
TRANSPORTATION RESEARCH RECORD
481

Formerly issued as Highway Research Record

Citizen Participation and Housing Displacement

**4 reports prepared for the 53rd Annual Meeting
of the Highway Research Board**

subject areas

11 transportation administration

15 transportation economics

82 urban community values



**TRANSPORTATION
RESEARCH BOARD**

**NATIONAL RESEARCH
COUNCIL**

Washington, D. C., 1974

NOTICE

These papers report research work of the authors that was done at institutions named by the authors. The papers were offered to the Transportation Research Board of the National Research Council for publication and are published here in the interest of the dissemination of information from research, one of the major functions of the Transportation Research Board.

Before publication, each paper was reviewed by members of the TRB committee named as its sponsor and accepted as objective, useful, and suitable for publication by the National Research Council. The members of the review committee were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the subject concerned.

Responsibility for the publication of these reports rests with the sponsoring committee. However, the opinions and conclusions expressed in the reports are those of the individual authors and not necessarily those of the sponsoring committee, the Transportation Research Board, or the National Research Council.

Each report is reviewed and processed according to the procedures established and monitored by the Report Review Committee of the National Academy of Sciences. Distribution of the report is approved by the President of the Academy upon satisfactory completion of the review process.

The National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering, serving government and other organizations. The Transportation Research Board evolved from the 54-year-old Highway Research Board. The TRB incorporates all former HRB activities but also performs additional functions under a broader scope involving all modes of transportation and the interactions of transportation with society.

TRR 481

ISBN 0-309-02267-3

Library of Congress Catalog Card No. 74-4000

Price: \$1.80

Transportation Research Board publications may be ordered directly from the Board. They are also obtainable on a regular basis through organizational or individual supporting membership in the Board; members or library subscribers are eligible for substantial discounts. For further information write to the Transportation Research Board, National Academy of Sciences, 2101 Constitution Avenue N.W., Washington, D.C. 20418.

CONTENTS

FOREWORD	iv
COMMUNITY INTERACTION TECHNIQUES IN CONTINUING TRANSPORTATION SYSTEMS PLANNING: A FRAMEWORK FOR APPLICATION	
Richard Yukubousky	1
Discussion	
Wayne R. Torrey	10
GOAL-RESPONSIVE COMMUNITY PARTICIPATION: AN IMPERATIVE FOR INTEGRATED SOCIAL-ECONOMIC-ENVIRONMENTAL ANALYSES	
Charles D. Bigelow	11
METHOD FOR PREDICTING THE EFFECT OF LONG-RANGE TRANSPORTATION PLANS ON RESIDENTIAL LAND USE ACTIVITIES	
Frank L. Ventura and Rajendra K. Mehta	21
ECONOMIC CONSEQUENCES OF FREEWAY DISPLACEMENT TO RESIDENTS RELOCATED UNDER THE 1969 AND 1970 RELOCATION PROGRAMS	
Jesse L. Buffington	29
Discussion	
D. C. Colony	42
SPONSORSHIP OF THIS RECORD	43

FOREWORD

Citizen participation in the continuing transportation planning process is a broad area that needs thorough and competent research from which insight as to the role of citizens can be ascertained. The papers in this RECORD contribute to an understanding of the mechanisms for involving citizens in public decisions, the results of that involvement, forecasting the number of households that a transportation facility will displace, and the effectiveness of programs to relocate those displaced by freeways.

Yukubousky presents a preliminary evaluation of the applicability of 50 community interaction techniques within the continuing phase of long-range transportation systems planning. He identifies the basic citizen participation principles and constraints and proposes a planning process framework that places emphasis on policy resolution.

Bigelow describes a practical, tested approach to involve the overall community in the planning and decision-making process so that a consensus for implementation can be reached. He discusses the conceptual background of the approach and its successful application to one of a series of domestic and international projects.

Ventura and Mehta describe a long-range predictive model for estimating the number of households that would be displaced by transportation systems planned for a metropolitan area. The model was tested on more than 12 miles of recently constructed freeways not included in the calibration of the model.

Buffington discusses the consequences of freeway displacement to residents who were relocated under federal and state programs superseded by the 1968 and 1970 legislation. He conducted a survey of 171 urban relocatees in 2 major urban areas of Texas to obtain facts and opinions concerning freeway displacement experiences. He presents comparisons of the findings of this study with those of former studies that dealt with the same subject.

COMMUNITY INTERACTION TECHNIQUES IN CONTINUING TRANSPORTATION SYSTEMS PLANNING: A FRAMEWORK FOR APPLICATION

Richard Yukubousky, New York State Department of Transportation

This paper presents a preliminary evaluation of the applicability of 50 community interaction techniques within the continuing phase of long-range transportation systems planning. Many of these techniques have been successfully used in other functional planning areas but have not been tried in transportation systems planning. Basic citizen participation principles and constraints are identified at the onset of the paper. A planning process framework is proposed that emphasizes policy resolution, ensures that transportation actions complement desired future community life-styles, emphasizes short- and medium-term problem-solving, and explicitly recognizes the political nature of transportation decision-making. Community interaction techniques are then classified by participation intensity level; communications requirements; applicability to systems planning, corridor location planning, and design; utility for completing various tasks; and estimated staff effort. This tabulation results in an array of potentially useful techniques for each systems planning activity. Technique selection criteria to aid the planner and community in choosing from this array are suggested.

•TRANSPORTATION plans have been developed traditionally by specialists working in relative isolation from the public as a whole, private interest groups, and individuals. Developed plans are then presented to the public through hearings or informal presentation.

Opposition encountered at project-level public hearings suggests that better methods are needed by which citizens can influence transportation decisions in a timely manner. Citizen participation should occur from the very onset of transportation systems planning. Recent legal and administrative requirements have provided added impetus. Most notable of these requirements derives from Section 136(b) of the Federal-Aid Highway Act of 1970 requiring transportation planning agencies receiving federal funds to develop an Action Plan that demonstrates that its entire project development process thoroughly considers all possible adverse social, economic, and environmental effects of proposals and that final decisions are made in the best overall public interests. These guidelines mandate increased citizen participation in the entire development process for transportation projects.

This paper presents a preliminary evaluation of the applicability of 50 community interaction techniques within the continuing phase of long-range transportation systems planning. Many of these techniques have been successfully used to involve citizens in other functional planning areas (e.g., Model Cities, water resource planning, and educational goal setting), but have not been tried in transportation systems planning. The New York Department of Transportation's Planning and Research Bureau has an active citizen participation research project under way; it has provided valuable input to the development of New York's Action Plan. Some of the more promising techniques will be implemented, monitored, and critically evaluated to determine the appropriateness of continued, more extensive use.

BASIC PRINCIPLES

Citizen participation is interaction among citizens, elected and appointed officials, and the planning staff early enough to afford the public full opportunity to influence transportation decisions. Effective citizen participation provides a forum for all interested parties with views on alternative actions so that informed decisions can be made with the best available information on the incidence and magnitude of all social, environmental, economic, and technical consequences of alternative actions.

There are many reasons why citizen participation may be desirable in planning: identify citizen desires, supplement staff with expertise and free time of community interests, enhance technical product by ensuring that all social, economic, and environmental impacts are considered, heighten community awareness of planning and policy issues, increase probable community acceptance of final decision, and meet legal requirements.

The transportation planning process should provide for both decisiveness and widespread participation. Urban transportation planning and policy decisions are made by elected and appointed officials, who must balance the needs and demands of many constituent groups. Thus, decisions are "political," i.e., compromises and trade-offs will occur. This decision framework is appropriate provided all interested parties have adequate opportunity to influence the outcome.

Within this framework, the function of planning is to provide the most complete set of information possible consistent with available community resources, including citizen views. Furthermore, the planner manages information-gathering and fact-finding activities; assists public in articulating its hopes, aspirations, desires, values, goals, objectives, and views; and identifies technical solutions to problems and their impacts and constraints. The planner must be an educator, communicator, clarifier, consultant, enabler, and change agent (1).

PLANNING PROCESS OVERVIEW

Long-range transportation systems planning can be defined by a set of activities that yield required output, available resources (money, manpower, data) that limit the scope and depth of this output, and interactions among various process participants that achieve these outputs. Each factor influences the selection of community interaction techniques needed to stimulate the desired or required level of community participation in any planning activity. Therefore, we cannot adequately discuss community interaction techniques until we have identified desired process products; key decision points; information needed to make technical and political decisions; sequence of activities that yield required information; existing manpower resources that can contribute valuable ideas, views, reaction, and information; and roles of actors in completing each planning activity.

Rather than assumptions being made that the present processes of completing transportation systems planning are adequate, modifications are proposed that attempt to make the process more understandable to the laity, place greater emphasis on policy resolution, ensure that transportation actions complement the community's desired future life-styles, place greater emphasis on short- and medium-term problem-solving, and emphasize the political nature of transportation decision-making.

PRODUCTS AND DECISIONS

A plan is a statement of intention to perform certain actions; these actions attempt to solve existing or projected future problems and suggest the means by which transportation service can promote desirable future life-styles.

Product or output of the transportation systems planning process include recommended provision of non-capital-intensive transportation service, capital construction programs, policies, and legislation. An assertion of priorities and a recommended schedule of actions orchestrate these changes in an orderly manner. Since these actions are recommended for implementation in a political process, the plan must also present information essential to understanding the basis of these recommendations:

projected impacts or consequences of action or inaction, evaluation, techniques, data, and the degree and type of community agreement already achieved. Existing technical, fiscal, legal, administrative, and political constraints that may curtail implementation must be identified. Finally, a progress report on the process itself is a desirable planning product.

Long-range transportation systems planning should be comprehensive. The purposes of transportation actions are to provide mobility for people, improve accessibility to places, and efficiently move goods. Comprehensive transportation planning objectively considers all existing or possible modes and the distribution of benefits and disbenefits to transportation users, providers, residents, government agencies, business and industry, and other community interests impacted by transportation actions. These actions can include governmental provision of facilities or services, promotion through incentives, encouragement, regulation, or cooperative effort with the private sector.

PROCESS ACTIVITIES AND INFORMATION NEEDS

The planning process is continuing development that involves many changes and requires a number of steps or operations; it is a flow of activities leading to desired products. The long-range transportation systems planning process should be designed to develop information and recommendations to stimulate political decision. The term "political"—influences affecting the decisional outcomes of government—is used to differentiate between those decisions and technical decision.

Figure 1 shows the relation of major activities within an interactive long-range transportation systems planning process. This process consists of 4 major phases: community mobilization, exploration, policy resolution, and service evaluation. Activity blocks shown in Figure 1 are keyed to the following descriptive text.

1. Community Mobilization. An important activity in a participatory planning process, community mobilization identifies sources of technical expertise, major participating actors, and other planning resources and carefully delineates and obtains agreement on the roles of various process participants. It is important that a process agenda be established, followed, and understood and that the decision-making process be clear to all participants. Key citizens are identified and sensitized, interaction techniques are selected jointly with key citizens, and extensive community participation is solicited. An areawide community mobilization occurs prior to exploration and policy resolution. The major activities of community mobilization are

- a. Identify key citizens,
- b. Identify sensitive key participants,
- c. Select interaction techniques,
- d. Prepare background, and
- e. Solicit wider involvement.

Each service evaluation requires a separate and more localized community mobilization.

