25	63.0	64.8	86.1	87.1	96.0	98.1	245.1	250.0
26	52.7	48.4	62.0	60.4	72.5	82.8	187.2	191.6
27	40.9	35.6	46.5	43.9	67.7	73.6	155.1	153.1
28	47.0	47.6	67.0	66.0	89.1	88.6	203.1	202.2

[a]Correlation: r = 97.26.

Clearly, even further research will be necessary before the MI can be determined to be a completely reliable tool in the freeway route location process. But it is equally evident that the index shows great promise as an instrument to assist in defining and locating neighborhood and further promise in the determination and prediction of freeway effects on neighborhoods.

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Living Patterns and Attitude Survey

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Recent planning efforts have stressed the need to understand better the basic desires and attitudes of people toward their environment. The value of "living patterns and attitude surveys" in achieving such understanding, and thus furthering the planning effort, has been shown through their use in a number of locations throughout North America. The most recent survey was conducted in connection with the statewide planning effort in Connecticut.

The basic points of interest are the effectiveness of the surveys and the use of the findings in planning. These attitude surveys were conducted by three techniques: (a) home interview, (b) hand out-mail return, and (c) mail out-mail return. The The relative responses are evaluated. The surveys investigated five areas of concern: (a) attitude toward housing, (b) attitude toward town, (c) attitude toward state, (d) leisure time, and (e) recreation, as well as the necessary personal information about the respondent to relate the responses to social characteristics.

The paper discusses techniques used to analyze the survey results and, as examples of the responses, discusses two issues—the responses to "g e n e r a l appearance" and "urban renewal."

These surveys are inexpensive and valuable to both the transportation and the urban planner. Surveys have effectively influenced the objective evaluation of state's goals and objectives.

•A CENTRAL task in planning is the determination of the needs and desires of citizens so that they can be considered and weighted as the basis for planning. Recent planning efforts have indicated the need to understand the likes and dislikes of the general public: what it wants, what its ambitions and aspirations are, and what it deems important in the community life—all of which leads to insights into what within the community should be saved and what can be foregone in the process of urbanization and growth.

Several years ago AMV undertook basic research into the field of "living patterns and attitude surveys." With the exception of the basic research effort necessary to develop and test the procedures, all of the surveys of this type have been undertaken within the framework of regular origin-destination home interview surveys. To date, six such surveys have been completed, the most recent of which was for the entire State of Connecticut. These studies are now beginning to reveal some of the basic underlying concerns of the people, and it is the purpose of this paper to highlight the more important of these and attempt to indicate how they may affect the decisions of both the transportation and the urban planner.

DATA SOURCES

The basic source of data comes from the Connecticut Interregional Planning Program study, which encompasses the entire State. The home interview portion of the survey was completed through two basic sources: the Tri-State Transportation Commission

completed the surveys in the area encompassed by that study, and the Connecticut Interregional Planning Program completed studies for the remainder of the State.

The surveys investigated the residents' general attitudes and preferences concerning their towns and the State as well as their residential, recreational and leisure-time preferences: what they liked, what they disliked, and where they thought improvements should be made. In addition, certain information was obtained on the family's characteristics (necessary for making use of the attitudinal information) and past histories (residential and job mobility). In general, the orientation was toward information which would permit a meaningful determination of the citizens' goals and objectives. Such information was vital in orienting State plans and programs in the directions desired and needed by State residents and in evaluating particular plans and programs in terms of the attitudes expressed.

Data Collection Procedures

Planning surveys were conducted as integral parts of four separate home interview surveys which in aggregate covered the entire State. Inasmuch as the travel surveys were undertaken at different times by different agencies, the procedures varied.

Waterbury Area Transportation Study (WATS)—One percent of all the occupied dwelling units was selected at random from the central Naugatuck Valley Region, according to standard home interview techniques for this study. The planning questionnaires were completed by interviewing the respondents in their homes. Of the 600 regional samples, 596 were complete.

Tri-State Transportation Study—The sample rate for the Tri-State area was established as 1 percent of the occupied dwelling units selected in accordance with standard home interview sampling techniques. The Tri-State Transportation Committee cooperated by permitting their interviewers to distribute the planning questionnaries to the respondents. These forms were returned to the State agencies by mail. Since the response procedure required a voluntary effort on the part of the respondent, the rate of return of the questionnaires was not so high as that for the Waterbury study. However, a total response rate of 49 percent was finally obtained.

Connecticut Interregional Planning Program (CIPP)—The experience during the Tri-State Survey indicated that a satisfactory (in some instances, better) response could be obtained using the mail-back techniques rather than direct questioning.

With careful planning of the follow-up procedures, a relatively high response rate could be obtained. More important, the respondents were, for the most, completing the questionnaires with care, and many were including letters further explaining their responses. Whereas the letters were difficult to analyze objectively, they did indicate the thought that was being devoted to the responses. Therefore, this technique was used for the CIPP Planning Questionnaire Survey. As with the Tri-State Survey, a 1 percent sample of the occupied dwelling units, selected at random from within the State, was used. Through carefully controlled follow-up procedures the final rate of response to the planning questionnaire was 71.5 percent.

Southeast Area Transportation Study (SEATS)—The southeast section of the State had recently been covered by a home interview travel survey, without the inclusion of a planning questionnaire. Therefore, for this portion of the State, a mail-out and mail-return technique was used. The sampling rate was established at 2 percent of the occupied dwelling units, and the final response rate was 39.9 percent.

Response Rates and Controls

A composite of the sample sizes and response rates (usable questionnaires as a percentage of total occupied dwelling units) for the four separate surveys is given in Table 1. The total response from the various surveys had a low of 0.5 percent and a high of 1.0 percent.

The variation in the response rate for the various mail-back surveys is significant. The difference between the Tri-State and the CIPP Surveys is believed to stem from the

TABLE 1

RESPONSES TO PLANNING QUESTIONNAIRES

Survey	Home Interview Sample Size	Percent Occup. Dwell. Unit	Usable Surveys Ret'd	Percent Ret'd	Percent Total Dwell. Unit
Waterbury area	600	1.0	596	100.0	1.0
Tri-State area	3224	1.0	1612	49.0	0.5
CIPP area	3190	1.0	2235	71.5	0.7
Southeast area	2910	2.0	466	39.9	0.8
Total	9924		4909	49.5	0.5

degree of control on the follow-up procedures. Both surveys used both mail and telephone follow-ups. Based on the experience during the Tri-State Survey, however, special emphasis was placed on the follow-up for the CIPP. When the interviewer left the planning questionnaire with the potential respondent, a carefully prepared statement, designed to impress the respondent with the importance of the survey and to elicit his support in completing the questionnaire, was presented. A control file was established so that the status of all questionnaires could be determined daily. If, after ten days, the planning questionnaire had not been received, a follow-up letter provided the respondent with another interview form and return envelope. If, after another ten days, no response was obtained, a telephone call was placed directly to the respondent and his cooperation was requested.

