

Social Effects of Modern Highway Transportation

FLOYD I. THIEL, U. S. Bureau of Public Roads

This paper presents evidence of the social effects that highways have created. It deals with social effects on highway users and nonusers, and refers to such effects as mobile and drive-in services and to the effect highways have on public services, opportunities for employment and nonwork activities, and residential patterns and characteristics. The discussion of highway effects on residences, for example, examines such matters as the relationship between highways and urban blight, the differing effects of elevated and depressed highways, and the influence of highways on residential development. The importance of recognizing and publicizing these social effects for better public relations and highway planning is pointed out.

•THE WIDESPREAD SOCIAL EFFECTS of highway transportation are everywhere apparent. In the United States there are now more automobiles than households, more adults holding driver's licenses than library cards (1). However, it is easier to determine that highway transportation is having far-reaching social effects than it is to identify and measure these effects with any precision.

Social effects may be regarded as those influences that change the relationship between people and such social institutions as the family, community, government, schools, and churches. In directing attention to certain social changes or trends that can be associated with or attributed to highway improvements, this paper relies on information gathered by the various highway impact studies and on other pertinent material. Though sociologists may consider a number of additional changes to be attributable to highways, this paper deals primarily with the effects highways have on (a) suburbanization, (b) population mobility, (c) residences, (d) relocation of residences and businesses, (e) employment conditions, (f) public services, (g) church activities, (h) rural areas, (i) recreation, and (j) drive-ins and mobile services. In some cases, these changes or effects overlap.

It seems worthwhile to focus attention on the social effects of highways for several reasons. In addition to the desirability of simply knowing more about the social effects of highways, such information can be of assistance in highway planning, public hearings, and public relations. It is fundamental that planning the locations for highways should take into account the social effects of highways built in the past. The provision that public hearings be held on route location is recognition of the need for taking account of highway effects, social as well as economic. At these hearings, socioeconomic questions may loom large; e. g., the likely effect of a highway relocation on schools, local government services, and residential areas.

The opportunity for improving public relations by developing and disseminating information about the social effects of highways appears to be very real. For a number of reasons, the public relations problems faced by highway builders are sometimes especially vexing. Those opposing or questioning highway projects are often more vocal than those supporting or indifferent to the project. The negative effects of highway construction (dust, noise, inconvenience, etc.) may be immediately apparent and the positive effects delayed so that the negative influence is often overemphasized. Furthermore, objective information as to the social and economic effects of highway projects is often lacking. As a researcher (2) in Kansas put it recently, "Costs are largely in the present, and they tend to be relatively definite and measurable while benefits . . . are only future anticipations and tend to be relatively diffuse and unmeasurable."

EFFECTS AND BENEFITS

It is hardly necessary to state that not all the social effects of highways are beneficial. Certain developments associated with highways (for example, noisy or littered drive-in facilities, poorly planned or administered parks for mobile homes, or ribbon developments) obviously have harmful effects — though these activities may be economically beneficial to certain people, at least temporarily. However, no suggestion is intended that the harmful effects equal or approach those influences that can be classed as beneficial, even if quantitative measures were available for precise comparison. Any investment of the magnitude of the highway system should be expected to result in substantial net benefits, both social and economic.

A good deal of the attention that has been focused on economic effects of highways has been useful in indicating what the social effects are. It seems safe to assume, for example, that increased residential land values which are often associated with highway improvements would be a reflection of certain social benefits — perhaps easier access to libraries, schools, government buildings, churches, friends' residences, and social contacts generally. For fairly small communities (e. g. , 1, 200 population or less,) it is of course possible that bypass routes may be located in such a way that residential and commercial development may be somewhat restricted (3).

SELECTED INDICATORS OF HIGHWAY EFFECTS

Although the title of this paper may suggest that certain social changes are a result or direct effect of highway improvements, these effects, like most social changes, have multiple causes and can be traced to highways only in part. For example, the social and economic changes occurring along Mass. 128 have been attributed to a variety of causes in addition to the highway: to a pent-up need for suburban expansion, to the abundant supply of technically-trained personnel, to aggressive banking, etc. Multiple causes are of course standard for social events and are not at all peculiar to highway effects.

In addition to having multiple causes, cause and effect of social trends interact to such a degree that it is generally difficult to distinguish between them. Highways, for example, may have important influences on family living — by broadening employment opportunities, by facilitating school and church consolidations, etc. At the same time, changes in family composition (e. g. , more children per family or more working wives) have certain implications for highway building.

Although some of the analyses of social and economic effects now under way (e. g. , in Utah, Connecticut, and Pennsylvania) are expected to make possible some quantification in determining the social effects of highways, so far there has been little use of quantitative terms to describe the social effects of highways, and no new advances are claimed in this paper. But as Hennes (4) has pointed out, the lack of precise instruments for measuring changes does not excuse highway people from exercising some measure of intuitive judgment in determining social benefits. To ignore realities because one cannot find numbers to put into formulas would, as he suggests, be most unfortunate.

In the absence of summary quantitative indicators, then, perhaps some of the social effects of highways can be detected by careful observation and analysis of certain social changes or trends that appear to be strongly influenced by highway transportation. For example, some indication of the highway role can be gathered by noting the timing of certain trends. In commenting on the adjustment which farmers make to a loss of land for highway right-of-way, McKain (5) has pointed out that highways may simply accelerate and smooth the way for changes that are inevitable; e. g. , consolidation of farm properties. It seems entirely possible that improved highways may also hasten other changes which would occur later in the absence of a highway. Changes or trends of this nature appear to include the whole suburban movement, population mobility, school and church consolidations, and generally expanded community boundaries, upgrading of residential property, improved public services, larger farms, fewer farm buildings, and more off-farm employment. Other possible indicators of highway effect to which attention is directed include residential development, changes in employment conditions and in recreational activities, and the development of drive-ins and mobile services.

Suburbanization

The phenomenal increase in population of United States metropolitan areas is well known. Since 1950, about 97 percent of the growth in population has occurred in metropolitan areas. Within metropolitan areas, the suburban fringes are experiencing the fastest growth rates — approximately seven times as fast as the rate of growth for central cities. By 1980, three-fourths of the Nation's 245, 000, 000 people are expected to be urbanites (6, 7).

The drift of population to metropolitan areas was underway in this country well before the advent of motor vehicular transportation and can hardly be attributed to improved highways, but the influence that improved highways are having on the current acceleration of the movement of people to the edges of metropolitan areas is undeniable. Of all the influences responsible for the phenomenal growth of the suburbs (mass-produced homes, shorter working hours, easy mortgage financing, septic tanks, and driven wells), improved highway transportation has surely been one of the most influential (8). This highway influence on suburbanization is quite similar to other effects which highways exert and results primarily from the increased accessibility and easier driving which modern highways afford.