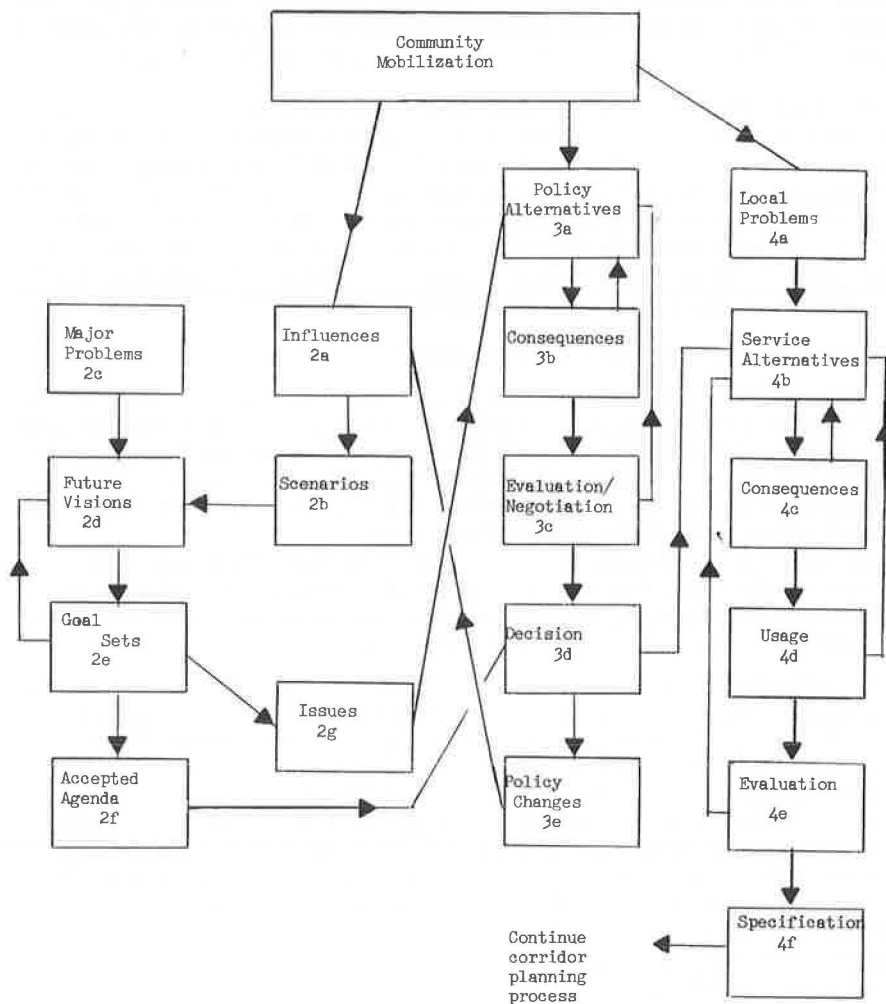
2. Exploration. The purpose of exploration is to identify key regional transportation issues, i.e., matters or questions to be disputed or decided through a dialog process. Within the context of the continuing transportation study, exploration will occur in plan reevaluation. There are several major outputs of exploration.

a. Influences. Key transportation decisions are influenced by various funding programs, guidelines—governmental, legal, administrative, and regulatory—policy decisions made by the public and private sector, population growth, technological development, and sociocultural norms.

b. Scenarios. A scenario is an outline or synopsis that indicates activity or action in the order of its development. Alternate scenarios can be created by assuming that key policy changes occur. One scenario can be labeled a "trend forecast"; its purpose is to estimate the future condition of the transportation system if none of the current influences changes. Potential future transportation problems can be identified through these exercises.

c. Major Problems. Major problems can include existing transportation and significant transportation-related difficulties or symptomatic disorders. The purpose in identifying and ranking these is twofold: to provide input to goal articulation and to

Figure 1. Major planning activities within interactive transportation planning process.



identify opportunities for transportation solutions. Examples of major problems that must be considered in long-range transportation systems planning include energy shortages, environmental and ecological degradation, housing shortages, poor transportation service, inadequate mobility for all groups, and a depressed local economy.

d. **Future Visions.** Solutions to perceived current and future physical, social, and economic problems are contained in future visions. They indicate not what the future may be but what the future should be. Many future visions exist because of the pluralistic nature of our society.

e. **Goal Sets.** Current planning practice is to generate one set of goals for the transportation study area that everyone presumably agrees to. Unfortunately, these goals must be very general and abstract before all or even most community interests concur. Some planners have labeled these as "apple pie and flag" goals because conflicting community goals held by a full spectrum of interests are not explicitly recognized. Furthermore, even people who hold similar goals often weigh them differently. Instead, goal sets that are an outgrowth of future visions and perceived existing and future problems should be identified.

f. **Accepted Agenda.** Some goals are commonly held by most or all major partic-

ipants. This agreement provides the basis for drawing up an agenda or list of actions to be taken. An examination of alternative future visions in the Boston Transportation Planning Review, for example, suggested that improvements to arterial streets, truckways, parking, radial line-haul transit, core and downtown transit distribution systems, intensive coverage transit, and circumferential transit were common to all major future visions (2).

g. Issues. Issues evolve from conflicts in alternative goal sets; i.e., they are matters or questions to be decided or disputed. Issues help to define policy analysis needs by heightening awareness of topics requiring hard decisions.

3. Policy Resolution. The purpose of policy resolution is to resolve transportation issues to the fullest extent possible and to establish priorities for intensive service evaluations. Plan reevaluation will focus on policy resolution. Also, routine review or major review (in the continuous study) will highlight specific issues requiring short-range policy evaluation studies. The following are key outputs of policy resolution.

a. Policy alternatives. These will evolve from conflicting goals and thus provide a range of choice.

b. Consequences. The magnitude, incidence, and uncertainty of all significant adverse and beneficial social, economic, environmental, and technical impacts of alternative actions can be identified from all viewpoints.

c. Evaluation and Negotiation. In a participatory planning process, an integral part of evaluation is either formal or informal negotiation. A proposal is usually rejected because people perceive the total cost (to them) as being greater than the benefits (to them). Negotiation directly addresses the question, What changes can be made to this alternative to make it acceptable to party X without losing the support of other parties?

d. Decision. If agreement can be negotiated, a decision should be no more than formal ratification of one course of action. When agreement is not possible, the designated decision-makers decide based on the best available information.

4. Service Evaluation. The purpose of service evaluation is to specify the range of applicable modes, facility types, and service levels for subsequent corridor refinement and to make a preliminary identification of the impacts of alternative solutions. As such, this phase of systems planning merges with corridor or location planning. General planning activities that comprise service evaluation will be similar to those of policy resolutions. However, the analysis detail level, types of alternatives considered, and nature and scope of identified impacts will be geared toward choosing specific corridor projects or solution packages. The specific activities are as follows:

a. Local problems. These are neighborhood-level, transportation-related problems that are tangible to area residents and can be either solved or complicated by alternative transportation improvements.

b. Service alternatives. Options include different modes, facility types, service levels, location bands, and design features.

c. Consequences. During service evaluation, consequences will be more localized and detailed than those addressed in policy resolution.

d. Usage. How many people will be served by each alternative?

e. Evaluation. Criteria can include the level of service provided, growth impact, network considerations, impact on open space and the ecology, air quality, community disruption, and any other community objective.

f. Specification. Systems planning considerations and the available level of detail will usually not be sufficient to specify projects and service levels. Intense corridor or location studies will start with the range of possible solutions from service evaluation and continue to project-level decisions.

Throughout service evaluation there will be an interplay between individual corridor assessment and network evaluation since a service specification made in one corridor can impose additional loads or remove pressures from other links in the network. In the context of the continuing transportation study, routine review and major review (2 plateaus of plan reappraisal) describe the technical processes by which adopted systems plans are altered when corridor project development and implementation occur (3).

Except when a full plan reevaluation occurs, the major focus of the continuing transportation study will probably be corridor service evaluations.

COMMUNITY PARTICIPATION PARAMETERS

In a complex society, it is naive to expect that all citizens have thoughts or feelings about all issues. According to their own priorities, persons ration their capacities to perceive, to remember, to decide, to communicate, and sometimes to participate. Thus, any particular community issue, such as transportation, can be expected to interest only some of the citizens. If the interactive planning process is carefully designed, everyone will at least be aware of and have an opportunity to participate. Each person will of course select the issues that are most relevant and budget his or her time accordingly.

For discussion purposes, it is convenient to stratify participants into classes indicative of the level and type of their expected involvement and interest in a participatory transportation planning exercise:

1. Key citizens are citizens whose interest in a community issue is potentially most intense, usually initiators, activists, or leaders in the groups they are affiliated with. They can also be unaffiliated citizens with strong personal or professional interests in a particular issue.
2. Community officials are local decision-makers, either elected or appointed, and the county, city, town, and village agency personnel who are administratively responsible to these decision-makers.
3. Transportation study organizations include transportation planning committees, commissions, and technical study staffs responsible for transportation policy-making and planning in urbanized areas.
4. Implementing agencies are the departments of transportation, regional public transportation authorities, and urban renewal and other agencies that implement transportation service or related joint development activities.
5. Federal, state, and regional public agencies include those that have responsibilities in program areas necessitating interaction with transportation functions.
6. Other citizens are individuals not covered in the above categories, particularly organized groups and unaffiliated citizens who may be impacted by alternative transportation actions.

Citizen participation mechanisms can be defined by combinations of community interaction techniques matched to planning process activities and actors. Community interaction includes the ways by which the planner learns about the community; the community learns about the planning process, range of alternatives, impacts, and decision process; the community learns about itself; and the planners and the community work in partnership (4). Approximately 50 community interaction techniques (5, 6) have been identified and categorized by a set of descriptors (Table 1).

PLANNING ACTIVITY AND INTERACTION TECHNIQUE MATRIX

Table 2 gives community interaction techniques to involve officials and citizens in completing various transportation systems planning activities and tasks. Actor groups are defined by their participatory desires, thus other citizens are by definition those whose interests are less intense than key citizens. Furthermore, interest levels of actors within each matrix cell will also differ. Therefore, the planner will probably use at least one information-response technique and one dialog technique to complete each activity. Final selection of techniques from those given in Table 2 will be guided by the criteria discussed below.

TECHNIQUE SELECTION CRITERIA

There are often many techniques that can be used to stimulate the involvement of a specific set of actors in a specific planning process activity. Criteria or considerations to guide the planner and community in their selection of techniques are suggested.

Table 1. Community interaction techniques by descriptive dimensions.

Participation	Technique	Code	Focus ^a	Stage in Process ^b	Staff Effort ^c
None	Encourage internal communications	N1	A	P	L
	Monitor mass media	N2	A	P	L
	Analyze past and current plans	N3	L, C	G, A, I	L
	Review election issues	N4	L, C	G, A	L
	Conduct background studies	N5	A	P	M
	Do sensitivity training (laboratory method)	N6	A	P	M
	Catalog planning and design concepts	N7	A	A	L
	Do parallel search	N8	A	G, A, I	M
	Monitor impacts of completed projects	N9	C, D	I	L
	Provide capabilities to deal with nontrans- portation problems	N10	A	A, N	L
	Test communications for effectiveness	N11	A	P	L
	Initiate legislation	N12	A	I, N	M
Low	Establish a process agenda and operate within	L1	A	P	M
	Produce material for the media	L2	A	P	L
	Present range of alternatives to public	L3	A	A	L
	Map sociopolitical data	L4	A	I	L
	Illustrate in lay terms	L5	A	P	L
	Conduct demonstration project	L6	C, D	I, N	M, H
	Conduct experiment	L7	C, D	I, N	L, M
	Educate public about planning and decision process	L8	A	P	M
	Listen to public for suggestions	L9	A	P	L, M
	Look for analogies	L10	A	P	L
	Maintain open planning and project files	L11	A	P	L, M
Medium	Survey facts, opinions, and attitudes	M1	A	G, A, I	M
	Hold public hearings	M2	A	I, N	M
	Circulate issue ballots	M3	L, C	G, A, I	M
	Schedule participatory TV programs	M4	L, C	G, A, I	M
	Hold citizen referendum	M5	L, C	N	M
	Do value analysis	M6	A	G	M
	Set up community-led seminar	M7	L, C	G, A, I	L
High	Do anthropological field work	H1	C, D	G, A, I	H
	Use citizen advisory committee	H2	A	G, A, I	M
	Hire an advocate	H3	C, D	P	L
	Operate a field office	H4	C, D	A, I, N	H
	Mediate between interests	H5	A	N	H
	Look for third party in negotiations between 2 interests	H6	A	N	L, M
	Appoint task force	H7	A	G, A, I	M
	Hold workshops	H8	A	G, A, I	M
	Hold informal neighborhood work meetings	H9	A	P	L, M
	Conduct a design-in	H10	C, D	A, I, N	M
	Establish and maintain contact with key actors	H11	A	P	L, M
	Use role playing and games	H12	L, C	P	M
	Appoint ombudsman	H13	A	I, N	H
	Deal with public in agency offices	H14	A	P	M
	Engage in charette	H15	C, D	G, A, I	M
	Employ community residents	H16	A	P	L
	Brainstorm	H17	A	A	L, M
	Generate extreme solutions from various viewpoints	H18	A	A, I	L, M
	Set up listening posts	H19	L, C	G, A, I	M
	Do arbitral planning (hearing officer)	H20	A	N	M

^aL = long-range systems planning, C = corridor planning and site selection, D = design, and A = all of above.

^bG = goals, problems, and issue identification; A = alternative action identification; I = impact prediction; N = negotiation and evaluation; and

P = anywhere in process.

^cL = low, M = medium, and H = high.

1. Available resources. Resources can include money, manpower, time and expertise provided by the transportation planning staff, other planning agencies (such as the regional planning boards,) community officials, and citizens.

2. Local perspective. What do local community officials and key participants consider to be a workable community interaction planning approach? Which techniques have succeeded or failed in the community? How committed is the community to inter-active community planning? Are participants willing to commit their time and skills to organize, manage, and direct community participation planning activities?

3. Ease of application. Does the planner know how to use the technique properly? Do key participants understand what the technique attempts to accomplish?

4. Agency credibility. Does the community believe that the agency is a reliable source of information? If not, certain techniques might be perceived as attempts to

Table 2. Community interaction techniques by planning activity and actors.