The response rate for the Southeast Area Survey was significantly less than for the others, undoubtedly because there was no personal contact with the respondent at which time the importance of the survey could be impressed. The relatively high response rate of nearly 40 percent for such a lengthy and personal questionnaire is rather significant and seems to indicate the importance of the follow-up procedures.

Response rate is not the total story on mail-back surveys. Table 1 indicates the numbers of usable surveys which were returned. Many of these returns had a significant proportion of the questions unanswered, so that the number of usable responses to many of the questions is much less than would be indicated by this simple ratio. For example, approximately 30 percent of the respondents did not divulge their income, probably the lowest response rate to any question. By comparison, 98 percent of the respondents stated the age of the head of the household.

As a result, the Connecticut Survey, a new procedure for obtaining attitude information, was developed and will be tested at the first opportunity. This procedure is designed to obtain the benefits of having the respondents personally complete the attitude survey at their leisure, thereby obtaining their true well-thought-out feelings, and yet to avoid the difficulty of the non-response and the no-answer. This procedure involves sending the attitude questionnaire with the pre-interview letter and requesting the respondents to complete the attitude survey before the visit by the home interviewer. If the attitude survey form is completed when the home interviewer arrives to conduct the regular travel portion of the survey, it can be scanned for completeness and any unanswered questions completed by personal interview. In the event that the interview form has not been completed, the home interviewer can obtain the information by a personal interview in the normal manner.

By working the data collection phase of the survey with the normal home interview, the costs are kept to a minimum. There is, in fact, only an insignificant increase in the administrative costs to include the attitude portion of the survey. By including the attitude questionnaire as a mail-back, the significant added data collection costs include: form preparation, testing, and printing, status and sample number control (to cross reference the information to the travel survey), and the follow-up work. For the 5,000 samples obtained this amounted to about $0.65 per interview.

The coding, data reduction, analysis, and report writing, and operations however, represent a sizable added burden, but still relatively small in terms of the common home interview survey. For these surveys the costs were approximately $14,000, or about $3.00 per interview. In total, less than $4.00 per interview, over and above the

home interview costs, were required to gather and analyze the data. To obtain this same information by standard home interview techniques, without the "write-off" to the travel surveys, would have cost over three times as much.

Factoring Procedures

Due to different response rates in the various surveys the data could not be simply and directly combined to produce a valid cross-sectional representation of the State's attitudes. The minimum adjustment necessary was to weigh the responses from each survey area by the response rate. However, to insure more nearly representative data, adjustment factors were calculated for each of the 15 planning regions.

Previous experience with mail-back surveys has indicated that both high and low income families usually return questionnaires at a substantially lower rate than middle income families. If this was true for the attitude survey, it would indicate that the responses did not represent a true cross section of the attitudes of the State's population, inasmuch as the middle income families would be overrepresented. Although the responses compared surprisingly well with the 1960 census data, all deviations were eliminated by factoring by income class, controlling to the 1960 census.

ANALYSIS OF ATTITUDES

The real advantage of these types of surveys seems to be that they give an overall guidance and direction to the planning effort. They give an indication of what the public is thinking and of the issues which it feels are of greatest importance, and in a general way they form a logical basis for the development of planning objectives. Although in many cases these surveys seem only to confirm what is already known, or should be known, they do in many cases give a "scientific credence" to overall planning principles. At the same time, however, some seemingly apparent planning principles are being shown to be of questionable importance.

In some instances the respondents had neither the understanding nor the ability to give meaningful answers to the questions posed. In some instances they have not seen, or are unaware of, the "full range of choice." (For example, it is doubtful that the general public is aware of all the different possibilities for housing and transportation modes.) Therefore, their attitudes could change drastically if the range of choice were expanded. Yet if this is realized at the outset, and as long as the attitudes expressed are not subjectively converted to "standards," a great deal of valid information can be obtained. The responses do reflect attitudes—the things that are "on the respondents' minds."

The important factors in these types of surveys are not the response rates per se, but the rankings of responses to the various issues and the similarities and differences of respondents as responses are cross-tabulated with various social and economic variables. For example, in the search for a meaningful analysis unit, the attitudes to certain questions varied drastically between towns of different characteristics. Furthermore, it was apparent that these different types of towns have different problems. Similar differences occurred when the responses were structured by income. Also of significance was the similarity of responses to some questions regardless of the social or economic breakdown. An example of this was the response to general appearance as the most liked feature regardless of the social or economic stratification.

