IMPACT OF HIGHWAYS ON URBAN NEIGHBORHOODS: A MODEL OF SOCIAL CHANGE

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This paper describes a model of urban neighborhoods in which certain physical and demographic characteristics of a neighborhood are related to the amount of social interaction that occurs within that neighborhood. Once properly validated, this model might be used to estimate the changes in social interaction in urban neighborhoods as a result of highway improvements. It is proposed that the degree to which a specified geographic area functions as a neighborhood be calculated in terms of the amount of social interaction and cohesion evidenced by the residents' shared behavioral patterns (personal interaction, use of local facilities, and participation in local organizations) and perceptual patterns (identification with local area, commitment, and evaluation). Through the use of factor analysis, these variables can be combined into a single number, called the neighborhood social interaction index. This index is useful in that it is highly predictable from data (called descriptors) that describe specific physical and demographic characteristics of the neighborhood. These descriptors are mobility of the population (which explains most of the variance in the index), land use mix, and housing density. The influence of highways on the neighborhood social interaction index can be predicted by estimating highway-related changes in these 3 descriptors. Highway characteristics that could change these neighborhood descriptors are amount of land taken and placement of the highway with respect to the spatial dispersion of these descriptors. Highway characteristics that could change intraneighborhood accessibility are the preceding two plus number of crossovers per mile and elevation of the roadway. The neighborhood social interaction index, when validated, could be used in making decisions regarding the neighborhoods through which the highway should be routed, where the highway should be located within the neighborhood, and the character the highway should have within the neighborhood.

•WHEN a highway is built through or close to an urban neighborhood, an enormous variety of physical, economic, political, and social changes occur. Although many of the changes experienced by highway users have been explicitly measurable for sometime, the accounting system for nonuser benefits and costs is incomplete, particularly with respect to changes in the social functioning of those people remaining in neighborhoods affected by the highway construction. This paper represents an attempt to make such changes explicity measurable.

It is readily apparent that the social effects of highways—those changing the functioning of groups of people—are very much different from those effects that change the welfare of individuals or that change the overall environment, particularly with respect to their frequency of occurrence and geographic specificity. Social effects on the neighborhood as a whole occur only to the extent that an informal network of social support exists within the neighborhood. It is, therefore, possible that in some areas the social changes produced by highways will be negligible. This is not true for individual and environmental impacts, which will be incurred in all neighborhoods. The social impacts

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are restricted to the area defined as a neighborhood, but there is no reason for the individual or environmental effects to end at the neighborhood boundary and, in fact, they do not.

To measure social changes, one must address the following questions: What is a neighborhood? What functions do neighborhoods perform that other areas of the city do not? Can these functions be estimated from available data, or must they be measured for each neighborhood? How do highways affect the nature and the magnitude of the social interaction in urban neighborhoods?

THE URBAN NEIGHBORHOOD

Previous research on neighborhoods has produced little agreement on basic concepts, patterns of causality, or even a precise definition of neighborhood. [The first full explanation of the neighborhood unit theory—more a principle than a theory—was by Perry in 1929 (1). Comments on the subject of neighborliness go back more than 2,000 years. (2, p. 176). A very thorough discussion of the sociological literature pertaining to neighbors, neighboring, and neighborhoods is given by Keller (3).] We, therefore, feel free to suggest our own approach. From our standpoint, the following definition represents the essence of the concept of neighborhood: A neighborhood is an area in which behavioral and perceptual relationships exist with high degrees of frequency and intensity among the residents and is an area that can be identified as a discrete and distinctive unit of the city by the spatial projection of these relationships. (This paper assumes that the boundaries of the neighborhood are predefined. The full report of this project discusses methods of determining neighborhood boundaries. None of the current methods can be considered fully adequate.)

Other features must also be considered. A neighborhood must be predominantly residential in land use, although a minimum of supportive services is required to make it function well. Also, both the population and the land area must be small if the probability and intensity of behavioral or perceptual relationships existing between any 2 random adults in the area are to be relatively high. We are not now prepared to quantify the minimum probability or intensity necessary for an area to qualify as a neighborhood; however, it appears that most neighborhoods will contain approximately 2,500 persons on the average and that an area containing 10,000 residents is the largest that would conceivably qualify as a neighborhood.