Planning Activity	Actor	Involvement	Technique
1a	Transp. study, reg. plan. board, local officials, state and federal agencies	Varied	N1, N8, L2, H17, H1, H11 ^a , M1 ^a
1b	Transp. study, key citizens, local officials, reg. plan. board, state and federal agencies	Information-response Dialog	L1 ^a , L2, L6 ^a , M7 N6, H12, H8 ^a , H9 ^a
1c	Transp. study, key citizens, local officials, reg. plan. board	Dialog	H2, H7 ^a , H8 ^a , H9 ^a , H17, H15
1d	Transp. study, key citizens, local officials, reg. plan. board	None Information-response Dialog	N5 ^a , N8, N4 L9, M7 H7, H8 ^a , H9 ^a , H11
1e	Transp. study, key citizens, local officials, reg. plan. board	Information-response Dialog	L1 ^a , L2 ^a , L5 ^a , L8 ^a M11 ^a
2a	Transp. study, key citizens, reg. plan. board, state and federal agencies	None Information-response Dialog	N5 ^a , N8 ^a , N1 M1, M7 H7, H8 ^a , H9 ^a , H11
2b	Transp. study, key participants reg. plan. board	Dialog	H3, H7 ^a , H8 ^a , H9 ^a , H17
2c	Transp. study, key citizens, local officials, reg. plan. board, state and federal agencies Other citizens	Information-response Dialog Information-response Dialog	M1 ^b , L4 ^a , M3 ^b , M4 ^b , M7 ^{ab} H2, H19 ^a , H7 ^a , H8 ^{ac} , H9 ^{ac} , M11 L9, M1 ^b , L4 ^a , M3 ^b , M4 ^b , M7 ^b H3, H13, H14, H1, H4, H19 ^a , H7 ^a , H8 ^a , H9 ^a
2d	Transp. study Transp. study, key citizens, local officials, reg. plan. board, state and federal agencies Other citizens	None Information-response Dialog Information-response Dialog	N5 ^a , N8, N3 ^a , N2 M3 ^b , M4 ^b , M7 ^b H2, H19 ^a , H7 ^{ac} , H8 ^{ac} , H9 ^{ac} , H17, H15 L3, L4 ^a , M1, L9, M6, M3 ^b , M4 ^b , M7 ^b H3, H1, H4, H19 ^a , H7 ^a
2e	Same as 2d		
2f	Transp. study, key citizens, local officials, reg. plan. board	Information-response Dialog	M1, M3, M7 ^a H19, H7, H8 ^a , H9 ^a , H15, H11 ^a
2g	Same as 2f		
3a	Transp. study, key citizens, local officials, public agencies Other citizens	Information-response Dialog Information-response Dialog	L10, M3 ^{ab} , M4 ^b , M7 ^{ab} H19 ^{ac} , H12, H7 ^c , H8 ^{ab} , H9 ^{ab} , H17 ^{ac} , H15, H11 ^{ac} L3 ^a , L4, L9, M3 ^b , M4 ^b , M7 ^b , H9 ^b H3, H13, H4, H1, H19 ^a , H7 ^a , H17 ^a , H11 ^a
3b	Transp. study	None	N8, N5, N4, N7 ^a
3c	Same as 3a plus technique M2 Transp. study, key citizens, local officials, reg. plan. board	None Information-response Dialog	N5, N10 ^a N12 ^a H3, H9, H5 ^a , H6 ^a , H11 ^a M5, H20
3d	Transp. study, community officials		
4a	Key citizens, community officials, transp. study, reg. plan. board, implementing agencies Other citizens	Information-response Dialog Information-response Dialog	M1 ^{ab} , M7 ^{ab} H7 ^b , H8 ^b , H9 ^b , H2, H19 ^b , H15, H11 M1 ^b , M7 ^b , H7 ^b , H19 ^b , L9, M6, N2 H3, H1, H4, H14
4b	Key citizens, community officials, transp. study, public agencies, implementing agencies Other citizens	Information-response Dialog Information-response Dialog	L4 ^{ab} , M3 ^b , L10, M7 ^{ab} , L2 ^{ab} , L3 ^{ab} , L11 ^{ab} H7, H8 ^a , H9 ^a , H18 ^a , H2, H12, H19 ^a , H15, H17 ^a , H10 ^a , H11 ^{ac} , H4 ^c L4 ^b , M3 ^b , M7 ^b , L2 ^b , L3 ^b , L11 ^b , L9 H8 ^a , H9 ^a , H18 ^a , H19 ^a , H17 ^a , H10 ^a , H11 ^a , H4 ^a , H16, H3, H14, H13
4c	Same as 4b, plus all participants		L6, L7
4d	Key citizens, community officials, transp. study, implementing agency	None Information-response	N8, N9, N10, N5 L4

^aRelatively simple and easy to use.^bInformation-response techniques for all actors for specific activities.^cDialog techniques for all actors for specific activities.

manipulate. How does the agency enter the process? Does it initiate citizen participation in the community? Or is it forced into a reactive role?

5. Complexity of planning activity. How many people are impacted? What is the size of the participating group? How severe are the existing local problems? What is the area extent, and how developed is the geographic planning area?

6. Status of interactive planning in community. Do community participation programs exist in other functional planning areas (Model Cities, OEO, water resources) within the community? Can these be tapped and plugged into transportation planning?

7. Internal agency communications and work relationships. Are internal agency communications and work relations strong enough to allow the planner to tap other agency resources needed to successfully implement certain techniques?

8. Specific advantages and disadvantages of techniques. These also provide technique selection criteria.

The specification of performance measures for citizen participation mechanisms and techniques and the testing and monitoring of various techniques relative to these measures are topics requiring further research.

CONCLUDING REMARKS

Implementing citizen participation at the systems level is no easy task. The organizational structure, responsibilities, and roles of the policy bodies of transportation studies, comprehensive regional planning boards, regional or city transportation operating authorities, and project implementing agencies need to be carefully delineated or re-evaluated or both in some metropolitan areas to ensure that systems plans result in service implementation and that citizen participation resources are efficiently used. New or increased funding may be required to implement meaningful community participation programs, hire additional or specifically trained staff, and possibly to reimburse certain participating citizens' expenses. Staff members must be trained in citizen participation strategies, approaches, and techniques; effective intergroup communications and group dynamics; nontechnical planning and political decision-making processes; and community participation management activities. Suitable methods and techniques are available; implementation issues are primarily administrative and institutional.

Some of the terms given in Table 2 are defined as follows:

1. Anthropological field work. A fieldworker, as a participant-observer, explores a neighborhood's culture to identify how various life-styles are intertwined and to identify community values.

2. Brainstorm. A technique used to encourage people to articulate their ideas no matter how tentative or far-out they may be; participants' suggestions are not criticized. Rather, participants try to stimulate each other's thinking by picking up ideas and developing them further.

3. Task force. A temporary alliance formed to solve a specific problem or to complete an arduous job; it is usually composed of persons of diverse expertise and skills.

4. Charette. An intense brainstorming process to produce plans within a strict, usually short, period of time.

5. Process agenda. A schedule of important activities and decision points accompanied by a description of the process activities and decision-making framework.

6. Issue ballots. A short mail-back ballot, usually circulated with a daily newspaper, containing open-ended issue questions and follow-up questions that critique the structure of the ballot. Respondents are self-selected and are provided with personalized follow-up opportunities, e.g., an option to have their ballots forwarded to a public official of their choice after the ballots are tabulated.

7. Participatory TV. Information is fed forward through the television (or radio) media; participants respond by telephone to indicate their feelings.

8. Ombudsman. An independent and nonpartisan public officer who investigates and expedites the resolution of complaints from the public alleging bureaucratic administrative injustice and incompetence.

9. Advocate. Someone who is hired to interpret technical information for a client and to articulate his position as clearly as possible.

10. Listening posts. A public meeting using issue ballots for a general agenda. The purpose is to provide environments for in-depth considerations and probing of issues. The meeting may be open to the general public or by selected invitation only.

11. Value analysis. A strategy for evaluating the community consequences of alternative proposals that enables a panel of community residents assisted by planners to make recommendations on alternative proposals at community meetings.

12. Role playing and games. By simulating a real-world problem or decision-making situation, games attempt to teach complex interrelations to the players. Role playing is an educational exercise relying heavily on the imaginations of the players; it seeks to uncover values held by community interest groups.

REFERENCES

1. Osdoby, S. R. An Examination of The Planner's Role in The Participatory Process. Presented at Conf. of American Institute of Planners, Boston, 1972.
2. Themes for The Future. Regional Economic and Development Group, Memorandum to Boston Transportation Planning Review participants, Dec. 16, 1971.
3. Operations Plans for Continuing Urban Transportation Planning. Federal Highway Administration, Instructional Memorandum 50-4-68, May 3, 1968.
4. Manheim, M. L., et al. Community Values in Highway Location and Design: A Procedural Guide. Cambridge, Sept. 1971.
5. Bleiker, H. A Catalogue of Community Interaction Techniques. Cambridge, Sept. 1971.
6. Yukubousky, R. Community Interaction in Transportation Systems and Project Development: A Framework for Application. New York State Department of Transportation, Albany, Prel. Res. Rept. 50, Sept. 1973.

DISCUSSION

Wayne R. Torrey, Federal Highway Administration

Yukubousky has made a useful contribution to the field of citizen participation in the planning process. He has organized what was previously a mass of significant but difficult to use material.

His format provides the nonexpert with a framework in which he can make rational choices in order to incorporate citizen participation in the decision-making process.

Early in his paper Yukubousky makes the important point that many of the policy decisions made in the transportation planning process are compromises and trade-offs. Thus, they are political decisions. He then develops a model of the process through which these decisions should be made. A model of this process is extremely important if one is to understand at which point citizen input can be usefully made.

However, this model fails to carefully distinguish between activities and inputs and outputs. For example, inputs such as "local problems" are identified as activities. Thus, the process model needs to be refined to increase its precision.

The meat of this paper is in the section on "Community Participation Parameters." Here, he presents an extensive list of techniques classified by degree of participation, planning level, effort required, and process stage. In this section the process has been delineated consistently by functions. A second tabulation identifies which factors, type of involvement, and technique are involved with each of the activities of the process model. Again inputs and outputs are treated as activities.

Yukubousky's extensive classification provides a much-needed step in the development of citizen participation. From it we can move toward developing methods of evaluating the effectiveness of various techniques. Having entered this stage, perhaps citizen participation will cease to be an art form.

GOAL-RESPONSIVE COMMUNITY PARTICIPATION: AN IMPERATIVE FOR INTEGRATED SOCIAL-ECONOMIC-ENVIRONMENTAL ANALYSES

Charles D. Bigelow, Bigelow and Associates

This paper describes a practical, tested approach to involve the overall community in the planning and decision-making process so that a consensus for action can be reached. The concept of the approach is discussed, and its successful application to one of a series of projects is described to demonstrate that it is not an academic, untested proposal. A 5-phase procedure is described that involves everyone affected by the planning. The application of the process results in the development of an understanding throughout the community of the implications of having chosen specific goals and of alternative, practical ways of attaining those goals. Thus, the community is drawn into an active participation from the outset of the planning effort. In addition, the process incorporates techniques for deriving realistic goals, for managing multidisciplinary specialist teams, and for conducting truly integrated economic-social-environmental analyses. The project chosen to exemplify the approach was sponsored by the New York State Department of Transportation. This project dealt with transportation at an urban and regional (systems planning) level. The participation programs for the New York and other projects have been different in that each was adapted to the special conditions of that project. Thus, no one of the applications followed exactly the process described here. However, each application did follow the general outline, scope, and intent of the goal-responsive approach.

•CONGRESS is continuing to legislate more and more requirements for an awareness of human values by all federal departments and agencies. Furthermore, the President has reiterated the need "to return power to the people and put the individual 'self' back in the idea of self-government" (2). These concerns are strongly reflected in the Federal Highway Administration's program and in its development of process guidelines (3). Thus, the stage is being set for a significant change in the way in which the public is involved in planning, from federal down to municipal and neighborhood levels.

The idea of citizen participation and involvement in community planning is not new. It was one of the basic principles on which our system of participatory democracy was originally founded, even though our planning processes may have strayed somewhat from this principle. Viewed in this light, the new legislation requiring participation by affected citizens is strengthening a basic precept of our form of government—a precept whose importance, in the eyes of legislators, is as strong now as when our governmental processes were first organized. It is already clear that this redirection can offer significant advantages to planners if they realize that the community involvement requirement is not just another obstacle in the path of their programs. In fact, "public participation is an exceedingly valuable tool in transportation planning, programming, and implementation. If properly used, it is as valuable as any of the more technical or professional activities . . ." (8). An understanding of the terms and meanings of the community involvement process is important to understanding the application of the principle.