Town Type

The search for a meaningful analysis unit produced not only the desired results but in itself revealed a great deal about the study area. The final analysis unit was defined as "town type" and is a composite index which includes town age and density. The former is defined as the number of decades since the town reached half its present population (an indication of growth rate) and the latter as the net residential density. The town type index does not include a measure of town size, an apparently untenable situation for the kind of analysis anticipated. However, in Connecticut all of the towns encompass approximately the same area and, therefore, residential density to a certain extent acts as a proxy for town size.
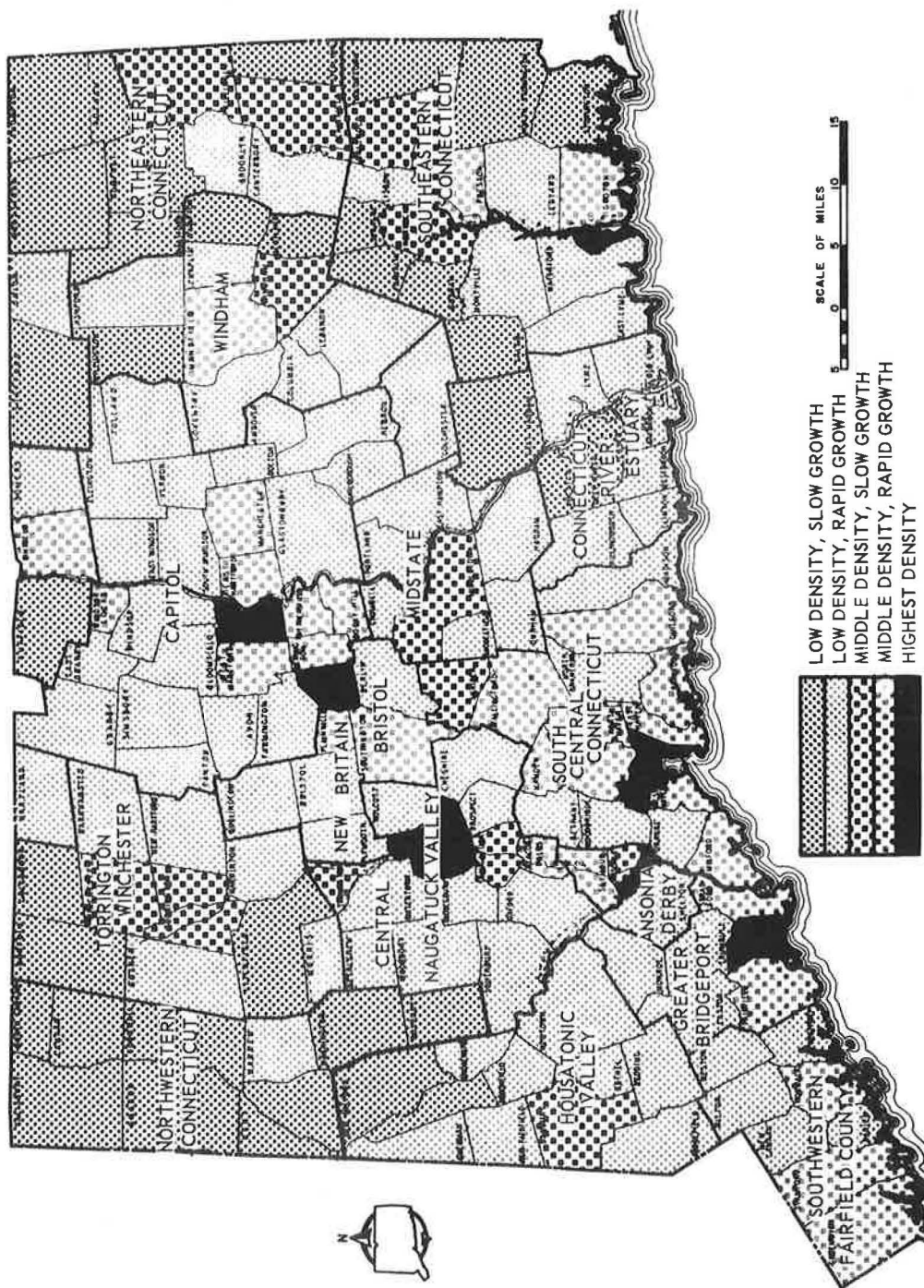
Figure 1. Connecticut towns by town type.

TABLE 2

TOWN TYPE OF RESPONDENTS BY INCOME

Town Type	Respondents in Each Income Group							
	Total Households (%)	Under $3000 (%)	$3000 - 5000 (%)	$5000 - 7000 (%)	$7000 - 10,000 (%)	$10,000 - 15,000 (%)	$15,000 or more (%)	No Answer (%)
Low density, rapid growth 0 to 6.9 persons/net res. acre; 0 to 4.4 decades since half present size	25	14	18	24	27	30	38	33
Low density, slow growth 0 to 6.9 persons/net res. acre; 4.5 or more decades since half present size	10	15	13	11	8	8	4	13
Middle density, rapid growth 7.0 to 15.9 persons/net res. acre; 0 to 4.4 decades since half present size	35	28	28	31	39	40	46	19
Middle density, slow growth 7.0 to 15.9 persons/net res. acre; 4.5 or more decades since half present size	11	14	14	11	11	9	5	10
Highest density, slow growth 16.0 or more persons/net res. acre; 4.5 or more decades since half present size	19	29	27	23	15	13	7	25

The age-density class limits were determined by identifying differences in the responses from towns of different ages and densities to selected questions which produced meaningful distinctions between concerns of different communities (e.g., education, suburban-rural atmosphere, parks and recreation, streets and highways, and jobs).

The towns thus fell into five categories: (a) low density, rapid growth; (b) low density, slow growth; (c) middle density, rapid growth; (d) middle density, slow growth; and (e) high density (including the largest towns and cities all of which have slow growth). Table 2 gives the percentages of respondents living in towns of each type, broken down by income classes. Figure 1 shows the distribution of actual towns, by town type. The analysis of responses to several questions by these town types yielded more sharply distinguished results than the analysis by regions (or any other breakdown for that matter), primarily because the regions are too heterogeneous to permit the precise classification of the respondents involved.

TABLE 3

"TOWN FEATURE MOST LIKED" BY TOWN TYPE[a]

Feature	Respondents in Each Town Type Who Liked Each Feature					
	Total Households (%)	Low Density, Rapid Growth (%)	Low Density, Slow Growth (%)	Middle Density, Rapid Growth (%)	Middle Density, Slow Growth (%)	Highest Density (%)
Suburban or rural atmosphere	19	38	19	15	12	5
General appearance	12	13	14	13	9	9
Parks, recreation areas and facilities	10	5	5	12	9	17
Convenient location	8	7	6	10	8	6
Public education facilities	7	9	4	8	9	5
Shopping facilities	5	3	6	6	6	6
Friendly people	3	3	4	2	4	3
Job opportunities, good working conditions	2	—	3	1	3	5
Good street and highway facilities and maintenance	2	1	1	2	4	2
Redevelopment program (modernization)	2	—	6	1	1	3
Low tax rate	1	1	0	2	1	1
Cultural facilities and activities	1	1	1	1	0	2
Religious facilities and activities	1	—	—	1	1	1
Other	8	6	8	7	9	11
Don't know	2	1	1	2	2	3
None	2	1	1	2	2	5
No answer	15	11	21	15	20	16
Total	100	100	100	100	100	100

[a]Question asked: what feature of your city or town do you like the most?