By focusing on the degree to which a neighborhood functions as a socially interactive unit, we need deal not with the issue of what should a neighborhood be like but with the issue of what neighborhoods actually are like. A pitfall that has trapped others is that they find few neighborhoods operating as they expected them to—according to the "classical" concept of neighborhood (akin to the sociological concept of the village)—and, therefore, question the validity of the concept of neighborhood. Neighborhoodness is a matter of degree, and it should not surprise anyone that there are very strong and very weak neighborhoods too or that the very strong neighborhoods may in fact be relatively rare.

Our measure of the degree to which a specific geographic area functions as a neighborhood comprises 6 specific variables that measure patterns of behavior or perceptions that describe mutually supportive relationships among neighbors. The behavioral patterns that are shared by neighbors may be described as neighboring, use of local facilities, and participation in neighborhood organizations. The shared perceptual patterns, which indicate feelings of identity and belonging, may be described as identification with the neighborhood, commitment to the neighborhood, and evaluation of the neighborhood. We call these 6 measures social interaction variables. The behavioral variables are defined as follows:

1. Neighboring—the extent of neighboring or interpersonal interaction that occurs;
2. Use of local facilities—the extent to which residents conduct their business at local facilities (grocery stores, schools, work places, doctors' offices, churches, and banks) as opposed to nonlocal facilities; and
3. Participation—the extent to which residents participate in organizations whose members are residents of the neighborhood or whose primary focus is generalized neighborhood problems or activities.

The perceptual variables are defined as follows:

1. Identification—the extent to which persons identify themselves as belonging to a distinct social community and the extent to which persons feel that they reside in a distinct area;
2. Commitment—the commitment of the residents to the local area as expressed by their desire to continue living there; and
3. Evaluation—the extent to which residents evaluate their neighborhood as a place in which they would like to live.

A common failing in previous work has been a lack of distinction between (a) variables that actually express neighborhood social interaction and (b) factors that cause or are correlated with such variables. For example, neighborhoods have been described as homogeneous, self-contained, distinctive, and stable. These characteristics cannot be used to determine the degree to which an area functions as a neighborhood because they do not describe interactions among people and because they can characterize areas of little social interaction as well as areas with much social interaction, although they are commonly associated with the latter. For another example, many researchers have said that the ethnic or cultural characteristics of an area are important, but these characteristics are only important in that they are a convenient proxy for the degree of psychological unit among the residents. Similarly, stability—low rates of residential mobility, high average lengths of residency in the neighborhood—is often called a characteristic of neighborhoods, but its importance is that it acts as a causal factor in the development of social interaction.

We use the word descriptors for those terms that describe the physical characteristics of a given area and the demographic characteristics of the people living there. The descriptors are quite different from the interaction variables. They describe the people (the interacting agents) and the neighborhood and its facilities (the shells or spatial context in which the interaction occurs), but they do not describe the social interaction itself. Some of the confusion evident in the literature is due to the fact that the descriptors and the interaction variables are related, sometimes by causality and sometimes by correlation alone, and other authors have seldom made the appropriate distinctions. We can now specify (for the first time quantitatively) the relationships that exist between particular descriptors and each of the social interaction variables.

Having established a definition of neighborhood, including a list of the components of social interaction, we can now proceed with the analysis. The first step is to determine if the 6 social interaction variables can be combined into a single value that would express the composite degree to which a particular area functions as a neighborhood. We will show how this can be done. The second step is to explore the procedures necessary to establish an interaction value for each neighborhood. This is a problem, for data concerning the 6 social interaction varibles are not commonly available. However, we find that the overall level of neighborhood social interaction can be estimated by using readily available data concerning neighborhood descriptors. These 2 steps set the stage for the linking of highway characteristics and changes occurring in neighborhoods affected by highway improvements.

MEASUREMENT OF SOCIAL INTERACTION

One of the major problems of this study was obtaining the appropriate data. We could not collect our own data and had to rely on the work of others. We found only 2 studies that had collected information on most of the social interaction variables. However, the sample size of one study was too small to provide accurate data for areas as small as neighborhoods. The other study was based on a 2 to 10 percent sample of households in selected census tracts in west Philadelphia (4). Table 1 gives some selected characteristics of the west Philadelphia area. The analysis presented in this paper is based solely on the Philadelphia case. However, the relationships discovered there are so strong that we have recommended that similar research be commenced immediately in other cities.