First, involvement of the community applies to all levels of governmental planning

and decision-making for all public activities including transportation, land use, water resource use, and waste disposal. However, since governments also must provide support for private investments, the involvement process may affect the planning of privately financed projects. Recent court cases, particularly in California (*Friends of Mammoth Versus Mono County*, 8 Cal., 3rd, 1), have mandated a governmental involvement with private development projects that significantly affect the larger community or environment.

Second, the community, in this paper, refers to the larger community affected by planning. For the example presented later, the community included federal, state, and local government officials (whether elected or appointed), residents of the study region and adjacent regions, and special interest groups including environmentalists, chambers of commerce, real estate agencies, and social and educational groups. This community of decision-makers also included those who, armed with existing legislation, threatened to file suit to stop or delay the project.

Finally, the involvement of citizens is required by a growing body of legislation and guidelines. As early as 1962, the U.S. Department of Housing and Urban Development required citizen participation in the community planning process. Later, the Federal-Aid Highway Act of 1968 initiated the involvement requirement for highway planning. Now, the Federal Highway Administration, for example, requires community involvement from the outset of project planning and at the system, location, and design stages (3). Although these guidelines may have been developed belatedly for highway planning purposes, they offer much more hope for successful integration into the highway planning process than do similar guidelines for housing and community development. Furthermore, the process guideline (which specifies a series of planning actions rather than a step-by-step technical analysis) appears to be an approach that will be able to withstand changes over time, i.e., changes in people and in institutions.

Given the legislation and guidelines for community participation throughout the planning process, a major question remains. How, in a participatory democracy, can individuals and collections of individuals most effectively participate in the process?

Our concepts for involvement have been far too narrow in the past (4, 5). Also, the question above is particularly hard to answer when we know that each individual (and groups of individuals) will have his or her own goals and objectives and that these goals and objectives will change over time. At the same time, legislation and court findings are making it increasingly clear that the responsibility for ensuring a meaningful community involvement lies with those agencies that have the planning responsibilities. Thus, planners are caught in a dilemma between difficulties and demands. In addition, to be effective in having their recommendations accepted, planners must be able to obtain consensus for one of the alternatives and community commitment to support and vote for those political organizations or financing methods or both that are required to ensure the success of that alternative.

This paper describes one approach that might be employed by various government agencies in a goal-responsive, community participation process. It also shows not only that "community involvement cannot be separated from the assessment of economic, social, and environmental impacts" (6), but that these should be included as integral elements of the planning process rather than as impacts after the basic planning work is complete.

This paper discusses one of several experiences with the approach. Although the New York project is used as an example, each application of the process has been unique to the situation. Thus, no one of the projects has been an exact application of the process. Consequently, the philosophy and concepts on which the approach is based are discussed first, and then an application of the process to the project for New York State is described.

CONCEPTS AND DIRECTIONS

The time for change is now, for there is developing within our cities and our country a crisis of major proportions: a crisis which stems from the inability of governmental structures to deal with the complex problems of contemporary society. This crisis is multifaceted. It involves the age-old question of economics [and] the need to perfect our democratic process (9).

These comments made in 1967 are no less true now than then. They provide a number of indications for the form and directions that participatory processes might take. These concepts and directions are, in fact, already partly reflected in the FHWA process guidelines, in guidelines by the U.S. Corps of Engineers, in the National Environmental Policy Act, and in U.S. Department of Housing and Urban Development guidelines. Also, past failures in community involvement programs provide indications of forms and directions to avoid (10). The positive and negative characteristics are both reflected in the following summary of concepts. The concepts are neither all-inclusive nor necessarily fixed, for social groups vary tremendously in their willingness to participate actively. Different groups will respond to different approaches and techniques. In this connection, it is important to note that the case study that follows in a later section must be viewed as unique to that community and to that point in time. However, the general approach and process have been successfully employed elsewhere with quite different social groups.

Concepts Concerning Goals

1. A goal-defining process must be established, for no one can list desirable goals without understanding the implications or consequences of adopting those goals.
2. Goals change over time, so the goal-defining processes must be flexible to accommodate repeated changes in objectives.
3. All those involved with the planning and decision-making process must understand the relations among goals.
4. Advocacy positions by planners and their consultants must be avoided during the processes of identifying goals and of selecting alternative programs for meeting those goals.

Concepts Concerning the Community Involved

1. All members of the subject community and neighboring communities affected by the planning must be sought out and encouraged to participate.
2. The affected community includes all those whose interests are sufficiently strong to result in their using legal means to interfere with the implementation of proposed projects.
3. The community representation must be such that all interests, and particularly those of the opposing groups, are represented equitably.
4. The community must be involved from the outset of the planning process and in such a way that many people and groups are encouraged to participate. The earlier lack of a meaningful involvement has discouraged many from participating.
5. The understanding of goal implications and goal relations must be sufficiently detailed to permit the development of a community consensus.

Concepts Concerning Techniques and Analyses

1. To ensure meeting the intent of current and pending legislation, primary attention must be given to the overall involvement process. The courts look to processes rather than techniques, as evidenced by the fact that many judgments on environmental questions have been based on the adequacy or inadequacy of planning procedures and not on the adequacy or inadequacy of techniques.
2. The choices must be clear to the community, and the community must be involved in selecting alternatives that the consultants and specialists investigate in detail. A null option must be included to permit an adequate technical analysis and to meet guideline requirements.
3. Consultant and specialist involvements must be multidisciplinary, and they must be "integrated" to permit an analysis of relations between social and economic goals, between economic and environmental goals, and so forth.
4. Presentations to the community by consultants or specialists should avoid highly structured and mathematical models, highly technical analyses, and overly simplistic scoring or evaluation techniques. Instead, analytical tools should be used to identify

goal relations and the implications of a particular set of goals. These relations and implications should be the focus of presentations to the community.

5. Planners' communications with the community must be 2-way and must avoid a simple solicitation of views or presentation of results. Instead, a presentation-response format should be used to ensure a clear understanding of choices and a meaningful involvement in the selection of alternatives.

NEW YORK CASE STUDY

The study centered on a proposed 250-mile highway improvement in upstate New York (7). The north-south highway would have followed a corridor of 10 counties from the Delaware River at the southern border to the St. Lawrence River on the northern border. These 10 counties are essentially an extension of the 13-state Appalachian region and have similar problems of poverty, unemployment, population, and business out-migration. It was to solve these interrelated problems that the Delaware-St. Lawrence highway was first proposed.

The objective of the study, according to the study contract, was "to place before decision-makers as much information as possible . . . concerning the feasibility of the project . . . within the context of alternatives for improving the economic, social, and physical condition of the state's population." On June 18, 1972, the New York Times stated correctly that "this is the first time that a consultant was called in after a definite decision was made that a road was not needed. . . . It was not (merely) a transportation problem. . . . That's why we called in a consultant with knowledge in sociology, economics, and ecology."

As a result, the study included interrelated social and environmental as well as highway and economic objectives. In addition, the study included an identification of community values and goals for development. Both the understanding of social-economic-environmental relations and the identification of community values require an extensive, effective, community participation. It is for this reason that community participation is viewed as an imperative for truly integrated social-economic-environmental analyses.

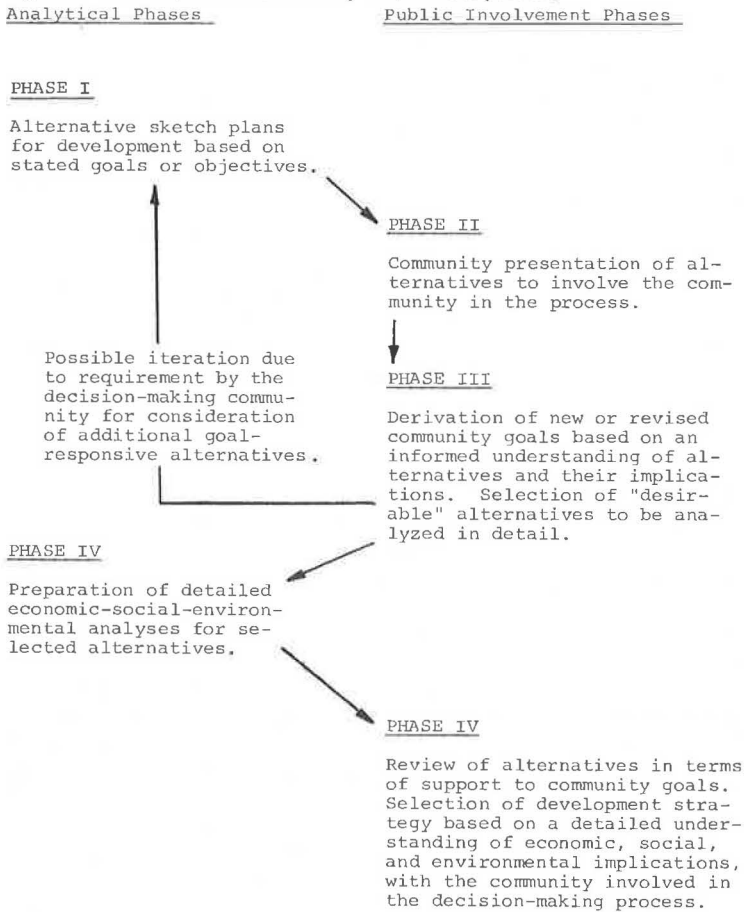
The involvement program was not so clearly organized in this project as in some of our other projects. Instead, the program was structured around legal requirements for formal hearings and by the project schedule. Even so, the community was involved in the key phases of the program described below.

Based, first, on concepts for the goal-responsive, community involvement program listed earlier, second, on the legal requirements for public hearings, and, third, on the unique "community" in the 10-county New York region, the involvement process followed a 5-phase program (Fig. 1).

Phase 1

The first step in phase 1 was to develop sketch or preliminary plans for several feasible and desirable alternatives. (One of these was a null or "do-nothing" alternative. A null alternative is essential to a technically correct economic comparison of alternatives because it provides a common base against which all other alternatives can be measured or compared.) The evaluations for each plan were, in turn, based on (a) immediately available data and goals, (b) a broad rather than an in-depth set of analyses, and (c) the organization of sets of similar goals. These goals were derived largely from existing state, county, and municipal planning documents. The most important of these documents, by far, were the state-level plans. (In comparison with other states, New York has an extraordinary history of state-level planning.) Preliminary goals were also derived from regional, county, and municipal documents as well as from government personnel, special interest groups, and the general population who attended the formal hearings.

The second step in phase 1 was to evaluate the preliminary planning alternatives (strategies) from an integrated economic, social, environmental standpoint. Thus, the alternatives (including the do-nothing strategy) were subjected to preliminary analyses that stressed an identification of relations between the economic, social, and environ-

Figure 1. Goal-responsive community involvement process.

mental elements. Thereafter, the future implications of each alternative were identified; these implications included projected economic, demographic, land use, environmental, and other changes that might take place with the adoption of one of the strategies. The basic reason for developing the strategy implications was to improve the understanding of all of the decision-makers regarding the probable results of having chosen a particular set of goals or a particular action plan.

In the New York project, 3 strategies were identified that coincided with groups of similar goals. They were (a) a development strategy that involved coordinated state investments in industrial and transportation programs; (b) a greenbelt strategy that was intended to create a buffer zone between the more industrialized region west of the study corridor and the environmentally protected Adirondacks area to the east of the study corridor; and (c) the do-nothing strategy. The development strategy included evaluation of an expressway along the full length of the 10-county region, in spite of the fact that the New York State Department of Transportation had already found the expressway to be economically infeasible. However, because the goals of a significant portion of the community still included the construction of the expressway, it was a major consideration throughout the project.

Phase 2

Phase 2 consisted of presenting the preliminary alternatives to the community so that its various groups would understand goal implications and relations. With such

an understanding, a community can select goals and groups of related goals that are consistent with their willingness to support action plans. Thus, the selection of goals is not an academic exercise, but is based on a knowledge of the political and financial support necessary to support various goals.

In New York, the alternative sketch plans were presented to the decision-makers affected by the proposed developments. These decision-makers included elected and employed government officials who had any jurisdiction over the project, special interest groups, and members of the general population. The decision-making group also included those who might file suits to stop or delay the project.

The 2-way communication included the techniques of (a) information material prepared by New York State Department of Transportation and news releases that appeared in newspapers and on radio and television, (b) transcribed formal hearings with television coverage, (c) surveys on environmental problems and on industrial and recreational development potentials, (d) the use of slides and charts and the preparation and distribution of progress reports, and (e) 100 to 200 meetings with individuals or groups by the team of professionals.