TABLE 4
"TOWN FEATURE MOST DISLIKED" BY TOWN TYPE[a]

Feature	Respondents in Each Town Type Who Disliked Each Feature					
	Total Households (%)	Low Density, Rapid Growth (%)	Low Density, Slow Growth (%)	Middle Density, Rapid Growth (%)	Middle Density, Slow Growth (%)	Highest Density (%)
Inadequate recreation and entertainment facilities	7	9	6	7	6	5
Poor streets and highway facilities	6	4	7	6	6	6
High tax rate	5	7	5	7	4	2
Poor rail and bus service	5	5	8	5	8	4
Poor government services and facilities	5	7	3	4	3	4
Slum areas, lack urban renewal	4	1	5	3	4	9
Poor shopping facilities	4	6	4	3	4	2
Traffic	3	2	4	4	3	2
General appearance	3	2	3	3	1	7
Politics and management	3	2	2	4	4	3
Parking	2	1	4	1	5	5
Poorly managed planning and zoning	2	4	2	3	1	—
Inadequate job opportunities (not enough industry)	2	2	2	1	5	1
Poor education facilities	2	2	1	2	1	2
Lack of planning and zoning	1	2	1	1	—	1
Poorly managed urban renewal	1	1	—	1	1	2
Racial problems	1	—	1	—	—	1
Planning and zoning too restrictive	—	—	—	—	—	—
Too much urban renewal	—	—	—	—	—	—
Other	12	11	10	13	12	11
Don't know	2	2	2	2	2	2
Nothing, none, satisfied	9	11	8	8	8	11
No answer	21	19	22	22	22	20
Total	100	100	100	100	100	100

[a]Question asked: what feature of your city or town do you dislike the most?

Tables 3, 4, and 5 indicate the attitudes of the respondents categorized by the five town types used for the survey. The questions which produced these responses are given at the bottom of these tables. These were open-ended questions and were coded after the survey forms were all available. The following is a summary of the pertinent information contained in these tables. In this analysis, it is the differences between the various response rates which are the most significant.

Town Feature Most Liked—In response to this question, there were several obvious differences (Table 3).

TABLE 5
"MOST IMPORTANT PROBLEM" BY TOWN TYPE[a]

Problem	Respondents in Each Town Type Who Selected Problem					
	Total Households (%)	Low Density, Rapid Growth (%)	Low Density, Slow Growth (%)	Middle Density, Rapid Growth (%)	Middle Density, Slow Growth (%)	Highest Density (%)
Redevelopment	11	2	5	12	13	21
High tax rate and finance	8	10	10	11	6	3
Inadequate schools and education	8	10	6	9	5	4
Unplanned growth, lack of planning	7	13	6	8	4	1
Attracting and maintaining industry	5	6	5	4	9	2
Provision and maintenance of streets and highways	5	3	7	4	5	3
Provision of government services and facilities	4	7	4	3	4	2
Cost of school construction, education	3	4	4	3	2	1
Providing adequate job opportunities	3	1	5	2	7	4
Poor local government	2	2	1	4	3	2
Inadequate public transportation	2	2	2	2	2	1
Integration	2	1	5	1	—	2
Low income housing	1	—	4	1	1	1
Recreation facilities	1	2	1	2	2	2
Child and teenage recreation	1	1	—	1	1	—
Other	11	9	13	12	10	13
Don't know	3	3	5	4	2	3
Nothing	1	1	1	1	2	—
No answer	22	23	16	16	22	35
Total	100	100	100	100	100	100

[a]Question asked: what do you feel is the most important problem facing your city or town?

1. Suburban rural atmosphere decreases as a most liked feature with increasing density from a high of 38 percent in the lowest density rapid growth towns to 5 percent in the major cities within the State.

2. General appearance holds up well across the entire town type range.

3. The larger towns rank parks and recreation areas substantially higher than the smaller towns, reflecting the fact that the smaller towns have not yet provided these facilities.

4. Convenient location ranks higher in the middle-density rapid growth towns than any other type; perhaps this is why they are rapidly growing.

5. Shopping facilities rating was consistent across the entire range of towns with the exception of the low-density rapid growth towns, where it ranked low.

6. Job opportunities ranked highest in the major cities.

Town Feature Most Disliked—Table 4 indicates the same type of information in reply to the question about the town feature most disliked. For the most part the same types of issues were pinpointed.

1. Inadequate recreation facilities showed up as a problem in the rapid growth towns, ostensibly because these towns have not yet caught up with the new demand.

2. High taxes were pinpointed as a problem in the rapid growth towns, as these towns attempt to provide the required facilities for the new population.

3. Slum areas and lack of urban renewal rated high on the list of problems in the slow growth towns of all density classes, with the highest rating in larger cities.

4. Poor shopping facilities showed up as significantly high in the low-density rapid growth towns (note similarity with the previous table).

5. Poorly managed planning and zoning was mentioned significantly more often in the rapid growing towns of both sizes than in the more slowly growing areas, indicating that this is a problem which these types of towns have not been able to keep up with.

Most Important Town Problem—Table 5 is perhaps the most significant of the entire survey. In this open-ended question, the respondents were given free reign to pinpoint the most important town problem as they saw it.

1. Inadequate schools and education were highlighted in the rapidly growing towns, indicating that these towns had not been able to keep up with the demand for such facilities.

2. Unplanned growth and lack of planning was significantly higher in the rapidly growing town than in the slower growing town.

3. Redevelopment activities, as a problem, increased proportionately with density from a low of 2 percent in the low-density rapid growth towns to a high of 21 percent in the major cities.

4. Providing job opportunities was pinpointed as a problem in the slow growth towns, even including the highest density category. (The difference between the rapid growth and the slow growth middle-density towns is quite revealing and is probably indicative of the reason for the difference in the growth rate.)

5. Provision of governmental services and facilities was pinpointed strongly in the low-density rapid growth towns.

There are substantial differences between these various town types. The significance of these differences from a planning standpoint is obvious. Inasmuch as these variations have been isolated on the basis of physical characteristics of the town, it is valid to assume that as a town changes from one category to another, over time, the town's problems will also change. For example, the problems in low-density towns will eventually change to those of the low-density rapid growth towns as the wave of urbanization moves out. If trends continue, the problems will change from such things as providing adequate job opportunities to questions of zoning, taxes and providing other government facilities. Similarly, as the growth in middle-density slow growth towns accelerates, their problems will in turn change from one category to another. In a sense, this analysis has permitted the planning agencies in these communities to chart the course of their future problems as their towns change from one type to another.