A recent Texas study (9) provides a good indication of the important role highways play in suburbanization. This study directed attention to the experience of Richardson, a small community from which travel time to downtown Dallas was cut from over 30 min to about 17 min when the North Central Expressway was completed in 1955. Richardson's subsequent growth (for example, in terms of population increase and manufacturing activity) showed greater gains than comparable towns that were not influenced by the Expressway.

The growth of metropolitan organization has resulted from the conquest of distance as a barrier to community size (10, p 3). With modern highway transportation, it has become possible for almost any worker, regardless of economic or social level, to commute some distance to work. Thus the private auto, which was earlier considered to offer "a picture of the arrogance of wealth," having its beginning "as the rich man's toy (has developed) into the universal magic carpet . . ." (11, pp 49-51; 12). Reducing the limiting effects of distance has permitted an extension of community boundaries of up to 35 mi or more from the center, approximately one hour's travel time.

Modern highway transportation has not only been instrumental in extending the limits of settled areas, but in filling in many of the vacant areas near urban centers. These undeveloped areas resulted from the pattern of development before the 1930's when, in most cities, development was feasible only if the site could be conveniently reached by public transportation. This emphasis on public transportation resulted in the pattern of city growth in major cities frequently assuming a starlike appearance. The present tendency for urban development to spread out more evenly (that is, to fill in gaps between public transportation arteries) has certain advantages; for example, in providing public utilities or public services.

In extending community boundaries and in filling in undeveloped land between public transportation arteries, modern highways have the effect of increasing the supply of land available for urban development. For the Interstate System alone, for example, land near metropolitan areas which is expected to be made suitable for development has been estimated at between 4.5 and 9 million acres by researchers at the University of Washington (13, p. 4-A).

Population Mobility

The mobility of the American people is another effect of the highway system though, like most effects, it does not depend solely on highway transportation. In any one year, about 7 percent of the American people move their place of residence across county lines. Disproportionately large numbers of these are attracted to those areas where they must depend on automobiles and highways for transportation (14). This tendency for people to move is a response to social and economic opportunities. It is purposeful, at least from the point of view of those moving. Migration apparently occurs primarily for economic reasons and "a positive relationship between economic health and migration" has been reported (15). Although the mobility now characteristic of

people may have certain harmful effects (e. g. , family and community ties may be broken or weakened) opportunities for additional desirable contacts may also be opened up. In addition, geographic mobility usually speeds and eases social mobility and reduces provincialism, effects which must be regarded as generally desirable.

Highway Effects on Residences

The suburban upsurge referred to earlier has depended largely on the large-scale conversion of land to residential purposes. Single family residences have become the largest consumer of land in urban areas, accounting for from 50 to 75 percent of the total urbanized area. Thus, the extent of the expansion of urbanized areas (over a million acres a year) is largely governed by the quantities of land converted to residential use.

Effects that modern highways have on residential development are quite apparent. By bringing more land close enough to employment and shopping centers in terms of traveling time, modern highway facilities make it feasible to develop land for residential purposes which was formerly too remote for such development. The attraction that sites near modern highways have for residential developers is so apparent and generally recognized (e. g. , 16) that it hardly seems necessary to cite specific instances where new residential developments have been associated with highway improvements.

Instead of documenting the accepted fact that residential developers tend to gravitate to highway sites, perhaps the effect that modern highways have on residential areas can be discerned more clearly by considering what has been learned about other aspects of the question on which there is less general agreement. Thus, it may be helpful to direct attention to such matters as the opinion of residents toward nearby highways, whether highways attract a particular type of resident, and how highways affect community blight.

Residents' Attitudes Toward Highways.— Although attitudes are no objective measure of benefits or disadvantages, how residents feel about a nearby highway facility provides an important indication of the social impact that the highway has on the local community. A highway needs not only to facilitate the transport of goods and people but also to be generally acceptable to residents of the area through which the facility passes. Without this acceptance, a highway can result in such harmful effects as lowered land values (inasmuch as land values depend on how people feel about property and the surrounding area) and general community blight.

In determining attitudes toward highways, attention must be given to the stage of development of the highway improvement. Typically, the degree of acceptance of a highway facility increases over time, perhaps because positive effects are not immediately appreciated and apprehensions about highway effects are often worse than the actual experience, as was suggested earlier. In spite of this tendency for many residents to be initially suspicious of nearby highways, modern highways appear to be quite acceptable to the major portion of residents in areas served by these facilities. This acceptance is based not only on the attitude that the highway is good for the community generally but, in many instances, on the person's feeling that he personally or his property is benefited by the highway. There is also some evidence that certain "community leaders" display a more favorable attitude toward highway facilities than is the case for average citizens (17). A few of the findings from these attitude surveys are referred to later.

In Texas, about 80 percent of the residents questioned along the Dallas Central Expressway felt that the highway made their property more attractive and increased its value. Along a portion of one San Antonio expressway, about 60 percent of the owners said the attractiveness of their property had been enhanced as a result of the highway improvement, while about 40 percent felt that their property had not been affected. Along another section of a San Antonio expressway (Loop 13) the attitude of nearby residents was favorable by a 2 to 1 ratio. In Baltimore, residents near the Beltway who were questioned also considered their highway locations to be generally satisfactory, with the exception of those located near a particular interchange handling a

considerable volume of truck traffic. Attitude surveys in New York State also indicate that residents have generally found important traffic arteries in their neighborhoods to be acceptable, though the acceptance of a highway facility was found to depend largely on the highway's proximity (18 through 22).

As might be expected, there is a relationship between the proximity of a person's residence to the highway and his attitude toward that highway. In Westchester County, for example, the percentage of residents with a favorable opinion of the nearby highway varied from about 33 percent in the first 100-ft zone to over 75 percent in the 300- to 400-ft zone. The percentage of residents regarding the highway facility as a nuisance was about 50 percent in the first 100-ft zone and only about 5 percent or less in the 300- to 400-ft zone. This relationship is shown in Figure 1 which presents a summary of opinion of residents along two Westchester parkways (23, 24). The tendency for residents near but not abutting a highway facility to have a higher opinion of the facility than residents whose property abuts the highway has been noted in other studies; e. g., in Texas and California. Another finding from the New York studies which agrees generally with results from Texas opinion surveys is that residents with children tend to object more to a nearby highway than residents without children, presumably because of the hazard that traffic may pose.

The general acceptance of highway facilities is based on an interesting combination of reasons (in addition to the general improvement in access to employment and shopping that highways provide). In San Antonio, benefits mentioned by those residents expressing approval of the expressway were the assistance the lighted highway provided in keeping prowlers away, the easier circulation of cooling breezes along the right-of-way, and the entertainment value provided by passing cars. Several of these advantages have been mentioned in other States; for example, in Illinois where advantages mentioned include the interest and activity along the highway, assured light and air, and the park-like environment provided by the broad right-of-way. In New York, residents have referred to the ease that a highway location provides for directing friends and relatives to their homes as a special advantage of highway location (19, 20, 24, 25).