TABLE 1

VALUES OF THE INTERACTION INDEX AND SELECTED DESCRIPTORS IN WEST PHILADELPHIA CENSUS TRACTS

Tract	Index Value	Mobility (percent residents of 2 years or less)	Residential Land (percent)	Housing Units per Net Residential Acre	Median Family Income	Foreign Stock (percent)	Negro (percent)	Population
52A	1.99	30	24.8	17.5	$8,486	0	55	3,327
44E	1.52	23	55.1	47.0	4,661	0	93	7,298
34P	1.17	23	54.5	41.5	5,282	9	74	7,539
46C	1.03	25	51.6	42.0	5,363	0	82	6,293
44C	0.61	22	43.2	45.5	5,167	0	90	5,090
46H	-0.65	32	65.1	45.5	5,981	10	9	6,063
24E	-1.05	41	42.6	58.7	3,942	0	92	5,081
52H	-1.16	37	60.1	31.8	6,068	0	55	5,171
29J	-1.49	37	42.2	56.7	4,524	9	89	8,857
46A	-1.87	41	36.9	69.5	5,394	12	59	8,392

The Philadelphia study contains 4 of the 6 factors originally identified as important components of social interaction: use of local facilities, participation, commitment, and evaluation. In addition, as a proxy for neighboring, the percentage of families with all or most of their close friends in the neighborhood plus the percentage with 4 or more relatives living in the same area was used. As a proxy for identification with the neighborhood as a community, the percentage of families who could correctly identify the name of the area through unaided recall was used. Our analysis suggests that the actual interaction variable would have been better than the proxy measure in both cases.

Index of Social Interaction

We proposed to develop an index of the degree to which a neighborhood functions as a social unit, a means of combining the social interaction variables into one measure that would present a concise expression of neighborhoodness. To accomplish this, we had to answer the following questions: Are some social interaction variables more important than others if they are considered all at the same time? What are their relative weights? What is their functional relationship?

There appears to be no combination of the social interaction variables that is both theoretically correct and unique according to the literature of either sociology or urban planning. We, therefore, explored different methods of combining these variables into an index using the interaction data for Philadelphia. Through factor analysis, we established an index that is a successful combination of the social interaction variables in that it is highly predictable and uses just 3 descriptors of neighborhood characteristics. The establishment of this predictive model relating neighborhood descriptors to the social interaction index shows that it is possible to predict the level of social interaction within a neighborhood by using readily available data about the neighborhood.

The factor analysis established 2 factors that account for 73 percent of the variance in the social interaction variables from neighborhood to neighborhood. One represents how people feel about their neighborhood and the other how they act within their neighborhood.

We found that commitment, participation in local organizations, and evaluation are most important in establishing the first factor. The presence of friends or kin and the use of local facilities are most important in establishing the second factor. (Indentification was eliminated from consideration because of its low correlation with the other variables.) On the basis of this division of the interaction variables, we feel that in general the first factor represents how people feel about the neighborhood and the second factor represents behavior patterns within the neighborhood. The variable that does not fit into this pattern is participation, which one would logically expect to be included in the behavior factor. We are at a loss to explain this result, but feel that it may be due to inconsistencies in our small sample.

The factor analysis generated 2 factor scores—one for feelings and one for behavior—that we combined by weighting them equally. (Weighting the factors according to the percentage of the variance explained by each was also tested. This produced results

that were unsatisfactory in that negative coefficients appeared in the equation, leading to decreases in the index when some of the variables increased, which is not logical.) Using the variable loadings generated in the factor analysis, we established the following equation for the index from the interaction variables:

$$NSII = F_1 + F_2 = 0.26p + 0.26c + 0.07f + 1.071f + 0.16e$$

where

NSII = neighborhood social interaction index;
F_1 = factor 1 (feelings);
F_2 = factor 2 (behavior);
p = participation;
c = commitment;
f = friends or kin;
lf = use of local facilities; and
e = evaluation

The number established in this fashion is arbitrary but useful because our main purpose is to measure the difference in social interactions between neighborhoods and between different time periods for the same neighborhood. Our index can do this quite well. Large positive scores indicate neighborhoods where a great deal of social interaction occurs at the local level. Large negative scores indicate areas of very little social interaction.

Until we have examined a much greater number of neighborhoods than that afforded by our west Philadelphia case study, we cannot say within acceptable confidence limits what consitutes an "average" social interaction score or how neighborhoods are generally distributed with respect to this index. In fact, the coefficients in the equation cannot be regarded as final until data from other cities have been examined.