TABLE 6

"TOWN FEATURE MOST LIKED" BY INCOME GROUP[a]

Feature	Total Households (%)	Income Group					
		Under $3000 (%)	$3000 - 5000 (%)	$5000 - 7000 (%)	$7000 - 10,000 (%)	$10,000 - 15,000 (%)	$15,000 or more (%)
Suburban or rural atmosphere	19	13	15	19	19	24	27
General appearance	12	12	11	10	11	14	17
Parks, recreation areas and facilities	10	10	10	12	10	9	11
Convenient location	8	5	5	7	9	9	11
Public education facilities	7	5	6	8	9	8	8
Shopping facilities	5	6	5	6	6	4	2
Friendly people	3	3	3	3	3	3	4
Job opportunities, good working conditions	2	1	2	3	2	3	1
Good street and highway facilities and maintenance	2	2	1	2	2	2	1
Redevelopment program (modernization)	2	2	2	2	1	1	—
Low tax rate	1	0	1	1	3	1	1
Cultural facilities and activities	1	1	1	1	1	1	2
Religious facilities and activities	1	1	1	—	—	—	0
Other	8	8	8	7	7	8	7
Don't know	2	2	3	2	2	1	1
None	2	3	4	2	2	2	1
No answer	15	26	22	15	13	10	6
Total	100	100	100	100	100	100	100

[a]Question asked: what feature of your city or town do you like the most?

General Appearance

One of the more important findings from the CIPP study was the great concern for "general appearance" and "suburban or rural atmosphere." Tables 6, 7, and 8 indicate respectively: the "town feature most liked" by income group; the "State feature most liked" by income group; and the "State feature most liked" by town type. (Also, Table 3 indicates "town feature most liked" by town type.)

Nearly one-third of the respondents indicated that the "town feature most liked" was either "suburban or rural atmosphere" or "general appearance" (Table 6). (The only other feature which ranked close to these two were "parks, recreation areas, and facilities.") There is little difference in the response rate by income group to these two questions combined, although in terms of "suburban or rural atmosphere," the responses increase with higher incomes.

Although the response to "suburban or rural atmosphere" decreases with increasing density and town size, the response to "general appearance" holds up throughout the town type range (Table 3).

TABLE 7

"STATE FEATURE MOST LIKED" BY INCOME GROUP[a]

Feature	Total Households (%)	Income Group					
		Under $3000 (%)	$3000 - 5000 (%)	$5000 - 7000 (%)	$7000 - 10,000 (%)	$10,000 - 15,000 (%)	$15,000 or more (%)
General appearance (upkeep good, etc.)	17	15	15	17	16	20	25
State highway facilities and maintenance	14	14	17	15	15	13	8
Recreation facilities	10	6	12	12	11	10	6
Suburban atmosphere (New England, forests)	7	3	6	5	6	8	15
Geography, climate, size	6	2	4	6	6	7	8
Job opportunities	5	3	3	7	7	5	2
Convenient location	4	3	2	3	4	6	6
Cultural and educational facilities	3	3	2	3	4	3	6
Other	10	10	9	9	9	11	11
Don't know	2	4	4	2	2	1	1
Nothing, none	1	1	—	1	1	1	—
No answer	21	36	26	20	19	15	12
Total	100	100	100	100	100	100	100

[a]Question asked: what feature of the state do you like the most?

TABLE 8

"STATE FEATURE MOST LIKED" BY TOWN TYPE[a]

Feature	Respondents in Each Town Type Who Liked Each Feature					
	Total Households (%)	Low Density, Rapid Growth (%)	Low Density, Slow Growth (%)	Middle Density, Rapid Growth (%)	Middle Density, Slow Growth (%)	Highest Density (%)
General appearance (upkeep good, etc.)	17	20	16	17	15	15
State highway facilities and maintenance	14	13	17	12	19	17
Recreation facilities	10	8	9	11	11	13
Suburban atmosphere (New England, forests)	7	8	3	7	3	8
Geography, climate, size	6	6	6	6	6	4
Job opportunities	5	5	6	5	5	4
Convenient location	4	5	3	4	3	3
Cultural and educational facilities	3	3	4	4	3	3
Other	10	12	11	10	8	8
Don't know	2	2	2	2	2	3
Nothing, none	1	—	1	1	—	1
No answer	21	18	22	21	25	21
Total	100	100	100	100	100	100

[a]Question asked: what feature of the state do you like the most?

The responses to the "State feature most liked" by income group again indicate that "general appearance" is by far the most important (significant) factor (Table 7). As with the response to the similar question for the town feature most liked, the response rate increases somewhat with increasing income, yet it holds generally constant across all income ranges. Similarly, the respondents are consistent in their attitudes, by town type, to the question of "general appearance," although there is a slight decrease in this response from the higher-density larger towns (Table 8).

For purposes of this paper, two aspects of these responses are important: the implication of "general appearance" on the highway program, and the apparently unanswered question as to what the respondents really mean by "general appearance" and "suburban or rural atmosphere."

Table 3, which gives the town features most liked by town type, indicates that in every town type (except the highest-density cities) "suburban" or "rural atmosphere" was mentioned as the feature most liked. Furthermore, "general appearance" (and this includes even the highest-density cities) was given as the second most liked feature. In aggregate these two responses account for nearly one-third of the total responses to this question. In reflecting on these responses, it is impossible to avoid asking what is really meant by "suburban" or "rural atmosphere" and "general appearance," in light of the fact that the responses are so nearly uniform across all town types. Even in the medium-density towns, "suburban" or "rural atmosphere" is the most liked feature.

Inasmuch as these responses carry across town type, it is not reasonable to assume that all the respondents are referring to precisely the same things. Are these people calling for large lots in new subdivisions or some of the particular amenities obtained by this type of development? Perhaps the same amenities could be provided in some other manner on smaller lots or in a different type of development. Until we know the answers to these kinds of questions, it is not possible to determine what should be saved and what can be foregone in the process of urbanization. Certainly, more research is needed to know precisely what the respondents mean by "general appearance" and "suburban" or "rural atmosphere."

The importance of the answers to these questions (and there are many like this) is revealed by a simple calculation which shows that if all of the present residents live on the lot size which they most desire, over 400 square miles of extra land would be required simply to house the present residents (this is 25% of the total remaining land in Connecticut which is presently usable for residential development).

Furthermore, when the town feature most liked is compared to the income of the respondents, the concern for these factors increases with higher incomes. For example, in the highest income category, more than twice as many people listed "suburban" or "rural atmosphere" as the feature most liked, as did those in the lowest category. A similar, though less pronounced, range is noted for "general appearance."

In considering these responses as a source of information for future planning efforts, it seems quite obvious that with continually increasing affluence these two elements will attain even greater significance.