Although there appears to be a general acceptance of highway facilities by nearby residents, opposition is sometimes raised—particularly when a highway cuts through a residential community. For example, those opposing a particular highway location in Rhode Island stated their objections: (a) a four-acre playground will be taken entirely for an interchange; (b) police and fire protection will be more costly because travel distances will be greater; (c) of 443 houses, 114 will be taken and 40 will be isolated, leaving the community one-third smaller; (d) new friendships may develop, but more of the social life will have to be carried on by car; and (e) many children, instead of 15-min walks, will have a 1-mi bus ride (26).

Highways and New Residents.—A highway can have a significant influence on the general character of a community development—either to uplift it or to depress it. One of the ways in which this may be affected is in the type of residents that a modern highway tends to attract.

Several investigations suggest that the type of residential development and the residents being attracted to highway locations are tending to upgrade the communities involved. In Lexington, Mass., a town subject to the influence of Mass. 128, a recent

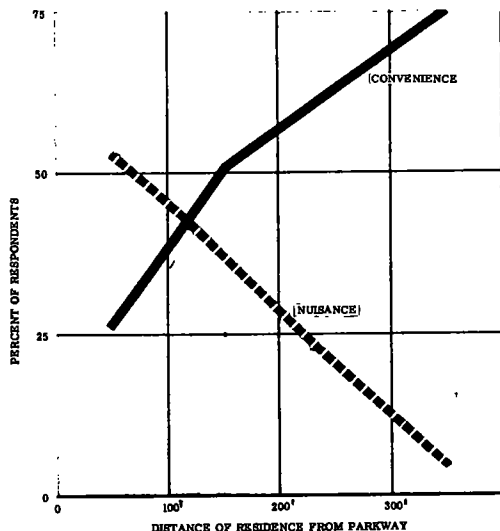


Figure 1. Residents' opinions by distance from parkway (Hutchinson River Parkway and Bronx River Parkway) (23).

study by the planning director (27, p. 176) has concluded that "Lexington is becoming more and more a residential area for professional and technical people and less and less a place of residence for service and operative workers."

In Blairsville, Pa., residents arriving after completion of a new bypass route generally had more formal education, higher incomes, more interest in community affairs, and more upward occupational mobility than was the case for people with a longer period of residence (17). In Monroeville, Pa., where rapid development has been experienced along with greatly improved highway access, recent residential construction has been reported to be predominantly for white collar employees, in contrast to the character of earlier residential development (28). A similar upgrading in residential development has been associated with the Atlanta Expressway in Georgia.

Though it may be true that "more often than not the express highway will set the tone of the community and enhance its development" (29), caution should be exercised against overstating the highway influence. Some increase in the proportion of technical and professional people attracted to any new development, with or without highways, is to be expected in view of the increasingly higher educational and training standards for the work force. For example, since 1900, the percentage of the labor force accounted for by professional workers has increased some 50 percent while the percentage of manual workers has dropped. From 1960 to 1970 the number of professional and technical workers is expected to increase about 40 percent without any significant change in the number of unskilled workers (30, 31).

Highways and Community Blight. — Highways can affect blight in several ways. The noise and accident hazard associated with some highways, especially those with free access, can have a blighting influence on nearby residences. Even limited access highways may pose this danger if residences are too close or poorly oriented to the right-of-way. But highways can also be useful in reclaiming blighted areas and in avoiding blight.

One way in which highway improvements are affecting blight is the removal of sub-standard structures. Because of the low cost of obtaining right-of-way property in a run-down condition, construction of the Interstate System has given a substantial boost to urban renewal efforts in a number of cities; for example, San Antonio, Dallas, Pittsburgh, and Boston.

In Boston, it has been estimated that at least 50 percent of the households displaced for the segment of the Inner Beltway between Memorial Drive and Massachusetts Avenue would have been displaced for urban renewal in any event (32). In addition to providing an impetus for clearing slum areas, the payment provided for the direct cost of property taken for the highway can assist localities in clearing out these areas. Figure 2, a portion of the Santa Ana Freeway in the Los Angeles area and structures cleared for the right-of-way, shows a desirable change from a marginal or blighted area of mixed land use to a well-landscaped transportation facility. The Federal Reserve Bank of Boston has referred to the effect that highway construction has on urban development as follows: "A web of new

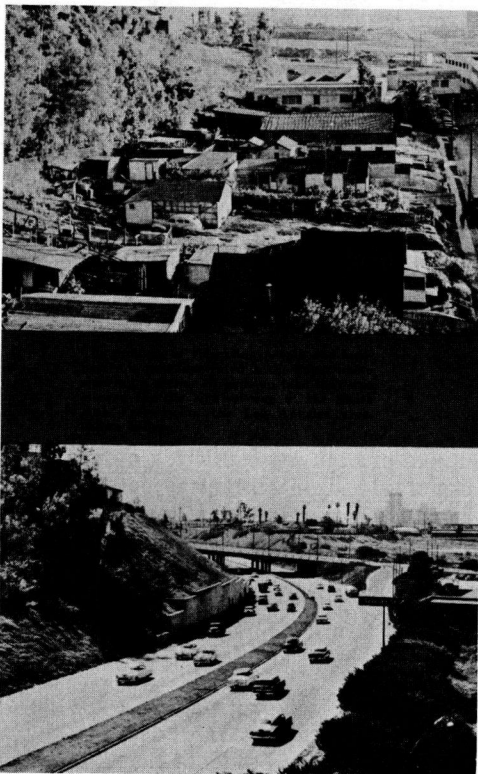


Figure 2. Before-and-after view of Santa Ana Freeway (29, p.23).

highways across the land is eating out slums . . . and generally changing the faces of our cities" (33).

Highways can also serve to avoid blight by providing boundaries between differing uses of land. Because modern highways are ordinarily broad, well-landscaped, and quite permanent with few traffic starts and stops, they make effective barriers; e.g., between residential and industrial areas. In Baltimore, Rouse and Owen (11) have compared the Waverly and Hampden areas, stating that Hampden has been able to keep its identity and avoid blight because of its surrounding barriers — including highways. The effective use of a highway facility to separate industrial and commercial uses of land from residential areas is shown in Figure 3 involving the Gulf Freeway.