Phase 3

The objective in phase 3 was to use the understandings and information gained from phase 2 to identify the alternatives that were to be studied in detail. In effect, community goals and objectives were solicited from the decision-making group based on their understanding of the economic, social, and environmental implications. At this point, it is much easier for the entire community to state goals that more nearly reflect actual desires and commitments to the programs necessary to attain these goals. Also, new goals are frequently easier to enunciate given this broader understanding of choices. More important, conflicting and changing goals are more easily identified. Changing goals are particularly difficult to determine if collected solely from surveys, from a group of community representatives, or from community hearings. The latter result in the identification of more static types of goals and of goals that are generally impossible to incorporate in a meaningful planning process.

Finally, new alternatives are frequently identified as a result of this approach. Furthermore, the citizens are actually involved in the identification of alternatives to be studied in detail. As a consequence of this feeling of involvement, many who might be against the project are much more likely to become involved on a positive basis in the development of a community consensus. This is another point during the planning process where those who might otherwise decide to take legal action can be heard and given a real opportunity to suggest alternatives for detailed study. Thereafter, the agency carrying out the study can organize dynamic goals, desirable development alternatives, and evaluation criteria into a coordinated format for detailed study. As shown in Figure 1, it is also possible that a new set of alternatives might require a preliminary analysis, particularly if goals change as a result of the improved understanding of implications.

Phase 4

Up to this point, the community had selected goals, broad strategies, and general programs that it desired and was willing to support. In phase 4, specialists analyzed, in detail, the advantages and disadvantages of selected alternatives. The selection of alternatives was frequently a reflection of continuing conflicts over goals within the community.

Phase 4 places the greatest burden on consultants and specialists. Multidisciplinary teams are difficult to manage, and the integration of their analyses is even more difficult to accomplish. Each specialist must be concerned not only with his own professional analysis but also with the relation between his own and other disciplines. It is in these latter efforts that the interdisciplinary team is most likely to break down. But it is also the results of these efforts that are most needed by the community of decision-makers. For example, it is of little use to produce an excellent highway analysis and design without at least an understanding of what that highway means in terms of new

jobs, improved educational and health delivery systems, pollution effects, and the organizational and financial ability of government to ensure that the program is a success.

Many of these difficulties are diminished by the proposed approach. For example, the scope of necessary economic, social, and environmental relations were identified in phase 2 so that the interdisciplinary study team knew in advance what and how much data they would need. Thus, the risks of collecting unnecessary or irrelevant data were practically nil. In addition, the balance between the data collection and the analysis efforts for engineering, economic, and social aspects was much easier to maintain with this approach. This is so because the task leaders had an opportunity to learn about intertask requirements in the preliminary phase 2 work. Finally, this approach had the distinct advantage of considering social and environmental aspects from the outset, rather than after the fact, as impacts resulting from a more narrowly based decision.

The work for New York State resulted in identification of the need for a new development strategy. Doing nothing and adopting a strictly environmental strategy appeared almost equally undesirable, and the industry-expressway strategy was impractical. A new strategy evolved that required interrelated highway, industrial, employment, and educational actions. After the new option was identified, all of the final options were subjected to identical economic, social, and environmental analyses, and the implications of adopting each were identified.

Phase 5

The results of the detailed analyses are also presented to the decision-making community. The central objective is the development of a consensus on one of the alternatives—a consensus that is least likely to be upset by a formerly uninvolved minority. Essentially, this task is an interpretation by the planners or specialists of the detailed analysis. Since this final presentation includes the null alternative as well as quite different alternatives for, say, highway and economic development, the planners are not forced into an advocacy position of either a highway, an economic development, or an environmentally oriented program.

The New York project resulted in the development of a consensus. "It stresses the importance of promoting community economic well-being in our transportation (developments) and not just (the well-being of) those in proximity to a facility. . . . It offers perhaps a new perspective on the interplay of transportation and economic health. The study results have received general acceptance even by some of the most ardent expressway advocates" (11).

Although most of the publicity on the project assumed that the selected alternative was recommended by the consultant, there were, in fact, no recommendations. Neither was the consultant responsible for the selection. Instead, the process of community involvement (with the consultant acting as a catalyst for decision-making) resulted in what appeared to be a logical choice of alternatives. This was a choice by the majority of the community. No legal actions followed the choice despite the threat of 2 such actions during the phase 2 presentation.

Finally, the project resulted in a course of action that included the construction or reconstruction of highway transportation links, the reordering of state priorities to include investments in rural job training, education, and health, and the strengthening of existing rural transit services. Thus, in spite of a negative finding for an expressway by New York State Department of Transportation, the identification of alternatives by the community resulted in a positive finding for other regional highway improvements.

SELECTED PROBLEMS IN INVOLVEMENT

There are a number of critical elements in any involvement process, the success of which can make the difference between success and failure of the overall planning program. Included in these are (a) the general type of planning being attempted, i.e., the more traditional type of planning versus the integrated planning, plus the identification of planning alternatives and (b) the techniques or procedures used in the involvement program, such as hearings, surveys, or advisory committees.

The earlier sections of this paper dealt with the first element listed above. That is, they emphasized the advantages of performing integrated social-economic-environmental analyses regardless of the central planning focus. [In fact, these earlier sections have implied that the use of an integrated planning approach might have more of an impact on the success of a community involvement program than would the techniques for involvement. It is the repeated experience of the author that this is the case. In addition, it appears that this is also the experience of those who were involved in the transportation planning efforts in Boston and in Compton, California (6)]. Thus, the remaining portion of this paper will deal with the techniques for involvement.

Two cautions are worth mentioning before the techniques are discussed. The first is that no technique or set of techniques is likely to be applicable to each different problem and community. Instead, maintenance of a flexibility to the use of surveys, workshops, or committees could be the most important determinant for success. This may be true to the extent that, for the same project, different techniques might be used for the systems level of planning than for the locational or for the design levels of planning.

The second caution is that the 5-phase planning approach described earlier may have diminished the importance of selecting a particular set of techniques. That is, given a strong program for involving the community, techniques other than those actually used might have been equally effective.

Initiation and Maintenance of an Involvement

It was stated earlier that the involved community included both those for whom the planning was being done and those who might be affected by the planning. An emphasis was placed on the inclusion of decision-makers from these 2 groups. Some questions that might arise from this description are, How were the decision-makers identified, and who were they? How were very busy or disinterested decision-makers encouraged to participate from the outset? Through what techniques did they participate? How were they encouraged to maintain an interest during an 18-month study period? The following description will answer most of these questions.

First, the project in upstate New York had been discussed for many years and state-level legislation had also been passed that provided a mandate for it. The project had also been controversial, so there was a base of strong interest in the community. This base was significantly extended by the willingness of the Department of Transportation to consider related economic, social, and environmental factors after it had found that a proposed expressway solution was economically infeasible. This initiative by the department probably was the single largest factor in the community's perception that it could be meaningfully involved in the planning process. Thereafter, the involvement techniques employed by the planning team included the formal hearings, formal group presentations of the preliminary and final results, personal interviews, and specific surveys related to industrial development and environmental problems.

As a consequence of the state's activities, many of the community decision-makers were identified prior to the initiation of the study. These included local and regional business development groups, citizens' groups, and staff and elected officials of municipal, county, state, and federal governments. This identification was continued from the outset by about 12 members of the consultant team during numerous trips to the study region, adjacent regions, neighboring states and Canada, and federal government offices. For example, the biologists and zoologists were responsible for contacts with the environmentalists; the social scientists, for contacts with employment agencies and housing groups; the industrial and agricultural economists, for contacts with business and farmer representatives. In summary, the identification of the community decision-makers was a relatively simple, straightforward effort, an effort that was made easier by positive actions of the New York State Department of Transportation.

There have been speculations in recent literature that a community could not be involved at the system or regional level. And in fact, in New York, there was an initial tendency not to participate. However, this was probably due to the fact that some of those contacted had been discouraged at other hearings where most of the decisions had already been made. A general willingness to participate evolved following the formal

hearings when the need to develop alternative solutions was emphasized and the commitment to integrated planning was explained. This willingness was evidenced by the subsequent submission of opinions and data by members of the community to the planning team. Some very positive and thoughtfully prepared oral and written statements were received by the state and the consultants.

The overall effect of the approach described earlier was to make the public hearing a formal milestone of a more extensive participatory program. Thereafter, individual contacts were continued, and presentations of the preliminary and final results were made to a more limited cross section of the community. As mentioned earlier, the presentation of the sketch analyses resulted in the identification of a new alternative. This new alternative was analyzed and included in the presentation of final results. Thus, the community was involved in the process of identifying alternatives for both the preliminary and final analysis. This type of involvement had the effect not only of encouraging the suggestion of positive alternatives but also of eventually attaining a consensus of the majority of community decision-makers.

Opposing views and controversy were evidenced throughout the study. However, their intensity dropped noticeably after the presentation of the preliminary results. This was probably due to the improved understanding of relations among social, economic, and environmental factors and to the improved understanding of the implications of choosing to do nothing or to follow a strongly developmental or environmentally oriented action plan. Even so, opposing views and controversy persisted after the final results were presented and the report was distributed. However, they were at such a low level that early threats of legal action were not pursued.

Role of the Planner in Community Involvement

The role of the planner is obviously changing significantly. No longer is he expected (or permitted) to remove himself to a professional office for purposes of developing a plan that will be implemented after receiving a stamp of approval from the power structure. For many reasons, he must now work very closely with the community, and increasingly he must work with planners from other disciplines.

One of the basic results of these changes is that the planner, whether an engineer, economist, social scientist, or environmentalist, is being forced into a communicating role. This communications role is not for purposes of being better able to explain, justify, or sell his own plan. Rather it is the role of helping the community to understand relations among our increasingly complex social, economic, and environmental subsystems. Also included in this community are the planning specialists in education, housing, government organization, and law, who must be able to establish the qualitative and quantitative relations needed for effective planning and implementation.

The new requirements being placed on planners mean that they must develop even stronger leadership capabilities for

1. Organizing effective community involvement programs,
2. Identifying new and creative alternatives for improving our living environments,
3. Improving the technical approaches and analyses used in planning, and
4. Acting as a catalyst for community efforts in enunciating goals, understanding relations, and reaching a consensus for progress.

In addition, there are actions that should be avoided. Most important, for an effective community involvement, planners should avoid a position of advocacy. That is, they may be more effective in acting as a catalyst for the community in developing a course of action than as an advocate in promoting a predetermined course of action.

In the role of acting as a catalyst, the planner should avoid trying to communicate analytical techniques unless requested by knowledgeable members of the community. Very few members of the community can or need to understand the intricacies of the technical models and analyses. Instead, planners should be communicating the results of the technical analyses in terms of basic relations (i.e., between transportation and land use) and understandings of the implications of having chosen a particular course of action. This does not mean that the planner need not be prepared to provide specific

information about the details of his models or analyses. This is in fact a critical part of his communication with planners in other disciplines, and it is on the success of these communications that the credibility of truly integrated analyses rests. Unfortunately, the area of interdisciplinary planning is least developed, and yet is one that is most needed to improve the general public's understanding of relations.

On the positive side, planners must take the initiative in organizing the community involvement programs. Far too many citizens have been discouraged by earlier approaches used by governments in dealing with the community at large. Thus, they need to be convinced that times have changed and that there are now meaningful opportunities for involvement.

Planners must also take the lead in helping to identify new and creative alternatives for action, for it is they who have the technical ability to thoroughly understand relations and implications. Furthermore, this leadership may be important to the community's perception that an honest effort is being made to consider all alternatives to their problems.

Third, planners are the principal group with the ability to improve the technical models and analyses necessary to integrated planning. These relations are crucial to the planners' ability to perform effectively as professionals and to the general public's acceptance of their work.

Finally, it is clear that there are multiple advantages to the planner in acting as a catalyst for the planning and decision-making process. Equally clear is the fact that the change from the more traditional role is toward an even more creative, challenging role that most planners should welcome. As such, planners should approach their new role as positively as possible so that their professional stature remains undiminished in this critical activity.

REFERENCES

1. Green, J. W. *New Directions in Policies and Programs*. Agency for International Development, U.S. Department of State, 1972.
2. *The Budget of the U.S. Government—Fiscal Year 1974*. U.S. Govt. Printing Office, 1973.
3. *Policy and Procedure Memorandum 90-4*. Federal Highway Administration, Sept. 21, 1972.
4. Burke, E. M. *Citizen Participation Strategies*. Jour. of American Institute of Planners, Vol. 34, 1968.
5. *Citizen Participation in Transportation Planning*. HRB Spec. Rept. 142, 1973.
6. Fielding, G. J. *Community Involvement in Highway Planning and Design*. Federal Highway Administration, Jan. 1973.
7. Bigelow, C. D., et al. *Delaware-St. Lawrence Region—The Role of Transportation in Alternative Strategies for Development*. New York State Department of Transportation, March 1972.
8. Andrews, G. H. *Proc., Panel Discussion on Community Involvement in Highway Planning and Design*. Federal Highway Administration, Jan. 1973.
9. Esser, G. H. *New Dimensions in Highway Planning: Rising Expectations for Community Involvement*. Research Group, Inc., Atlanta, 1967.
10. Lash, M. *Community Conflict and Highway Planning (The Case of the Town That Didn't Want a Freeway)*. Highway Research Record 69, 1963, pp. 1-17.
11. Memmott, F. W. *Delaware-St. Lawrence Corridor Study*. Paper presented at HRB 5th Summer Meeting, 1972.