The other issue of importance here is the effect of the "general appearance" response on the highway program. It is quite apparent that the public, in general, is greatly concerned about appearance. For several years the highway program in many areas of the country has been stalled, or at least slowed down, because of the potential impact that the new facilities would have on the appearance of the area. From this cross-sectional representative sampling of the general public, it is understandable why this issue has assumed such great importance. For the highway planner to "sell" his product to this kind of people, the highway must be compatible with the surrounding areas and insure that not only does it not detract from the existing appearance, but preferably improves the appearance of the area through which it passes.

Urban Renewal

One of the more important issues that this survey was designed to investigate was the response of the Connecticut residents toward urban renewal. Therefore, in the tabulation of the open-ended questions, special care was taken to insure that as many data as possible were obtained regarding urban renewal, its acceptance, its quality, etc. Therefore, special categories were established for responses to these questions. The results were extremely significant.

Tables 9 and 10 indicate the "State feature most disliked" and "most important State problem," each tabulated by town type; the lack of urban renewal is pinpointed as the fifth most disliked feature and the fifth most important problem. By comparison, "too much urban renewal" and "too much redevelopment" both resulted in a response rate too small to analyze. However, "poorly managed redevelopment" did show up (Table 10) as an important problem.

The fact that such a high percentage of the respondents mentioned the "lack of urban renewal" as a most important problem and a "most disliked feature," on an open-ended question, seems truly significant. Of further significance is the concern over urban renewal at the State level across all town types (Table 9).

TABLE 9

"STATE FEATURE MOST DISLIKED" BY TOWN TYPE[a]

Feature	Respondents in Each Town Type Who Disliked Each Feature					
	Total Households (%)	Low Density, Rapid Growth (%)	Low Density, Slow Growth (%)	Middle Density, Rapid Growth (%)	Middle Density, Slow Growth (%)	Highest Density (%)
Highway appearance and facilities	8	7	7	8	10	7
High taxes	5	5	6	6	5	3
Government policies, political atmosphere	5	5	3	5	3	5
Climate	4	4	5	5	4	3
Lack of urban renewal	3	3	3	3	2	3
Inadequate recreation facilities	3	3	2	3	1	4
Insufficient public beaches	2	3	2	2	3	1
Air and water pollution	2	2	1	2	3	1
Attracting and holding industry, job opportunities	1	1	2	1	3	2
Lack of hunting and fishing	1	1	1	2	2	1
Poorly managed planning and zoning	1	1	1	1	—	—
Lack of planning and zoning	—	1	0	—	—	—
Highway program (too many highways)	—	—	0	—	—	—
Poorly managed urban renewal	—	—	—	—	—	—
Too much urban renewal	—	—	—	—	—	—
Planning and zoning too restrictive	—	0	0	0	0	—
Other	11	12	11	12	8	10
Don't know	5	5	6	4	3	6
Nothing, none	13	14	12	11	12	17
No answer	36	33	38	35	41	37
Total	100	100	100	100	100	100

[a]Question asked: what feature of the state do you dislike the most?

TABLE 10
"MOST IMPORTANT PROBLEM" BY TOWN TYPE[a]

Problem	Respondents in Each Town Type Who Selected Problems					
	Total Households (%)	Low Density, Rapid Growth (%)	Low Density, Slow Growth (%)	Middle Density, Rapid Growth (%)	Middle Density, Slow Growth (%)	Highest Density (%)
Holding and attracting industry	11	10	9	11	13	11
Providing sufficient and adequate highway facilities	9	8	10	8	13	11
High taxes	6	9	6	6	5	4
Other growth problems (population growth)	5	5	3	6	4	6
Lack of redevelopment	3	1	2	4	3	4
Quality of public education	3	3	3	2	3	3
Railroads, maintaining railroad system	3	3	3	3	1	2
Unemployment and retraining	2	3	2	2	2	2
Politics and government	2	3	2	3	2	1
Water pollution	2	3	1	2	3	1
Poor government services	2	2	1	3	2	2
Cost of public education	2	3	2	2	1	—
Integration	2	1	3	2	1	2
Providing adequate recreation facilities	1	1	1	1	1	2
Crime	1	1	2	1	—	1
Maintaining scenic beauty, open space	1	1	1	1	1	1
Redistricting the general assembly	1	1	2	1	1	—
Poorly managed redevelopment	1	—	—	—	3	1
Lack of planning and zoning	—	1	—	—	—	—
Poorly managed planning and zoning	—	—	—	—	—	0
Too much redevelopment	—	0	0	—	0	—
Planning and zoning too restrictive	—	0	0	—	0	0
Other	6	6	7	5	5	7
Don't know	6	9	7	6	8	10
Nothing, none	1	—	—	1	1	2
No answer	28	26	33	30	27	27
Total	100	100	100	100	100	100

[a]Question asked: what do you feel is the most important problem facing the state?

However, the low-density small towns are somewhat less concerned about urban renewal than are the larger and higher density towns (Table 10). The residents of Connecticut are asking for more redevelopment and urban renewal. In addition there is some concern over the poor management of the present redevelopment effort, particularly in the middle-density slow growth towns (Table 10).

SUMMARY

The purposes of this paper were to demonstrate the use of "living patterns and attitude surveys," to describe some typical findings, and to show how data collection can be economically obtained when combined with travel surveys.

In summary, these surveys serve to provide overall guidance and direction to the planning effort by showing the attitudes and patterns of thinking of a cross-sectional, representative sampling of the population. Perhaps, most importantly, they show how this sampling of people rate things by their relative importance.

It is significant that people from different environments, even though within the same social stratum, have different attitudes. This is reflected by the different ranking of features. Furthermore, different issues are important in different kinds of towns, for people of all social strata, reflecting the different types of problems that exist as towns grow and mature.

The similarities existing between social stratum and environment are also significant. This is indicated by the overwhelming response to general appearance as the "most liked feature."

When included within the framework of a normal travel survey, the cost of the attitude survey is extremely small in comparison to the data obtained.

Attitudes, Community Values, And Highway Planning

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Gaining citizen acceptance of highways is one of the most difficult assignments for the highway planner. Legislators have underlined "community values" for special consideration in highway planning; however, there is little agreement about the nature of community values or how to measure them. Of the various procedures used to identify community values, the attitude survey is one of the most frequently utilized. In practice, opinions are often measured, instead of attitudes. Opinions are simple views, judgments, or beliefs having to do with specific situations. By their nature they are inherently unstable and are open to influence and change by social pressure. The use of opinions as a tool, therefore, has little predictive value.