Geographical separations caused by highways can sometimes be undesirable; for example, elementary school district separations. This reinforces the need for coordinating highway planning with land-use planning. As Armstrong has said, "A highway resembles a hallway with the same need for a blueprint to show what is to be on either side — living rooms, office space, bedrooms, etc." (34). Enough experience has been gained with residential areas adjacent to modern highways to demonstrate that the two can be compatible if they are properly coordinated. Figure 4 shows a successful way of locating residential areas near a highway, with deep backyards abutting the highway. It is encouraging that over four-fifths of the 1,239 urban places of 10,000 population and over, which have responded to a Bureau survey (total number of such places=1,749), report the existence of a comprehensive, a transportation, or an arterial highway plan (35).



Figure 3. Varying land uses along Gulf Freeway. (Source: Gulf Freeway Study, Norris & Elder.)

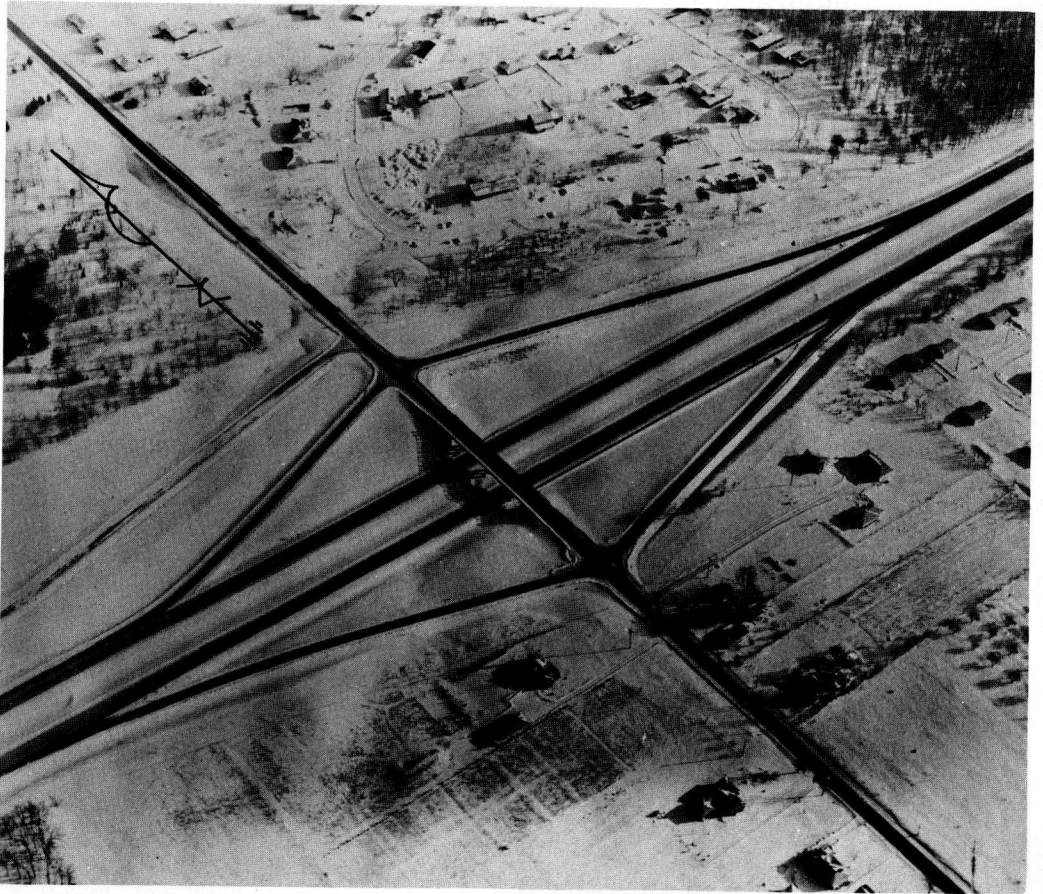


Figure 4. Residential lots oriented to a modern highway; aerial view after construction (36).

Relocation of Residents and Businesses

Although more detailed information is needed to show what happens to the people displaced from land taken for highway right-of-way, enough has been learned already to suggest that certain adjustments may be typical. Investigations in several different locations indicate that displaced residents often improve their living conditions, either by upgrading houses that are moved to new lots or by purchasing better quality houses. In fact, there is sometimes such an upgrading in housing that total assessed valuation for people relocating in the same community is greater than assessed values for all those who were displaced.

The cost of relocation cannot be measured in dollars alone. Many of the displaced businesses are in blighted areas and are run by part-time operators who use the business to supplement their retirement income. These businesses seldom survive a move. Of course some of the social costs of relocation are temporary and many of the displaced families are happier once the readjustment is ended (37, 38). It is easy, however, to overestimate the highway influence when upgrading accompanies relocation. There is also the possibility that some people improve their housing conditions because more moderately priced housing is unobtainable, though such cases would no doubt be few.

Employment Conditions

Modern highway transportation affects employment and employees in several important ways. Improved highway transportation has the effect of bringing additional employment opportunities within commuting distance. Highway improvements also commonly result in a saving to employees, in time or money or both. For employees working in locations served by a modern highway (e. g., in industrial parks), a further benefit of easy and economical parking ordinarily results. The reliance on highways for commuting to work is shown by the results of a recent survey in 20 States — almost 70 percent of all workers rely on the automobile to go to and from work (39, 40).

The importance of bringing additional employment opportunities within commuting distance can hardly be overestimated. Increased employment opportunities increase the likelihood that individuals will be able to find suitable employment, jobs that are at a level more nearly corresponding to their full capabilities where they "can make their greatest economic contribution to society and derive the greatest economic advantage" for themselves. Such a broadening of the labor market "gives a man access to jobs which previously were denied him and is real social gain" (41). As the Baltimore Regional Planning Council has stated, "an important goal to be considered is the desirability of maintaining a variety of employment opportunities accessible from any given residential area so that a change of job will not necessitate a change of residence away from established social ties" (42).

That workers are traveling increased distances to work using modern highways appears undeniable. Like many other types, work travel is thought of in terms of travel time rather than distance. Of those workers using automobiles for the trip to work, over 10 percent have a one-way travel distance of over 15 mi, and about two-fifths of these travel 25 mi or more. In Detroit, one out of five workmen are reported to travel over 10 mi to work. In Atlanta, 15 percent of the labor force crosses county lines to employment, and these commuters typically travel about 33 mi on public highways. A number of workers have been found who travel as far as 60 mi to work; and around Boston, commuters on the modern design Mass. 128 spend about the same amount of time in traveling about 15 mi to work as others spend in going an average 8.5 mi on other routes (43 through 46). This apparent advantage of a modern highway system may of course result in part from other causes; e. g., less settlement or congestion in the area served by Mass. 128. Thus, "areas for recruitment of labor have widened and . . . workers will travel long distances to their place of employment" (47, p. 21). No longer are "poorer wage earners . . . under a strong compulsion to huddle close to their places of work" (48). In fact, commuting to factory employment now extends into rural areas to such a degree (partly as a result of industry decentralization) that many so-called "farm-to-market" roads have, in effect, become "home-to-work" routes (49, p. 6). Figure 5 shows the effects that a modern highway apparently had on the commuting pattern of one firm's employees.