Predicting the Social Interaction Index

We very quickly found that data on the social interaction variables are practically nonexistent. However, these data are the basis for measuring the degree to which an area functions as a neighborhood, as a cohesive and interactive social unit. Because these data are not available now, they must be either gathered or estimated. To perform special surveys of interaction patterns in all neighborhoods that would possibly be affected by highway improvements would be a very costly and time-consuming task. Therefore, we explored means of predicting the social interaction index we established through the use of proxy measures.

We created the following list of descriptors of the physical characteristics of the neighborhood and the demographic characteristics of its population that appeared, from the literature or our own experience, to be important influences on social interaction.

1. Demographic descriptors
   a. total population of the census tract;
   b. percentage of population between 0 and 14 years of age;
   c. percentage of population older than 60 years;
   d. number of persons in households (total population minus persons living in institutions, dormitories, rooming houses, or military barracks);
   e. number of persons in households per net residential acre (net residential density);
   f. number of persons per household in the tract;
   g. percentage of families who have been living at their current address less than 2 years;
   h. percentage of census tract population that is nonwhite;
   i. percentage of census tract population that is of foreign stock;
   j. median family income;
   k. percentage of families who do not own an automobile.

2. Physical descriptors
   a. total land area of the tract in thousands of square feet;
   b. total land area minus land used for streets and alleys;
   c. residential land area of the tract in thousands of square feet;
   d. percentage of total tract area devoted to residential use;
   e. number of housing units;
   f. number of housing units per net residential acre;
   g. percentage of owner-occupied dwelling units;
   h. percentage of substandard dwelling units;
   i. commercial land area of tract in thousands of square feet;
   j. percentage of total tract area devoted to commercial use;
   k. index of neighborhood isolation, which we created to express the extent to which hard boundaries exist around an area.

Each descriptor has some predictive significance, and each is readily available or easily obtainable from data of the U.S. Bureau of the Census, city planning agencies, or other sources.

We used multiple regression analysis to determine which, if any, of these descriptors could be used to accurately predict the index values derived for the Philadelphia neighborhoods. In fact, our index is very highly correlated with the neighborhood descriptors in west Philadelphia. The percentage of families who have lived there 2 years or less explains 71.5 percent of the variance in the neighborhood social interaction index. Through a series of regression analyses, we found that, by adding 3 more variables (percentage of residential land, housing units per net residential acre, and percentage of substandard dwelling units), we could increase the explanation to 94.0 percent. However, because of our small sample size, no more than 3 descriptors should be used. The first 3 descriptors explain 91.4 percent of the variance, a figure that is significant at the 0.01 level. The contribution of any of the other descriptors to the explanation of the variance is very small with respect to the explanation afforded by mobility.

The equation for predicting social interaction is

$$NSII = 76.29 - 1.45M - 0.36R - 0.30HU + u$$

where

NSII = neighborhood social interaction index;
M = mobility (percentage of families in residence 2 years or less, 71.5 percent);
R = percentage of residential land (12.4 percent);
HU = housing units per net residential acre (7.5 percent); and
u = error term.

In other words, by using readily available data for mobility, percentage of residential land, and housing units per acre, the highway planner can easily obtain an estimate of the social interaction occurring within a particular neighborhood. The percentage of the variance that each descriptor explains is shown in the foregoing.

The preceding equation indicates that, as mobility, percentage of residential land, and housing units per net residential acre decrease, the social interaction index will increase. One can quickly see that this general rule could become absurd if carried to extremes, such as eliminating all residential land in a neighborhood, which would obviously have a negative impact on social interaction. Our interpretation of this situation is that the assumption of linearity in the preceding equation is suspect with respect to percentage of residential land and housing units per net residential acre. We do not feel that this problem is of a magnitude significant enough for us to discard the model because mobility explains most of the variance anyway and the assumption of linearity is probably acceptable within the normal ranges of the other 2 descriptors. (This latter hypothesis is worth testing.) The point to be made is that this predictive model, like all similar analytical tools, should be used with discretion and an understanding of its limitations.

We feel that the relationships discovered among the descriptors, the interaction variables, and the index are basically reasonable even if not exactly what we expected.

One of the important relationships that was both reasonable and expected was the importance of mobility to the individual social interaction variables and to the overall social interaction index, of which it explained 72 percent of the variance. This finding supports the work of Hill and Frankland (5), who hypothesized that "to the degree that the population in a neighborhood is stable, the cultural patterns of that neighborhood can be expected to be continuous, persistent, and enduring." This hypothesis was derived from their review of the literature but not subjected to verification. We feel that our study does verify the hypothesis that led Hill and Frankland to develop their mobility index.