Attitudes, however, are considered more basic and complex than opinions; they relate to rather abstract elements such as time, convenience, aesthetics, and education. An attitude is a learned predisposition to behave in a consistent manner in a given situation; as such, attitudes are more enduring than opinions. Hence, attitude assessment is a more reliable basis for prediction of terminal action than opinion study.

A variety of techniques exists within the social sciences for attitude assessment. Several of these projective techniques can be adapted for use in predicting behavior of those affected by the location and construction of new highways.

Through the use of projective techniques, attitudes toward basic concepts within the community can be established. From these attitudes, community values can be determined. The reaction to a given aspect of a projected facility can be predicted reliably by knowing the relative importance of attitudinal factors.

•GAINING citizen acceptance of highways is one of the most difficult assignments for the highway planner. Route selection, in particular, provokes much community resistance. Frequently, as soon as alternative routes are made public, community groups become action groups bent on using the most vocal methods to prevent or delay the proposed highway. These delays and preventive actions are expensive both in time and money. In addition, they lower the public image of the highway department.

Public hearings, one of the usual methods for airing objections, often become "gripe sessions" encompassing many issues, some of which are only peripherally related to the highway in question. The statements expressed at these hearings may or may not accurately reflect the true feelings of the people concerned. An individual who has had a recent unpleasant experience on a highway may use the hearing as a place to air his hostility toward highways in general.

COMMUNITY VALUES IN PLANNING

Officials are becoming aware of the disparity between the expressions of feeling presented at a public hearing and the true feelings of the people. As a result, they are attempting to consider what they call "community values" in the planning process. This is evidenced by a recent statement by Frankland and Hill (1): "Community values are the single most important items in the determination of highway location or improvements."

However, there is wide disagreement among officials concerning just what a community value is and how one identifies the prevailing community values in a given situation. Frankland and Hill (1) continue: "... few researchers have attempted to define the concept. Lawmakers have insisted that community values be considered in highway planning; but, they have not told highway administrators what a 'community value' is."

The dilemma must be faced; officials must consider the values of the people in the community through which the new highway will pass, yet few officials agree on what constitutes these values or how they should be measured.

The problems created by attempts to determine community values are demonstrated by the following examples. One method is set forth by the U. S. Bureau of Public Roads (2): "In a democratic society people's values about public expenditure are largely weighted through the political process. The technician has the responsibility for developing alternatives that take these values into consideration and then helping to evaluate the alternatives."

David Loeks (3) presents a simple definition of community values: "... that quality of a thing which individuals or society feels is worth acquiring, protecting and conserving."

In determining community values, Davidoff and Reiner (4) point out that there are several types of studies which may be used: market analyses; public opinion polls; anthropological surveys; public hearings; interviews with informed leadership; press content analyses; and studies of current and past laws, administrative behavior, and budgets.

Voorhees (5) distinguishes between studies and procedures when he proposes that there are three types of procedure that are applied in land-use and transportation studies for measuring values: "focus groups, rating panels, and attitude surveys."

The California Division of Highways (1) has attempted to identify these values in practice, and has found:

> ...that the public's conception of values is vague and all-embracing. We have found the public reacting in a conflicting manner in similar route selection hearings. And, in attempting to compile an itemized list of those "things" included as community values, we find that the list would include nearly every activity known to man. And we could not say that some of the items on the list would be more "important" than others, since we have found that "important" values are only such under given circumstances—they may be "unimportant" in other, even similar, circumstances.

Although there are many situational ramifications to community values, there are underlying motivating characteristics which determine what individuals value and, in turn, influence community values. These factors are known as attitudes.

ATTITUDES DEFINED

Unfortunately, many persons have used the term, attitudes, to describe any and all types of expressions of need, desire, motivation, and even interest of human beings. This is unfortunate because, properly used, the term implies an analysis on a more basic level. Attitudes are enduring, learned predispositions to behave in a consistent way toward a given class of objects or situations. As such, attitudes are very difficult to change. An opinion, on the other hand, is simply a belief, view, or judgment. It is open to reevaluation, hence is more fleeting and more amenable to change than an

attitude. Therefore, these two words are definitely not synonymous, and should not be used interchangeably. Most "attitude studies" have actually investigated opinions. The difference is mainly one of degree. Attitudes should be considered as more basic, more complex, and more motivating than opinions.

Although techniques which are used to elicit expressions of opinion are inadequate for determining attitudes, it must be conceded that opinion studies do represent an attempt to determine what people want and value. Why then, should highway planners be concerned with attitudes? The reasons lie in some of the weaknesses of opinion surveys.

WEAKNESSES OF OPINION SURVEYS

Some of the limitations inherent in the use of opinions and the merits of attitude appraisal are indicated in the following table.

Opinions	Attitudes
Strong social influence.	Little social influence.
Easily swayed.	Enduring motivating force.
Little predictive value.	Useful predictive data.
Opinion-action disparity.	Indicative of behavior.

Opinions are strongly influenced by social conformity and pressures. The organizations to which an individual belongs, the section of the town where he lives, his profession, and his religion all impose constraints on his opinions.

Most people feel a strong need to be socially acceptable in their particular "group." Although there are some individuals who do not succumb to such pressures, the majority will go along with group consensus even if they know the consensus is wrong. Hence, opinions, even when they are those of an individual, often reflect the beliefs of groups to which he belongs.

If group opinions are the ones expressed and these form "pressure groups," why should highway planners worry about what individuals actually think? The fact is that, although an individual may verbally express group consensus and endorse a new idea, when changes are involved which will affect him personally, he may disregard the group position and act on his own. This then becomes the crux of another problem with opinion surveys. What people say and what they do when confronted with real-life situations are not necessarily the same. Predicting behavior from an opinion survey often produces tenuous results. This is particularly true when behavior is being predicted in relation to facilities such as freeways with which citizens have had no previous contact or experience. In these situations, opinions have not proved to be a sound basis for predicting the use of the facility after it is built.

Another weakness of using opinions for behavioral prediction is that they are easily swayed. Being caught in a traffic jam on a particular morning easily influences one's opinion of freeways. However, what a person will do when the new freeway is built may or may not have been reflected in his previous opinions. Attitudes are almost point-for-point more useful for planning purposes, i.e., they are a more reliable basis for predicting behavior.