Highway Effects on Public Services

Highway effects on public services resemble the effects on many other aspects of American life. Some of the highway influences appear to be harmful while others are beneficial. In some instances, areas subject to the influence of a modern highway

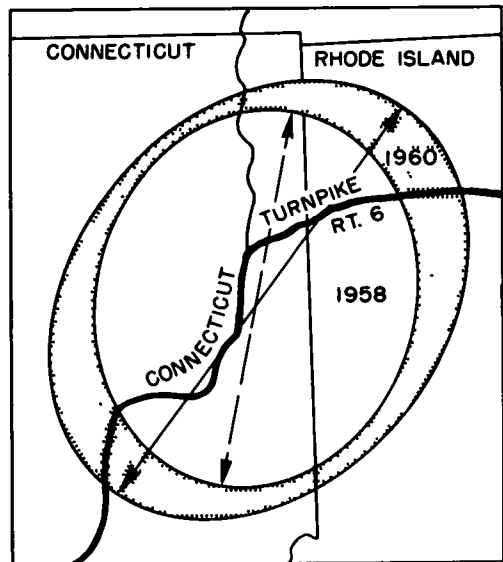


Figure 5. Labor market change, 1958-1960, for one manufacturing firm in eastern Connecticut (51).

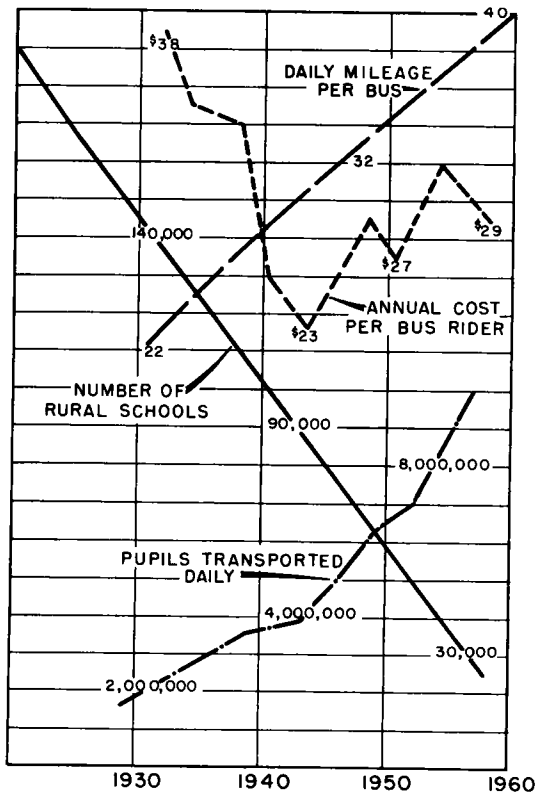


Figure 6. Trends in school bus operations and number of rural schools. (Sources: National Education Association and Wilbur Smith and Associates.)

have been associated with increased demands (and higher costs) for education and other public services (50) as well as with increased tax rolls to help pay for these increases in public service. Perhaps the most important effect of improved highway transportation on public services is the influence that highways exert for making public service facilities available more generally and for providing these services more economically.

Protection Services. — Services such as fire and police are clearly dependent on the availability of efficient highways. The fairly elaborate systems which fire fighting organizations employ for mutual aid in case of catastrophic fires provide an example of this important reliance on efficient highway transportation. Police protection may be enhanced by making police officers more mobile, by increasing coordination between State and local police, and by using more centralized headquarters. All of these effects have at some time been associated fairly closely with highway improvements.

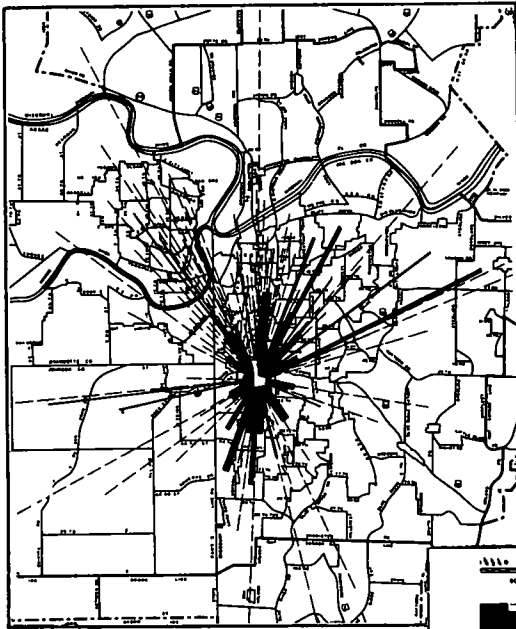
Education. — This has undergone several marked changes that appear to be quite directly related to highway improvements. Some of these changes are shown in Figure 6. The number of rural one-room schools has declined from about 190,000 to 25,000 during the past 40 years. During this same period, the number of pupils transported in school buses has increased, and the unit cost of transporting pupils has declined.

This lower cost appears to be due at least in part to the improved efficiency of highway transportation. During the past 30 years, the daily mileage traveled by each bus has nearly doubled (from 22 to 40 mi) and the number of pupils carried by each bus has increased. Other educational improvements apparently due partly to improved highway transportation are gains in school enrollment (both in absolute numbers and in the proportion of the school age population enrolled) and gains in the average attendance of enrolled pupils. Absentees in public schools in 1900, for example, averaged over 33 percent of enrollment compared with an absentee rate of only 12 percent in 1958.

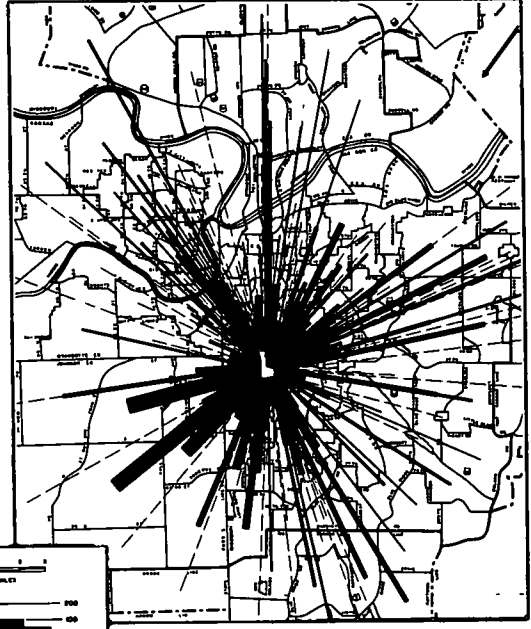
The increasing feasibility of daily highway travel to educational establishments has special significance for higher education. The burgeoning United States population combined with higher and higher expectations of education would place an intolerable burden on colleges and universities if these institutions had to provide living facilities for all attending college. In addition to offering colleges and universities some relief in providing dormitory space, commuting from home to college often permits young people who cannot afford to pay room and board to attend college. Such commuting by auto obviously may aggravate parking problems on campus and nearby.