Because of the importance of mobility as a predictor in all of the various formulations of the social interaction index that we tested, we feel confident that this descriptor will prove to be significant after the index has been recalibrated by using data for other cities. Furthermore, because mobility is so powerful a factor in the regression equations for the social interaction index, we feel that it alone can be used to provide rough estimates of social interaction changes, with other descriptors adding predictive capability as required. What remains now is to link the highway characteristics to changes in mobility and the other descriptors.

IMPACTS OF HIGHWAYS ON SOCIAL INTERACTION

Our method for relating highway characteristics to social interaction is to determine the influence of the highway on those descriptors that are most useful in predicting the neighborhood social interaction index because there appear to be no theoretical relationships between highway characteristics and the interaction variables. Using this method instead of trying to predict changes in each interaction variable is a shortcut that enables us to make the planning process considerably easier and that eliminates statistical errors in our predictions that a multistage process would have created.

We found, to our dismay, that functional relationships describing the influence of highway characteristics on our 3 important descriptors did not exist independent of the specific spatial relationship of the highway characteristics to the geographic distribution of each of the neighborhood descriptors. However, because mobility data are readily obtainable on a very detailed level, the particular displacement of population that a specific highway route causes can be measured and the specifc effect on the percentage of persons residing in the neighborhood who have lived there less than 2 years can then be described by comparing the mobility rates of persons living in the neighborhood before the highway to the mobility rates of persons living there after the highway. The effects on housing units per net residential acre and percentage of residential land are similar; there are no systematic impacts, but by knowing the specific highway route and the distribution of each descriptor, one can determine the impact of a particular highway.

The general relationship expressing the changes caused by the highway in each of these 3 descriptors is

$$\begin{pmatrix}\text{descriptor of remaining neighborhood}\end{pmatrix} = \frac{\begin{pmatrix}\text{descriptor of entire neighborhood}\end{pmatrix} - \begin{pmatrix}\text{descriptor neighborhood fraction}\end{pmatrix}\begin{pmatrix}\text{descriptor of displaced fraction}\end{pmatrix}}{1 - \begin{pmatrix}\text{fraction of neighborhood displaced}\end{pmatrix}}$$

The highway characteristics that are important to these calculations are the highway placement and the width of the right-of-way (including land taken for joint development programs). Superimposing the planned highway on a map of the distribution of each descriptor makes it possible to calculate these changes and feed them into our general model of social interaction, thus establishing a predicted post-highway social interaction index. Comparison of the pre-highway and post-highway situations indicate the magnitude of social change caused by the highway.

In our analysis of highway characteristics, it became apparent that an important class of highway-induced changes was not represented in the relationships discussed here. These are the changes in the ability of a resident to travel from one part of his neighborhood to another to carry on his particular set of interactions and activities. This descriptor, called intraneighborhood accessibility, could not be included in the empirical equation establishing the social interaction index for 2 reasons. First, sudden and great changes in intraneighborhood accessibility have dramatic effects on social interaction patterns because interaction patterns (and, hence, neighborhood boundaries) tend to occur within and not across major barriers. Second, significant differences in intraneighborhood accessibility could not be measured in the neighborhoods studied in west Philadelphia and, thus, there were no empirical data with which to calibrate the equation. It is possible that this descriptor may prove more useful in predicting interaction changes than static levels of social interaction.

All other things being equal, neighborhood social interaction varies directly with intraneighborhood accessibility: Any noticeable decrease in intraneighborhood accessibility will produce a decline in overall social interaction (not just for certain people but for everyone). Unlike our other descriptors, there is a direct functional relationship between certain highway characteristics and intraneighborhood accessibility. A highway improvement can change the accessibility within a neighborhood by the changes it makes in local street patterns, by its placement within the neighborhood, and by its psychological effect as a proximate object on the residents of the neighborhood.

The placement of the highway within the neighborhood is a critical matter for intraneighborhood accessibility because of the possibility that the highway will form a strong barrier. The impact of highway placement on intraneighborhood accessibility is obviously zero if the highway is outside of or just at the edge of the neighborhood. The placement impact increases to a maximum as the highway is moved to the center of the neighborhood (barrier effects held constant, of course), dividing the neighborhood into 2 equal portions. The change in intraneighborhood accessibility can then be expressed as a function of the relative size of the 2 portions of the neighborhood.