The identification of attitudes circumvents the problem of social conformity. Attitudes exist toward rather abstract elements such as time, comfort, convenience, cost, prestige, aesthetics, and education. The problem becomes one of defining the relative importance of these elements to different individuals, so that predictions concerning them may be made. By using techniques borrowed from the social sciences, the definition and significance of these abstract elements for the individual may be evaluated. For example, if a person had to choose between having trees or streetlights, which would he choose? Attitudes and values determine the choice. If time is of utmost importance to him, he will not use the six-lane Pogo Expressway if Smedley's Lane is

quicker. Similarly, if convenience is of primary importance, Lake Wazoo, which is accessible only by ski lift, will not be used as much as Colorful Springs, which can be reached by bus, plane, automobile, or train. Obvious as it sounds, the relative importance of factors such as comfort, convenience, cost, time, and prestige becomes vital in designing a system which will be used.

SIGNIFICANCE OF SOCIOECONOMIC FACTORS

Socioeconomic factors differentiate groups of individuals. If it can be shown that specific groups respond in a similar manner to attitude items concerning such elements as time and prestige, and also that these groups behave in a particular manner when confronted with real-life situations, then a firm basis for making predictions is available.

PROJECTIVE TECHNIQUES FOR ATTITUDE ASSESSMENT

Projective techniques are especially suited to identifying attitudes. They have been used in several pilot studies to identify basic motivations and to predict behavior.

The individual does not know what the "right" answer is in any of these techniques. This means that he is not able to give the response he thinks you want. This is one of the greatest advantages of attitude assessment over opinion surveys. The indirect approach provides a means to obtain valuable information which could not be obtained in any other way.

Projective techniques can be either constructive or destructive. Unless they are developed with caution, used with caution, and carefully interpreted, they can provide erroneous and misleading information. However, if used properly, they can aid in building a foundation on which sound planning decisions can be built.

Word Association Technique

The word association technique, which is fairly well-known, presents a list of words to the subjects as follows.

Word Association

1. Highway _____

2. Convenience _____

3. Accident _____

4. Pretty _____

5. City _____

The subject is asked to respond with the first word that enters his mind. As an example, the word "highway" might elicit the neutral word "car." However, individuals with strong positive or negative attitudes toward highways may respond with the words, "pretty" or "dirty" or "noisy." Individuals who respond in this manner to "highway" might respond to "convenience" with the word "car" or "nearby." By looking at the responses to many words and seeing how they interact, it is possible to ascertain positive and negative attitudes. When the responses from this technique are studied in conjunction with responses from the sentence completion and the semantic differential techniques, some indications of basic attitudes evolve.

Sentence Completion Technique

The sentence completion technique, as given in the following table, reveals strong positive or negative attitudes toward basic elements of a proposed facility.

Sentence Completion

1. I wish the city would _____ .

2. Highways are _____ .

3. On vacation _____ .

4. Old buildings should _____ .

The individual is asked to finish the sentences in any manner which he desires. As with the word association, in general, his responses will fall into a pattern revealing basic attitudes. For example, if a subject finishes the first sentence, "I wish the city would not cut down trees, " he reveals a different set of values from the subject who says, "I wish the city would cut taxes, " or "I wish the city would get better roads. " It must be emphasized that it is the combination of responses to many items—not just responses to one item—which reveals attitudes.

Semantic Differential Technique

In the semantic differential technique, originally developed by Osgood, et al, (9), the subject scales each noun, such as city, bus, park, and highway, on a number of different dimensions each of which is described by a pair of adjectives (see following table).

City

Active /	/	/	/	/	/	/ Passive
Strong /	/	/	/	/	/	/ Weak
Cruel /	/	/	/	/	/	/ Kind

Highway

Sharp /	/	/	/	/	/	/ Dull
Fast /	/	/	/	/	/	/ Slow
Large /	/	/	/	/	/	/ Small

Some dimensions seem obviously related to the noun being scaled. Others are more obscure. The very obscurity of some relationships aids in differentiating attitudes, because it is the cluster of nouns described in a specific manner by specific adjectives and the groups of individuals that respond similarly that are revealing.

This technique was used for a study in the area of recreation conducted by E. H. Heath at the University of Illinois. The study dealt with assessment and comparison of the attitudes of adults and youth in a bicultural setting in Albuquerque, N. Mex. Significant differences were found between the attitudes of Spanish-American and Anglo-American subjects relating to recreational needs. Sapora (6) says of this study that these are "...differences which appear to have definite value in program planning and particularly in understanding values and apparent recreation program needs of two different cultural groups. " He goes on to point out that: "Although further statistical analysis than that developed by Heath is needed to provide more conceptually independent measures of attitudes, the approach to learning more about recreational interests, habits, and attitudes using the semantic differential appears to have excellent promise. "

The same technique was used in a pilot study of the effect of a "fear arousing" safety film on physiological, attitudinal, and behavioral measures (7). The experimental treatment of subjects was evident in examining the differences in the semantic differential responses before and after the film.

ANALYSIS

In the analysis phase, responses to attitude items are correlated with socioeconomic characteristics (e. g., income, education, occupation, and family size). It is then determined whether people with certain characteristics who hold certain attitudes behave in specified ways significantly more often then people with other attitudes. Attitudes toward time, comfort and convenience, for example, can be translated into a prediction of the individual's use of a time-saving highway or rapid transit. Similarly, knowledge of attitudes toward convenience and money can be very helpful in predicting use of a proposed shopping center. The interaction of many attitudes toward many aspects of a facility determines an individual's behavior toward that facility, and consequently his constellation of values. During the analysis phase conflicting attitudes are dealt with. Some relative weightings of the importance and strength of attitudes can be assigned. These cannot be treated as physical measures, only as gross relative factors which are indications of the relative importance, to an individual or group, of certain aspects of community life.

The attitudes then become a basis for determining the community values which exist in a given set of circumstances in a given community. If time is a highly valued element and aesthetics is not, this fact can be a very important indication of what will be accepted and what will be rejected. Obviously, in a given community there will be individuals who hold different community values. However, it is likely that people of similar socioeconomic characteristics will hold similar community values. Thus, the presentation of a highway plan to a given group can be oriented toward their particular values. This can be a significant factor in reducing resistance.

THE FUTURE

Studies of attitudes as they relate to highway acceptance and rejection are now under way. In the future, the techniques will be refined, and some indications of their predictive ability will be established. If these techniques prove as valuable as present evidence indicates, then further development and refinement will be warranted. In addition, and most important, they will provide a valuable tool for highway planners. This tool could be used by planners in selecting locations of routes. The attitudes identified by this tool can be used as an indication of community values and as a basis for prediction of use. A continued and expanded research program designed to investigate all possible facets of the application of attitude studies to highway problems is needed. Only then will the ultimate possibilities of these potentially valuable techniques be established.

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