Comparison of Figures 7 and 8 shows typical changes that have occurred in the pattern of commuting to an institution of higher learning during the past 20 years. The increased volume and greater distances involved are quite noticeable. At many colleges and universities, nearly one-half the students arrive by automobile (51, pp. 19-23).

Postal Service. — Changes in postal services also reflect certain highway effects as well as such general changes as increased population mobility and suburbanization.



1939



1959



Figure 7. Residences of commuting students, University of Kansas, 1939 (51, p. 20).

Figure 8. Residences of commuting students, University of Kansas, 1959 (51, p. 21).

Improved highway transportation appears to be at least partially responsible for the trend to longer rural delivery routes, fewer post offices, and an increase in the portion of mail being hauled by highway.

Changes in rural mail delivery routes show a remarkable improvement in productivity. The average length of rural mail delivery routes has increased from 27 mi in 1920 to 56 mi by 1959. Table 1 gives additional information about the development of rural delivery routes. In addition to improved highway transportation, these increased

TABLE 1
RURAL FREE DELIVERY ROUTES, 1900-59¹

Year	Number of Routes	Length of Routes (10 ³ mi)	Avg. Length of Routes	Annual Travel (10 ² mi)
1900	1,259	29	23	-
1910	41,079	993	24	303,007
1920	43,445	1,152	27	348,627
1930	43,278	1,335	31	404,738
1940	32,646	1,402	43	424,704
1950	32,619	1,493	46	453,260
1959	31,377	1,753	56	532,677

¹Source: (52) Table 649, p. 509, for 1900-50 and U.S. Post Office Department for 1959.

distances which rural carriers travel have no doubt depended on the more lenient requirements for establishment of rural delivery routes; e. g., from 4 families per mile traveled before 1953 to 2 families in 1959 (53, p. 10).

Increasing reliance on highway mobility has apparently been a contributing factor in making it possible for the Post Office Department to close a substantial number of smaller post offices without impairing postal service. Thus, from nearly 77,000 post offices in 1900, the number has now declined to less than one-half this number — approximately 36,000 (52, p. 507) — although many new post offices have been established during this same period to serve areas with increasing populations. Though the number of post offices has declined, the volume of mail has increased many times over; in recent years, the percentage increase in mail volumes has been about twice that of the population. As suggested earlier, increasing use is being made of highway units to handle this growing volume of mail.

Health Services. — These have also been affected in important ways by improved highway mobility. This improved mobility extends to many phases of health service — patients, physicians, visiting nurses, health inspectors, health testing units, etc.

Medical doctors were among the first users of the automobile. Automobiles permitted them to increase the number of patients they could call on — from 5 to 7 a day to perhaps 8 to 10 a day. Gradually, however, "owing partly to the automobile and partly to improvements of roads . . ." (54, p. 237) the practice of home visits changed until now the practice is for patients to visit the doctor's office. The increase in productivity of doctors resulting from this change in mode of operation (under which patients bear the burden of transportation) has been quite spectacular — from 15 to 35 patients are now seen daily. An American Medical Association study notes that in a rural county in Illinois, 16 physicians in 1950 provided more service for more people than 42 physicians had done in 1920.

The effectiveness of such health facilities as hospitals often depends largely on how accessible they are. Travel time to the facility may be all important. In some instances as many as 75 percent of all hospital patients arrive by motor vehicle.

Location Criteria for Public Service Facilities. — These criteria provide some indication of the effect highways have on public services. In general, service areas are expanding and accessibility is being recognized as more important than being near the geographic center of the area served. Thus, police stations may be established on an accessible site with space for parking. Schools may be located away from main thoroughfares to avoid grade-crossing problems. Public service activities that might annoy nearby residents (e. g., senior high schools and hospitals) need locations removed or isolated from residential areas but accessible to arterial highways. Physicians are of course locating more and more in suburban areas, many of them in medical centers oriented to high-capacity highway facilities (55). Libraries, especially those downtown, need to be accessible to both pedestrian and motor vehicular traffic. Figure 9 shows a dramatic example of the emphasis that has been given to accessibility in locating a library building.

Highway Influence on Voluntary Associations

The role that improved highway transportation has played in creating opportunities for new associations and in changing many local neighborhood ties is fairly apparent and has often been commented on. According to Hawley, for example, highway transportation, "more than any other single factor, has revolutionized the pattern of local relations." With the expanded community made possible with modern highway transportation, "the traditional support of local government, the church, the family, the neighborhood groups, is weakened." The services formerly derived from such units, if sought at all, are found in better equipped and more widely scattered units (56, pp. 406-418). Like many other highway effects, then, it appears that the influence highways have exerted on participation in voluntary organizations has been beneficial in some ways and harmful in others.

The easier participation in church, fraternal, social, civic, or other voluntary organizations which improved highways permit is suggested by the results of a Connecticut