METHOD FOR PREDICTING THE EFFECT OF LONG-RANGE TRANSPORTATION PLANS ON RESIDENTIAL LAND USE ACTIVITIES

Frank L. Ventura, Transportation and Urban Analysis Department,
General Motors Research Laboratories; and
Rajendra K. Mehta*, Consultant, Bombay

A long-range predictive model is described for estimating the number of households that would be displaced by planned transportation systems for a metropolitan area. The model consists of 2 linked submodels: a basic model whose output is the number of household units displaced per acre of right-of-way and a right-of-way model whose output is total acres of right-of-way required by the proposed system. The method involved generating, calibrating, and testing several basic models by means of regression analysis and used real-world historical data for 105 sections (later aggregated into 65 sections) of recently constructed freeways. The case study area was classified into 4 categories: central city, suburbs, standard metropolitan statistical area, and urbanized. Each basic model was tested with observations of freeway sections in each category, and the "best" of the basic models was selected for linkage with a right-of-way model. The predictive capability of the household displacement model was tested on 12 miles of recently constructed freeways not included in the calibration of the model. The estimates were found to be within 4 percent of the actual displacements.

•SOCIAL and environmental effects of alternative transportation plans are rapidly becoming important considerations in the planning process. Traditional economic analyses of proposed systems, in terms of construction and right-of-way costs and user costs-benefits, no longer suffice. Increasingly, decisions to select and implement future transportation systems will be based on comprehensive evaluations that include social and environmental effects.

The Metro Guideway System study program of the Transportation and Urban Analysis Department includes a comparative evaluation of a planned freeway and transit system in a case study area and an investigation of a concept of an automated highway (automobile and transit) system. One set of inputs to the evaluation model is the social and environmental impacts of the 2 systems. One of these impacts is the displacement of households.

This paper describes a model developed for the long-range prediction of the number of households that will be displaced by a planned system. The method has application to any transportation system if the design characteristics and forecast data are known for the affected travel zones in each corridor for the time period of expected implementation.

The rest of this paper describes the model developed for predicting household displacement by planned transportation facilities and the procedure followed in developing the model. The method uses a multiple regression technique on historical freeway data

*Mr. Mehta was with the General Motors Research Laboratories when this research was performed.

in testing the stability of resulting relations, in solving for the regression coefficients, and in selecting the key variables and the "best" of 8 basic models generated for predicting the displacement of households.

RATIONALE FOR HOUSEHOLD DISPLACEMENT MODEL

It was postulated that the number of households displaced by a proposed freeway is a function of the location of the freeway, the land requirements of the freeway, and the characteristics of the land use activities on the required land. Briefly, household displacement = $f(\text{location, land requirements, development characteristics})$.

Location

The spatial location of a proposed freeway across the surface of a metropolitan area can help determine the number of households that will be displaced. Because development characteristics vary across a metropolitan area and, quite often, across a community within a metropolitan area, the location of a freeway in relation to the spatial arrangement of land use activities is an important consideration in estimating the displacement impact. The method described here is spatially oriented in that it considers the subareas (zones) of the local communities in the metropolitan area through which the future freeway will run.

Land Requirements

The amount of land required by a freeway is another determinant of household displacement. Because approximately 40 to 50 percent of an urban community's total developed land area is in residential use, generally the greater the amount of land is that an urban freeway requires, the greater the probability is that households will be displaced. The displacement model is concerned with net right-of-way and takes into account existing right-of-way of affected public streets and reservations in each affected zone. Net right-of-way is defined as the total right-of-way required for a freeway less existing right-of-way within the path of the freeway.

Development Characteristics

Development characteristics of an area through which a freeway will be constructed can also play a significant role in determining the number of households that will be displaced. For the displacement model, the 3 determinants selected were extent of urban development, level of residential development in relation to urban development, level of residential development in relation to developed land area and total land area, and density of residential development.

With reference to extent of development, it was reasoned that, the higher the percentage of developed land is that an affected zone contains, the greater the probability is that households will be displaced. Concerning level of residential development, the 2 variables selected were percentage of developed land area in residential use and percentage of total land area in residential use. It was reasoned that, the higher the level of residential development is in a given zone, the greater the probability is of displacement of households. On the other hand, a freeway running through a nonresidential area, such as an agricultural area or a park area, will displace few, if any, households.

With reference to density of residential development, the reasoning was that, the greater the number is of households per unit (acre) of residential land, the greater the probability is of displacing a relatively high number of households. Displacement is higher in and around a central business district where densities may run as high as 30 or more units per acre of land than in the suburb where perhaps 6 units exist on an acre of residential land.

MODEL DEVELOPMENT

The approach to predicting the household (HH) displacement impact of a case study area's freeway program was to obtain historical input data and known impacts of recently

constructed freeways, establish relations between independent and dependent variables by means of regression analysis, and apply these relations to forecast data for the independent variables to give an estimate of the number of households that will be displaced by a post-1980 freeway system. The concept is shown in Figure 1. The major steps taken in the development of the forecast model may be outlined as follows:

1. Define the causal factors, input data requirements, and quantitative output measures;
2. Generate several different basic displacement models;
3. Obtain the historical input data for the independent and dependent variables from highway and urban planning agencies;
4. Calibrate the models;
5. Apply the models to observations on selected freeway sections in 4 area types and select the most valid basic model for the area type that provides the most valid results; and
6. Convert the best basic model to the household displacement model to be applied to the forecast data for the affected zones of future freeways.

Estimation of Model Parameters

Eight basic models were postulated, each to be tested with observations in 4 area categories. The models included additive and multiplicative functions and various combinations of independent variables. The model formulations are as follows:

$$Y = K_1 + K_2(A) + K_3(B) + K_4(R) \quad (1)$$

$$Y = K_1 + K_2(A) + K_3(C) + K_4(R) \quad (2)$$

$$Y = K_1 + K_3(B) + K_4(R) \quad (3)$$

$$Y = K_1 + K_3(C) + K_4(R) \quad (4)$$

$$Y = K_1(A)^{K_2}(B)^{K_3}(R)^{K_4} \quad (5)$$

$$Y = K_1(A)^{K_2}(C)^{K_3}(R)^{K_4} \quad (6)$$

$$Y = K_1(B)^{K_3}(R)^{K_4} \quad (7)$$

$$Y = K_1(C)^{K_3}(R)^{K_4} \quad (8)$$

where, for a given zone,

Y = number of households displaced per acre of right-of-way acquired,

A = percentage of developed land,

B = percentage of developed land in residential use,

C = percentage of total land in residential use,

R = net residential density,

K₁ = constant of regression, and

K₂, K₃, K₄ = regression coefficients.

The rationale for the basic models is that the number of households displaced per unit (acre) of freeway right-of-way depends on the state of future conditions in each sub-area (zone) through which the freeway will run. These conditions may be described by the following independent variables: developed land, developed land in residential use, total land in residential use, and net residential density.

Model Calibration

The coefficient values of K₁, K₂, K₃, and K₄ were determined by performing regression analysis on historical data on household displacement by sections of freeways re-

cently constructed or under construction for 4 area categories. The necessary data for calibrating the models were obtained from the state highway department and local urban planning documents.

Data for the dependent variable, number of households displaced by 3 selected freeways, and for the independent variable, land required for freeway right-of-way, were obtained from the state highway department. Data for the remaining independent variables were obtained from local land use studies.

Historical data were obtained for 3 freeways. Criteria used in their selection were recent construction, location within the counties of the case study standard metropolitan statistical area (SMSA), diversity of urban area types traversed, representation of the 2 basic freeway corridor types (i.e., radial and circumferential), and availability of suitable data.

Data from the state highway department were available for freeway sections ranging from 0.1 to 1.0 mile in length. Total data points were 105. Short freeway sections in similar urban area categories were aggregated into 1-mile sections, resulting in 65 data points or observations for analysis.

Because area characteristics within the SMSA varied across the metropolitan area, the basic models were tested on observations in each of the 4 area types in a search for the best results. The area types and the number of observations or freeway sections analyzed within each area category were as follows:

<u>Area</u>	<u>Observations</u>
Central city	32
Suburbs	33
SMSA	65
Urbanized	53

Historical data were tabulated for each freeway section for each area type. An example for freeway sections in the central city is given in Table 1. The obtained data were coded and keypunched for the regression analysis. The stepwise multiple regression analysis (STEP) program of the IBM System 360 scientific subroutine package (PL/I) was used for the analysis. This procedure was repeated for each model for each area category.

Calibration Results and Selection of Best Model

A number of the 8 models performed well, and the outputs were analyzed for their validity. Percentage of total land in residential use and net residential density were the 2 most significant independent variables in estimating household displacement per acre of right-of-way.

The results of the model applications to the city and suburb categories differed to the extent that net residential density was more significant in the city than in the suburbs. This may be due to densities generally being more uniform in the suburbs than in central cities where densities may vary from 30 or more household units per acre of land in and around central business districts to 6 or fewer units per acre in the city's fringe areas. Also, observations in the suburb category included some of the rural freeway sections that may have resulted in a biased sample.

A test was made to check this by applying the SMSA equations to the freeway sections in the central city and the suburbs, including the rural sections of the suburbs. The difference was only 5 percent in the case of the central city, but 40 percent in the case of suburbs, perhaps because of the mixture of urban and rural freeway sections in the suburbs.

Rural sections were, therefore, removed from the collection of observations, and a model was developed for the urbanized area only. Again, estimated Y values with the urbanized area equations and the city and suburb equations were compared. The difference was less than 5 percent in both cases.

Among the 8 basic equations, Eqs. 5 and 6 had a high degree of correlation ($R^2 = 0.903$). However, the t value for variable A was less than 2, indicating the insignificance

of this variable. Equations 7 and 8, without variable A, provided satisfactory results ($R^2 = 0.90$). Equation 8 and its application to observations for the urbanized portion of the metropolitan area, however, provided more satisfactory results than Eq. 7 in that its predictive capabilities would be enhanced because it reflects the undeveloped portions of an affected zone where the growth potential exists. Results of the urbanized-area tests are given in Tables 2 and 3.

A chi-square test was also made to further establish the selected goodness of fit of the selected model. The test revealed that the model fits at the 5 percent significance level.

Estimation of Household Displacement

The basic displacement model (Eq. 8) selected is described as follows:

$$Y = (0.61 \times 10^{-2})(C)^{0.85} \times R^{1.53} \quad (9)$$

After the number of households displaced per acre of freeway right-of-way is established by means of the basic model, the procedure then requires that the net right-of-way in acres be ascertained, which, when multiplied with the number of units displaced per acre of right-of-way, will provide an estimate of the total number of units that will be displaced in a given zone. In mathematical notation, we have

$$H = Y \times R_N \quad (10)$$

where, for a given zone,

H = number of household units displaced, and

R_N = net right-of-way, in acres.

For Eq. 10, the value of Y is provided by Eq. 9. To solve for H, however, requires that R_N be calculated. It was established that net right-of-way of a proposed freeway is a function of the length of the freeway, the design right-of-way, the number of interchanges, and the design and existing rights-of-way of each interchange.

It was reasoned that, if the number of displaced households were related to the amount of urban land that would have to be acquired for a freeway and if existing public right-of-way varied from community to community, depending on long-range planning policies, a straightforward measure of the design right-of-way would not suffice. A more realistic measure would be the design right-of-way less existing public right-of-way that would not have to be acquired in each zone. Therefore, Eq. 11 was formulated:

$$R_N = \frac{5,280L(R_D - R_E)}{43,560} + N_M(a_1) - e_1 + N_m(a_2) - e_2 \quad (11)$$

where, for each given zone,

L = length of freeway section not including interchanges, in miles;

R_D = design right-of-way, in feet;

R_E = existing right-of-way, in feet;

N_M = number of major interchanges;

N_m = number of minor interchanges;

a_1 = average right-of-way required for major interchange, in acres;

a_2 = average right-of-way required for minor interchange, in acres;

e_1 = existing right-of-way for major interchanges, in acres; and

e_2 = existing right-of-way for minor interchanges, in acres.

For case study area 1, the design right-of-way will be 350 ft for the conventional urban freeway and 450 ft for the multimodal urban freeway (e.g., a freeway with a transit system in its median). In addition, the major interchange, defined as an interchange between freeways, will require an average of 65 acres of land. The minor interchange, defined as an interchange between a freeway and a major divided arterial, will require

Figure 1. Model concept.