It appears that the highway characteristics that significantly influence the extent to which the presence of a highway could change intraneighborhood accessibility are (a) the percentage increase or decrease of the number of points within the neighborhood where the highway path can be crossed after the highway improvement and (b) design features of the highway that might create psychological barriers to movement across the highway (assuming that physical access is possible), including the width of the highway, its elevation, and the volume and speed of traffic it carries. In other words, we are concerned with the facilitation or hindrance of access across the highway path in both physical and psychological terms. We hypothesize that the changes in social interaction induced by physical barriers will be much greater than those induced by psychological barriers.

Overall Model: Combining the Factors

We are now ready to complete our model of highway-related changes in neighborhood social interaction. To predict the change in social interaction due to a particular highway plan, we have shown that intraneighborhood accessibility must be added to the equation. Thus, the general model for predicting the social interaction impacts of a highway on a particular neighborhood becomes

$$\Delta NSII = a - b_1\Delta M - b_2\Delta R - b_3\Delta HU + b_4\Delta A + u$$

where

$\Delta NSII$ = highway-induced changes in social interaction index;
a = constant;
ΔM = change in population mobility (percentage of residents who have lived in neighborhood 2 years or less) caused by highway displacement;
ΔR = change in percentage of residential land caused by highway land-taking;
ΔHU = change in housing units per net residential acre caused by highway land-taking;

ΔA = change in intraneighborhood accessibility caused by the highway improvement;
$b_{1,2,3,4}$ = coefficients; and
u = error term.

The signs for mobility, dwelling density, and percentage of residential land are negative because positive changes in each of these descriptors will produce a negative change in the social interaction index. Although the sign for the accessibility term is postive, we are hypothesizing that the highway will always be seen as a divider, even though its influence as such can be minimized. The values of the coefficients, constant, and error term will have to be estimated through further empirical work. Our guess is that further research would show that accessibility changes and mobility changes are the most important factors in the model. Further research is also required to determine whether the social cohesion that is sometimes generated by the dynamics of community opposition to proposed highway improvements would change the coefficients or even the variables within the model. This is a crucial issue.

If this methodology proves appropriate, a number of different measures of social change can be developed: the interaction changes in particular neighborhoods, the average changes in all neighborhoods, and the average changes for various types of neighborhoods (for example, black neighborhoods or poor neighborhoods). One must estimate the absolute change in social interaction instead of the percentage change because use of the latter measure would bias the impact measurements toward neighborhoods with low initial social interaction.

The local situation will determine which of these measures is most useful. The overall effect of the highway on all neighborhoods in the SMSA will probably be most applicable unless the neighborhoods affected are so dissimilar as to make aggregation of effects unwarranted. Different types of neighborhoods should be considered when the primary concern is whether a particular social group in the city is being affected more than others. Finally, when the issue is the best design and location from a social viewpoint with respect to particular neighborhoods, this can also be determined.

Significant Highway Characteristics

It does not appear that many highway characteristics influence neighborhood social interaction directly by changing the important descriptors. Mobility, percentage of residential land, and housing units per acre are affected by the total amount of land taken and the highway placement. These two characteristics, plus the crossovers per mile and the elevation of the roadway, influence the intraneighborhood accessibility descriptor. Other highway characteristics do not influence the descriptors used in predicting the social interaction index and, thus, need not be considered in the prediction of social change.

CONCLUSION

If this method for estimating the effects of highway improvements on neighborhood social interaction is fully validated, it could aid the highway planner by providing explicit information on social changes. For some planners, this method makes explicit factors that they have already implicity included in their decisions; for others, it enables them to consider social interaction effects in their routing and design decisions for the first time.

It should be obvious that the transportation plan that is most attractive from the social interaction viewpoint need not be the one that is best in terms of construction costs or benefits and costs to the highway user or even to the neighborhood resident. These other factors will also be important inputs to the final decisions concerning highway location and design. The highway planner should choose final highway designs in specific awareness of the negative or positive change in social interaction that design entails. With respect to the several neighborhoods along a proposed highway route, the planner would select the design that minimizes the negative value or maximizes the positive value of the total changes over all neighborhoods. The interaction index could become a highly important input to the following kinds of decisions: Through

which neighborhoods should the highway be routed? Where within the neighborhood should the highway be located? What should be the character of the highway within the neighborhood?

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