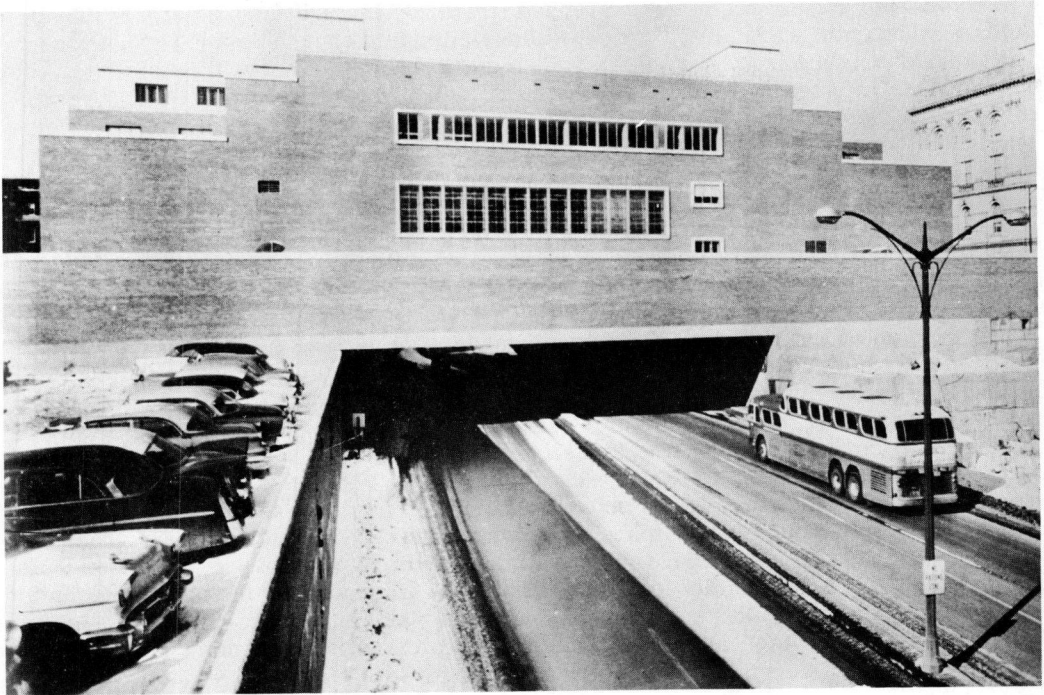


Figure 9. Building spanning highway is a public library in Hartford, Conn. Windowless section at base of building houses girders supporting structure in addition to containing library's basement stack areas.

study conducted some years ago. This survey of over 1,800 suburban families revealed that those families located on hard-surfaced roads had an average of nearly two memberships in voluntary organizations per family compared with an average of only about one-half membership for those families not located on hard-surfaced roads (57).

Among voluntary associations, variations in church experience and activity provide some indication of the effect of highway transportation. As might be expected, church activities provide a fairly close reflection of population movements. Thus, suburban churches are generally growing and prospering while churches in downtown areas of large cities and in rural locations are having difficulty in continuing.

Much of the general increase in total church membership (now about 113,000,000) and in the percentage of the population associated with a church (63 percent in 1961 vs 41 percent in 1910) has occurred in suburban areas (58, p. 147; 59, p. 15). A survey of over 4,600 Protestant churches in 23 metropolitan districts and 3 suburban counties shows that 70 percent of those in suburban areas have been growing (60). The Catholic church has experienced a similar growth in the suburbs, some 55,000 members having been added each year in the newer sections of Los Angeles alone in recent years (61, p. 65).

As previously suggested, the general growth in church activity has not been experienced in city locations or in rural areas. The survey of Protestant churches (60) revealed that a decline in church activity was experienced by 23 percent of these metropolitan churches, a disproportionate number of which were in downtown locations. In rural areas, Protestant churches closed at the rate of 1,000 per year between 1946 and 1956 (62).

Several of these changes in church experience are clearly related to improved highway transportation. For example, it seems reasonable to infer that trips for church attendance are becoming longer. This follows from the fact that the average number

of members per congregation has increased (from 235 in 1926 to 357 in 1959) (63, p. 280) even though an increasing portion of those attending church reside in suburban areas where population may be quite scattered. In helping to make it feasible for people to congregate in larger groups, highways have no doubt been at least partially responsible for the closing of many rural churches. Rural church difficulties may, of course, come about because former members travel farther to attend larger churches or because of the "intensified competition for the time of nominal adherents" (56, pp. 419-420). The beneficial effect that highways have in making pastors more mobile (for calls on parishioners and in many cases for dual preaching assignments) seems especially important in view of the growing shortage of clergymen. The number of clergymen has increased from about 118,000 in 1910 to 171,000 in 1950, a growth relatively smaller than that of church membership (58, p. 147).

The wisdom of locating near highways of modern design, as a number of suburban churches are doing, seems undeniable. The advantage of going on display along a heavily traveled highway may even be greater for churches than for other establishments locating along modern highways. Unlike school, work, shopping, and family associations, church affiliation is sometimes so tenuous that many people new to an area will make little effort to locate a church to attend. In the shift of population from rural and central city areas to the suburbs, many people delay affiliating with a church in the new area. In one suburban area in Connecticut, 25 percent of the new residents were found to have no church affiliation compared with 13 percent for those residents who had been in the community for some time (57). The need for having their location known to the mobile population — perhaps by locating along a modern highway — is further suggested by the fact that 50 percent of all Protestant church members have joined their congregations during the last ten years (64, p. 44).

Rural Effects

Improved transportation has generally been regarded as one of the more important forces underlying the American agricultural revolution (65, p. 808). In this transportation improvement, highways and motor vehicles have become an increasingly important part. Both passenger automobiles and trucks are particularly well suited to the needs of farmers and farm operations. Of all motor trucks, nearly one-fourth are in farm use, although the farm population constitutes a much smaller portion of the total population than this — slightly over one-tenth. Further, since 1940, the number of farm trucks has tripled, although the farm population during this same period has declined.

Figure 10 shows some of the changes that have been occurring recently in rural areas. The figure shows both the number of farm operators working off the farm and the number of hired farm workers have been increasing significantly during the same period that the total number of farm operators has been declining. These changes involve increasing mobility of the farm population, and highways are often the sole means of transportation in rural areas. Farm labor (both migratory and local day haul workers) is supplied practically 100 percent by highway. The importance that highway networks have on an adequate supply of farm labor is suggested by the fact that certain areas in New Mexico and Nevada located some distance from major highways have a chronic shortage of farm labor.

Highways are of course having a profound influence on living in rural areas. Changes in rural life which are attributable in part to improved highway transportation include wider opportunities for nonwork activities, increased opportunities for off-farm employment, and a general improvement or upgrading in rural areas as places in which to live.

That opportunities for such nonwork associations as shopping, recreation, and church, lodge, and farm meetings are increased with improved transportation is suggested by the increasing participation in these activities by farm people. In 1920, for example, 12,000,000 attendances at farm meetings occurred; in 1957, 77,000,000 attendances were recorded even though the total number of farmers has been declining (66). The influence of improved highways in "facilitating attendance at farm meetings"

has been noted in Missouri where highways have been credited with speeding "the work of county agents (and facilitating attendance) at social gatherings and church" (67).

In providing alternative opportunities for the close family relationships which have been traditional in rural areas, improved highway transportation may tend to weaken such relationships. Although the many changes that have altered farm life at such a rapid pace have created problems in family relationships and social orientation, these changes have, nevertheless, opened up new horizons and new opportunities for self-improvement and enjoyment of life in rural areas.

The tendency for more and more farm people to work in off-farm employment appears to result from several influences. As a result of the current technological revolution in agriculture, of which highway transportation improvements are an important part, farm people now have more time available for nonfarm employment. Also, the increasing dispersal of industry into rural areas has made more employment opportunities available than formerly existed. This is shown by a recent study of rural industry in North Carolina which found that one-third of the population in rural areas consists of non-farmers and concluded that "a primary contributor to this has been the automobile" (49). The tendency for modern highways to be associated with increased off-farm employment has been noted in a number of other locations; for example, in Iowa where the improved access provided by an Interstate route was credited in part for a higher-than-average rate of off-farm employment (68).