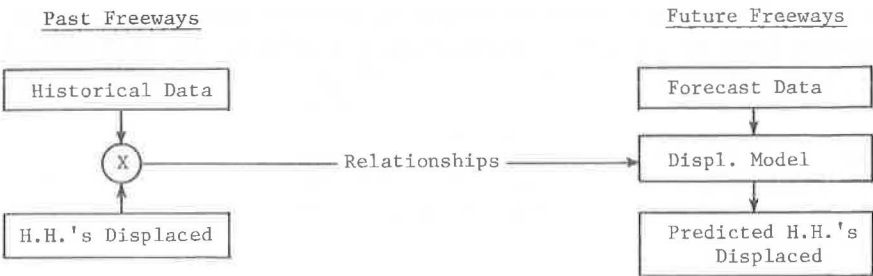


Table 1. Example of data for freeway sections in central city.

Freeway Section	Households Displaced/ Acre of Right-of-Way	Developed Land (percent)	Percentage of Land in Residential Use		Net Residential Density
			Developed	Total	
1	Y_1	A_1	B_1	C_1	R_1
2	Y_2	A_2	B_2	C_2	R_2
...
n	Y_{32}	A_{32}	B_{32}	C_{32}	R_{32}

Table 2. Results of application of model to 53 freeway sections in urbanized area.

Model	Regression Coefficients				Multiple Correlation Coefficient	Standard Error of Estimate
	K_1	K_2	K_3	K_4		
1	-10.64413	0.05657	0.08165	0.77643	0.808	2.828
2	-6.35368	-0.00175	0.10601	0.79468	0.832	2.662
3	-8.72528		0.08424	1.06782	0.790	2.914
4	-6.40391		0.10546	0.78705	0.832	2.636
5	0.000287	0.38063	0.97684	1.85187	0.903	0.204
6	0.0258	-0.59621	0.97685	1.85188	0.903	0.204
7	0.000861		0.97600	2.11844	0.900	0.206
8	0.0061		0.85095	1.52849	0.896	0.207

Table 3. T values and β coefficients of regression coefficients.

Model	Item	K_2	K_3	K_4
1	T value	2.022	4.221	4.048
	β coefficient	0.25784	0.35611	0.51629
2	T value	-0.060	5.138	4.397
	β coefficient	-0.00797	0.48657	0.52843
3	T value		4.236	8.186
	β coefficient		0.36745	0.71005
4	T value		5.750	6.217
	β coefficient		0.48408	0.52335
5	T value	1.356	6.706	7.201
	β coefficient	0.12890	0.41117	0.68481
6	T value	-1.889	6.706	7.201
	β coefficient	-0.20191	0.53515	0.68481
7	T value		6.644	12.670
	β coefficient		0.46618	0.78389
8	T value		6.407	7.769
	β coefficient		0.46618	0.56523

Table 4. Actual and estimated households displaced.

Freeway	Actual	Estimated	Ratio
1	641	643	1.003
2	1,112	1,178	1.068
Total	1,753	1,821	1.039

40 acres. (The rights-of-way of various existing interchanges were computed, and the averages were developed for the case study area. The design right-of-way was provided by the state highway department.)

Substituting these values in Eq. 11, we now have

$$R_N = 0.121L(R_D - R_E) + (65N_M - e_1) + (40N_A - e_2) \quad (12)$$

Combining the 2 submodels (Eqs. 9 and 12), we have the following household displacement model:

$$H = [0.61 \times 10^{-2}(C)^{0.85} \times (R)^{1.53}] [0.121L(R_D - R_E) + (65N_M - e_1) + (40N_A - e_2)] \quad (13)$$

DISPLACEMENT MODEL TEST

A test of the model's predictive capability was undertaken on 2 recently constructed or about-to-be constructed freeways whose actual household impacts were known by the state highway department. Two test areas were established on the basis of availability of data. One involved a 6.20-mile segment of a radial Interstate freeway, the other, a 5.98-mile segment of a circumferential Interstate freeway. Neither had been included in the calibration of the model.

Input data, except percentage of residential development, were obtained from various urban planning agencies. Data on existing and design rights-of-way, the number of major and minor interchanges, and the count of households displaced were obtained from the highway department. The percentage of residential development in each affected zone was calculated from data obtained from the metropolitan area's council of governments. Net residential densities were obtained from zoning ordinances obtained from local urban planning agencies.

The model estimated 1,821 household units displaced, which was within 4 percent of the actual displacement of 1,753 units. The actual versus estimated displacements for each study area are given in Table 4.

The model was accepted as satisfactory by the authors as a long-range forecast tool capable of providing decision-makers with approximate estimates of household impacts of alternative transportation systems. The model is not intended to substitute for the traditional parcel-by-parcel right-of-way study that normally precedes right-of-way acquisition. Rather, it is intended to serve as a long-range tool for urban and transportation planners so that they can assist decision-makers to assess the consequences of a number of systems and system alignments and to adopt housing programs and possible joint development and multiple-use concepts that would minimize adverse effects of future transportation systems.

REFERENCES

1. Campbell, E. W. Social and Economic Factors in Highway Location. Jour. Highway Div., Proc. ASCE, Vol. 92, No. HW2, 1966.
2. Cline, M. G. Urban Freeways and Social Structure—Some Problems and Proposals. Highway Research Record 2, 1963, pp. 12-20.
3. Crumlish, J. D. Notes on the State of the Art of Benefit-Cost Analysis as Related to Transportation Systems. National Bureau of Standards, U.S. Department of Commerce, Tech. Note 294, 1966.
4. Dean, B. V., Mantel, S. J., Jr., and Grundstein, N. D. A Method for Analyzing Urban Transportation Plan Implementation Problems. Operations Research Group, Division of Organizational Science, Case Institute of Technology, Tech. Memorandum 62, 1966.
5. Fellman, G., and Rosenblatt, R. The Social Costs of an Urban Highway: Cambridge and the Inner Belt Road. In Summary and Conclusions and Papers Presented, Conf. on Poverty and Transportation, American Academy of Arts and Sciences, Brookline, Mass., 1968.
6. Fried, M. Grieving for a Lost Home: Psychological Costs of Relocation. In The Urban Condition (Duhl, L. J., ed.), Basic Books, New York, 1963.

7. Freeways and Our City: Costs, Displacement, Suburban Sprawl, Alternatives. Committee on Urban Conservation, Washington, D.C., 1965.
8. Freeways in the National Capital Region. Federal City Council, Washington, D.C., 1966.
9. Grier, G. W., and Robinson, N. M. Social Impact Analysis of the Baltimore Freeway System. Urban Design Concept Association, final rept., 1968.
10. Hartman, C. The Housing of Relocated Families. Jour. of American Institute of Planners, Vol. 30, No. 4, Nov. 1964, pp. 266-286.
11. Hill, S. L. Watts-Century Freeway. HRB Spec. Rept. 105, 1969, pp. 117-121.
12. Christensen, A. G., and Jackson, A. N. Problems of Relocation in a Major City: Activities and Achievements in Baltimore, Maryland. Highway Research Record 277, 1969, pp. 1-8.
13. Hill, M. A Method for Evaluating Alternative Plans. Department of City and Regional Planning, Univ. of Pennsylvania, PhD dissertation, 1966.
14. Ellis, R. H. Some Comments on Social Impacts and Urban Transportation Planning. In Defining Transportation Requirements, Proc., 1968 Transportation Engineering Conf., ASME, 1969, pp. 276-285.
15. Lambrakis, H. C. A Report on Socio-Economic Analysis for the Crosstown Expressway Corridor. Chicago Department of Public Works, Nov. 1964.
16. Neuzil, D. R. Some Social Impact Aspects of Urban Freeways. Institute of Transportation and Traffic Engineering, Univ. of California, Berkeley, grad. rept., March 1964.
17. The Proposed Chicago Crosstown Expressway: Needs, Benefits, Community Impact, Proposed Alignment, Suggested Procedure for Developing Details. Transportation Advisory Group, Chicago, Nov. 30, 1965.
18. Relocation: Social and Economic Aspects. HRB Spec. Rept. 110, 1970.
19. Relocation: Unequal Treatment of People and Businesses Displaced by Governments. Advisory Commission on Intergovernmental Relations, Washington, D.C., Jan. 1965.
20. Sawhill, R. B. Freeways and Residential Neighborhoods. Automotive Safety Foundation, App. C, July 1965.
21. Thomas, E. N., and Schofer, J. L. Informational Requirements for Evaluating the Social Impacts of Transportation. In Transportation: A Service, Proc., Transportation Eng. Conf., ASME and New York Acad. of Science, 1968, pp. 101-116.
22. Transportation and Community Values. HRB Spec. Rept. 105, 1969.
23. Vance, J. C. Relocation Assistance Under Chapter Five of the 1968 Federal-Aid Highway Act. NCHRP Research Results Digest 3, March 1969.
24. Social and Community Factors. Ohio Department of Highways, Manual 9, 1966.
25. The War Over Urban Expressways. Business Week, March 11, 1967, pp. 94-103.
26. Zettel, R. M., and Shuldiner, P. W. Freeway Location Conflicts in California. Institute of Transportation and Traffic Engineering, University of California, Berkeley, Res. Rept. 29, 1959.
27. Kemp, B. H. Social Impact of a Highway on an Urban Community. Highway Research Record 75, 1965, pp. 92-102.

ECONOMIC CONSEQUENCES OF FREEWAY DISPLACEMENT TO RESIDENTS RELOCATED UNDER THE 1968 AND 1970 RELOCATION PROGRAMS

Jesse L. Buffington, Texas Transportation Institute, Texas A&M University

Various studies have been made to determine the consequences to residents who were displaced by freeways and relocated under federal and state programs superseded by the 1968 and 1970 versions. Since the 1968 and 1970 relocation programs have provided relocatees with considerably more relocation assistance in terms of both services and payments, a study was needed to evaluate the effectiveness of such programs in reducing the adverse effects on residents displaced by freeways. A survey was made of 171 urban relocatees in 2 major urban areas in Texas to obtain facts and opinions concerning their freeway displacement experiences. The study revealed that more than two-thirds of the relocatees upgraded their housing, most of them doing so voluntarily. The extent of upgrading of housing by relocatees caused a significant increase in housing costs, and replacement housing payments did not cover adequately the increased costs. The extent to which relocatees upgraded their housing varied significantly with selected characteristics of relocatees. Relocatees who originally lived in substandard housing tended to move into standard or above-standard replacement housing. This paper compares findings of this study with those of former studies that dealt with the same subject.

●PRIOR to the acceleration of the urban renewal and road-building programs of the late 1950s, residential displacees were given very little relocation assistance. However, concern for those faced with relocation by governmental agencies dates back into the 1940s (3). Yet the historical governmental attitude toward displacement had been to pay owners fair market value for their properties and let them solve their own relocation problems (7, p. 2). This meant that displaced renters did not receive any money, even through a property settlement, to help cover relocation costs. In recent years, the government has changed its attitude as numerous persons, governmental and nongovernmental, have noted that benefits are not necessarily received by the same people who bear the costs of a project. The traditional attitude has been tempered by concern for the general good of society and the protection of minorities. Persons forced to relocate shouldered an unequal share of the social costs of governmental programs, causing an unfair redistribution of wealth or resources (2, p. 1). Government programs such as those that provide transportation facilities generate costs and benefits for both users or nonusers of those facilities. A divergence between private costs or benefits for users and social costs or benefits for both users and nonusers has been identified by economists (13, p. 183; 8, p. 215). Some economists say that supplementary government programs, such as relocation programs, have been enacted into law to help correct this apparent inequity.

The first relocation program passed by the Congress was authorized by the Federal-Aid Highway Act of 1962 that required the provision of certain relocation services and authorized the payment of up to \$200 in moving expenses to each household displaced by federal-aid highway programs. However, moving payments were made only in states that legally authorized them. After passage of the 1962 Act, the Congress and federal

agencies initiated several studies that dealt with various facets of the relocation problem (2, 5, 17, 18, 19, and 20).

1968 AND 1970 RELOCATION PROGRAMS

Perceiving a need for other types of relocation payments, the Congress passed the Federal-Aid Highway Act of 1968 that required a payment for actual moving expenses or a combined schedule payment and dislocation allowance of up to \$300, a supplemental housing payment of up to \$5,000 for long-term owner-residents and \$1,500 for tenant-residents and short-term owner-residents, and a payment for miscellaneous expenses necessary to transfer the property to the governmental agency making the purchase. Also required by the 1968 Act were expanded relocation services that provided re-locatees with current price and rental information on available replacement housing.