That the attractiveness of a rural area as a place to live should be enhanced as a result of improved highway service seems only natural, and this development has been noted in several instances. In Montana, for example, a road improvement was rated as making the farm home a more pleasant place to live by 78 percent of the farm people queried (69, pp. 18-40). Among the specific advantages referred to by Montana farmers contacted were (a) ease in visiting other farms, (b) elimination of dust, (c) easier marketing and buying, (d) improvement in school bus roads, (e) easier commuting to college, and (f) faster service in emergencies; e.g., medical visits.

In Texas, several improvements have been observed in the rural community served by the Camp Creek road. Following the upgrading of this road, the number of dwellings along the highway increased, in spite of the general migration away from Texas farms. The upgrading of this road apparently reversed the tendency for this farm neighborhood to disintegrate as a result of farmers or retired farmers moving to town. Several of the new house owners said they would not have built along this highway if it had not been improved (70).

Farms partially taken for highway right-of-way ordinarily experience a sharp impact. As suggested earlier, there are some indications that partial takings have the effect of hastening changes that would occur later in the absence of the highway. Changes that have been tentatively associated with partially taken farms include increased employment off the farm, increased farm consolidations, dispersed farm operating units, fewer buildings per farm, and higher farm mortality. With the regrouping following highway acquisition, the farm units losing land for highway right-of-way have, in

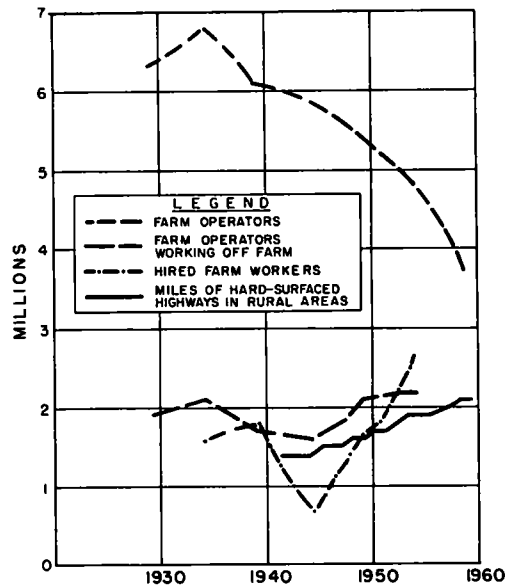


Figure 10. Some features of farm labor and miles of hard-surfaced highways in rural areas. (Sources: U. S. Bureau of Public Roads and U. S. Bureau of Census.)

several instances, ended up with more land than they had had previously.

Highway Effects on Recreation

The differing ways in which highways have affected recreation have been commented on recently by Owen, who deplures the taking of park and recreation land for highway right-of-way, but points out that highway transportation often makes possible the fullest enjoyment of park areas (11). Acquiring highway right-of-way has in some cases necessitated taking portions of recreational areas, an effect that should obviously be avoided if possible. Criticism has also resulted from the alleged lack of "intellectual stimulation" and "emotional content" (71) of modern highways; but highways have often been given credit, along with increased leisure and income, for the tremendous increase in recreational facilities and activities (72). At a recent New York-New Jersey Regional Recreation Conference, for example, "the tremendous expansion of the arterial network criss-crossing the metropolitan region" was referred to as making possible the "phenomenal growth of the park system" (73). In the New York-New Jersey region, the arterial system has not only provided "easy access . . . to the State park systems" but has, in addition, "provided the neighborhoods in the city through which it passes with hundreds of acres of urgently needed neighborhood recreation space" (74).

There is a strong association between highway travel and recreation. In California, the total passenger-miles traveled for recreation has been reported to be as great as for all other purposes (75), and the strong reliance of many recreational areas on good highway transportation has been well documented. In Yellowstone National Park, for example, the number of annual visitors increased from 52,000 before 1917 when no cars were permitted inside the park to 250,000 annually in the 1917-1927 period; and in 1959, 1,400,000 persons visited Yellowstone (76, 77).

Drive-Ins and Mobile Services

Among the most obvious of the ways in which highway transportation is influencing the American way of living are the various drive-ins and mobile services. The variety of commercial enterprises or services that have been established as drive-ins or as mobile facilities is quite remarkable, regardless of whether these highway-oriented establishments are considered desirable.

Drive-in facilities have been used for such endeavors as banks, churches, laundries, telephones, insurance claim windows, drug prescription windows, tax offices, car washes, mail and library deposit boxes, and motor vehicle registration windows; and the number has grown phenomenally. The original drive-ins (filling stations) have increased to over 182,000. Other types of drive-in facilities that have become fairly numerous include motels, 58,000; bank windows, 6,000; and drive-in restaurants, 30,000.

Drive-in restaurants are among the fastest growing types of drive-in establishments. Three out of each five new restaurants being established are drive-ins, and about one-third of all money spent at restaurants is accounted for by drive-ins. There may be some cause for concern in the rapid growth of these eating establishments, because there are sometimes objectionable noise and litter problems associated with these businesses. An analysis of the relative desirability of retail trade locations shows that drive-in restaurants are incompatible with nearly all other types of businesses (78, pp. 70-71).

The growth and variety of mobile services has paralleled that of the drive-ins. Mobile homes, for example, have shown a phenomenal growth. Retail sales of mobile homes have increased from about \$13,000,000 in 1930, to \$39,000,000 in 1954, to \$600,000,000 in 1957; and about 3,333,000 persons are now housed in these units, the majority of them in some 13,000 mobile-home parks. The popularity and community acceptance of mobile-home living varies considerably from region to region. As might be expected, it appears to depend in an important way on climate, mobile homes having generally been more popular in southern and western regions of the country. There appears to be a growing awareness of the need for planning sites for these abodes to fit in with residential areas of the conventional type and with other land uses (79, 80).

Other less common activities that have been made mobile on the highways include swimming pools and, curiously, bee hives. A few resourceful beekeepers have been able to stretch out the honey-making season by mounting bee hives on trucks and transporting them between Minnesota and Texas, between southern California and Idaho, and between New York and Florida (81).

CONCLUSION

These are some of the ways in which highways affect the American way of living. MacDonald had listed as one of the objectives of highway improvement the provision of serviceable facilities "for social and recreational purposes" (82), an objective that is being accomplished at least to some degree. Much of the information cited is, of course, general in nature so that the highway effect can only be inferred and not definitely proven. But the pervasive role that modern highway transportation plays in urban and rural living is undeniable. Thus, though there may be some question as to whether improved highway transportation has been the cause or the effect of some of the changes referred to, it is clear that without modern highway transportation life in urban and rural areas would be far different from what it is today.

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