More recently, Congress passed the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 that expanded the scheduled moving payment and displacement allowance to \$500 and the supplemental housing payments to \$15,000 for long-term owner-residents and to \$4,000 for short-term owner-residents and tenant-residents. Also, the 1970 Act required the payment for increased interest expenses resulting from a change in mortgages and payment for incidental expenses incurred in the purchase of a replacement home. The 1970 Act further expanded the required relocation services offered to all residents displaced by federal-aid programs.

Both the 1968 and 1970 Acts required that residents relocate into "decent, safe, and sanitary" housing to qualify for the supplemental housing payments. Also, both Acts required that the supplemental housing payment be based, in part, on the price or rent of property "comparable" to that taken from the relocatee. The Federal Highway Administration's definition of a comparable replacement dwelling contains 9 requirements. They include size, quality, location, availability, and financial considerations.

A search of the literature revealed that only one study had been made to determine some of the effects of highway displacement to residents relocated under the 1968 relocation program (12). Only a limited determination of the economic effects of relocation was made in that study. No studies have been made of residents relocated under the 1970 relocation program. However, some studies were conducted to make economic evaluations of previous federal and state programs. One of these studies was conducted in Dallas in 1961 (1), when Texas had no relocation program that provided financial assistance to relocatees. Another study summarized the findings of 33 housing relocation surveys conducted prior to 1964 (10). Two of these surveys dealt with highways. The last study of the impacts on residents relocated under prior relocation programs was conducted in Ohio during 1971 (6).

Perceiving the need to assess the effectiveness of the 1968 and 1970 relocation programs in reducing the adverse economic effects on residents displaced by freeways, a study was conducted by the Texas Transportation Institute under the sponsorship of the Texas Highway Department (THD) and the Federal Highway Administration. Both the 1968 and the 1970 federal relocation programs were fully implemented in Texas (16, p. 396). This paper reviews the results of this study.

OBJECTIVES OF STUDY AND RESEARCH PROCEDURES

The objectives of the study were to determine the extent to which

1. The owner and tenant relocatees voluntarily and involuntarily upgraded their housing;
2. The payments received by relocatees were adequate to cover all compensable costs required to obtain replacement housing;
3. The changes in housing costs affected the financial status of owner and tenant relocatees; and
4. The different economic effects identified by the study varied by selected characteristics of relocatees.

Data were obtained from the THD records and from relocated residents through personal interviews. THD personnel helped to canvass freeway projects in urban areas

to determine which would qualify for study. To qualify, a project was required to meet the following criteria: have residential relocatees that were relocated after April 1, 1969; have relocatees displaced from low-valued housing; be located in a city with a population of more than 200,000 people; and be in a city that had a considerable number of qualified residential relocatees.

As a result of this canvass, several projects located in 2 Texas cities, Austin and Houston, were selected for study. The original design called for a random sample of 240 relocatees, 120 owner-residents, and 120 tenant-residents, which met the following qualifications: vacated property taken for right-of-way after April 1, 1969; occupied property taken for right-of-way at least 90 days prior to the first date of negotiation for property; occupied a property that was a whole taking; occupied a dwelling or apartment unit valued by the THD at not more than \$15,000 in residential use; and occupied a single-family residence if owner or any type of residence if tenant. The resulting number of relocatees qualifying was considered too small to sample; thus, all were included in the study.

The number qualifying for study consisted of 251 relocatees, 107 owners, and 144 tenants. Of that number, 187 (75 percent) relocatees were available for interview. The other 64 (25 percent) were not available for interview for various reasons. We do not know to what extent the results were biased by the exclusion of those not available for interview, but we assumed that this group had characteristics and experiences very similar to the group interviewed. Of those available for interview, 16 were rejected because their household composition changed in such a way as to make it almost impossible to make before-and-after comparisons. Therefore, the remaining 171 relocatees, 85 owners, and 86 tenants, who availed themselves for interviews formed the sample for study.

Objective 1

Objective 1 called for a determination of the extent to which relocatees voluntarily or involuntarily upgraded their housing. Economic, quantity, and quality measures were used to make the upgrading determination of whether each relocatee's housing had been upgraded. The economic measure was based on the market value of the original and replacement dwellings. In the case of original tenants, monthly rents were used for the original and replacement dwelling value comparisons. If the relocatees changed tenure, estimated purchase prices or rents of replacement dwellings were generated through the use of gross rent multipliers (11, pp. 48-49; 4, pp. 990-991). For the quantity measure of upgrading, 12 selected physical characteristics of the original and replacement dwellings were compared. These characteristics were type of construction, age of dwellings, size of dwelling, number of rooms, number of bedrooms, number of bathrooms, type of heating, type of cooling, automobile storage, driveway material, type of street, and size of lot. For the quality measure of upgrading, the opinions of the relocatees were used. These 3 independent measures of upgrading were compared to determine the extent of disagreement among them.

The next task under objective 1 was to establish whether a respondent relocatee who had upgraded his housing did so voluntarily or involuntarily. Since a relocatee was required to purchase or rent a replacement dwelling that met the decent, safe, and sanitary (DS&S) standards in order to obtain relocation housing payments, he may have upgraded his housing involuntarily. Also, even though the relocatee's original dwelling was DS&S, the fact that the THD established a value for comparable replacement dwelling higher than that for the original dwelling would indicate that he may have upgraded his housing involuntarily. For the above reasons, a relocatee who upgraded his housing, in economic terms, to the extent that the value of his replacement dwelling was higher than the value set on his original dwelling but not more than the value established on the comparable replacement dwelling was classified as one who involuntarily upgraded his housing. On the other hand, if the value of his replacement dwelling was higher than the value of the comparable replacement dwelling, he was classified as one who voluntarily upgraded. Then the data were aggregated into groups according to those who failed to upgrade, those who voluntarily upgraded, and those who involuntarily up-

graded to reveal significant statistical differences and relations between the original and replacement housing values (9, 14).

Objective 2

To accomplish objective 2, a comparison was made between compensable relocation payments received and corresponding relocation costs incurred to obtain replacement housing. The essential difference between the relocation payment and the relocation cost measures of value used in this analysis is that the payments were based more or less on comparable values established by the THD whereas the costs were based on actual expenses obtained from the relocatees. In other words, the payments were constrained not only by the maximums established by law but also by the maximums set by comparable values. However, the moving and increased interest payments were limited not by comparable values but by other criteria. Relocatees were given 2 alternatives in claiming moving expenses. They could claim actual moving expenses up to 50 miles from their original dwelling, or they could accept payment under a scheduled payment up to \$300, based on room count, plus a relocation allowance of \$100 under the 1968 program or \$200 under the 1970 program.

The interest payment made by the THD was based on the lesser size and the shorter term of the remaining mortgage loans on the original and replacement dwellings. Also, the interest rate of the replacement loan had to be greater than that of the original loan. Therefore, the difference in the series of monthly payments between the original and the replacement loans was determined. Such a difference was due only to a higher interest rate. Then the present worth of that series of differential monthly payments was obtained by discounting it at the rate of interest paid on savings accounts by commercial banks in the area. A 4.5 percent discount rate was used by the THD in all of these computations involving eligible respondent relocatees who had original and replacement loans.

TTI researchers computed the interest cost to respondents who had a mortgage on both their original and replacement dwellings by determining the net worth of the difference between the monthly payments of the original mortgage at the actual interest rate versus a 4.5 percent alternative investment rate and by determining the net worth of the difference between the monthly payments of the replacement mortgage at the actual rate versus the 4.5 percent alternative rate. The difference between these 2 net worth values was called the actual interest cost or saving. This value could be positive or negative, which meant that it was possible to save interest in the process of changing mortgages. The interest costs or savings were also computed for respondents who had an original mortgage and also for those who had only a replacement mortgage. Of course, these 2 groups of respondents were not eligible under the law to receive an interest payment.

The housing supplement, down payment, and rent supplement were payments made to relocatees to help purchase or rent a replacement dwelling. Since all the original owner respondents were long-term occupants (as defined by law), they were not eligible for the down-payment supplement. Also, the original tenants, short-term and long-term, were not eligible for the housing supplement. All 3 of these supplements were established by using the asking prices or rents and customary down payments of available comparable replacement property.

The rent supplement is a payment that could have been treated like a time series and discounted, as was the interest differential, because it was meant to cover the extra rental expenses during a 2-year period under the 1968 program and a 4-year period under the 1970 program. Under the 1970 program, the rent payment was made in 4 equal installments during the 4-year period. Those who received lump-sum payments could have invested it during the next 2 years and earned some interest to help pay future rent. Therefore, the original lump-sum payment plus the interest could have yielded enough funds to rent replacement dwellings for more than the 2-year period if no change occurred in the differential between original and comparable rents. So that it would be comparable to the lump-sum rental payment, the actual rental cost was made to represent the rental cost for the same period used to compute the rental pay-

ment. Individual relocation payment-cost differentials were generated by original replacement tenure of relocatees to reveal significant differences and relations.

Objective 3

Objective 3 was accomplished by making a study of the changes that occurred in each relocatee's housing costs and showing how these changes affected the relocatee's financial position measured in terms of changes in net worth, monthly cash flow, and household balance sheet items. Compensable and noncompensable costs were included in such measures. As an independent measure of the overall financial effects of the move, the opinion of each respondent relocatee was obtained. Each indicator of financial effect was cross tabulated with the type of economic change made in housing to determine statistically significant differences.

Objective 4

Objective 4 was accomplished by comparing the findings of objectives 1, 2, and 3 with the age and race or nationality of the heads of households, the number of persons per household, and type of persons in the household. Cross tabulations of these characteristics were made with the economic upgrading of housing, changes in monthly costs, payments received versus cash expenses, and respondents' opinions of financial effect. The frequency distributions of respondents formed by the above cross tabulations were tested for significant difference or degree of independence by use of the chi-square statistic (9, pp. 73-75).

CHARACTERISTICS OF RESIDENTS SAMPLED

About 75 percent of the respondents were relocated under the 1968 program, and all of them had lived in their dwellings long enough to receive relocation payments on replacement housing and moving expense payments. Many of the owners had lived in their dwellings at least 10 years before the date of notice of availability of relocation assistance, and many of the tenants had lived in their dwellings fewer than 5 years.

The mean and median age of all the respondent heads of households was 49 years at the time of interview. The owners were considerably older than the tenants; the median ages were 57 and 38 respectively. About one-third were females, regardless of tenure. A slight majority (56 percent) of all heads of households were Anglos; most of the others were black. On the other hand, non Anglos made up the majority (63 percent) of all tenants, and the reverse was true for owners. More than three-fourths (78 percent) of them had full-time or part-time jobs. Nearly one-fourth (24 percent) of the owners were retired.

The mean size of all respondent households was slightly more than 3 persons, and the tenant households were about 1 person larger on the average. One-third of the tenant households were composed of 5 or more persons, whereas nearly two-thirds of the owner households were composed of no more than 2 persons. The makeup of these households consisted primarily of the head of household living alone, living with spouse alone, or living with spouse and children. Owner households made up the majority of the first 2 groups, and tenant households made up a majority of the last group. The median annual income was about \$7,000; owner households had slightly higher annual incomes than tenant households.

RESULTS OF STUDY

Extent and Nature of Economic Upgrading of Housing

Economic upgrading of housing was achieved by 126 (74 percent) of the 171 respondent relocatees. According to the quantity or physical characteristics measure, 73 percent of the relocatees upgraded their housing. In terms of the quality measure, 68 percent of the relocatees thought that they had upgraded the quality of their housing. The difference between each measure of upgrading was not statistically significant. Therefore, there was general agreement among the 3 measures as to the existence of upgrading of housing.

Nearly 79 percent of the owner relocatees accomplished economic upgrading. The earlier 1961 study revealed that 65 (77 percent) of 84 owner relocatees accomplished economic upgrading (1, p. 8). On a quality basis, 67 percent of the owner relocatees of the same study believed that their replacement housing was of superior quality to original housing compared to 72 percent of those of this study. The 1961 Texas study was conducted when no housing or rental supplements were paid relocatees, but the owner relocatees had personal and housing characteristics that were similar to those of this study.

Nearly 69 percent of the tenants accomplished economic upgrading of housing. The majority of the tenant relocatees that upgraded their housing were those who changed tenure. This study found that 50 percent of the displaced tenants purchased replacement housing. The 1971 Ohio study reported that more than 50 percent of the tenant relocatees became owners (6, p. 11). The Ohio study involved residents relocated prior to the 1968 relocation program.

Since the relocatees were required to purchase or rent a DS&S replacement dwelling to qualify for relocation housing payments and were required to use such payments in purchasing or renting a replacement dwelling, many of them may have involuntarily upgraded their housing to the comparable replacement value. However, if they entered the housing market and purchased or rented replacement housing at values higher than the comparable replacement values, upgrading was presumed to have been done more or less on a voluntary basis.

The existence of voluntary and involuntary upgrading was established by applying the above definitions to the relocatees' experiences. The results indicate that 55 percent of the respondents voluntarily upgraded, 19 percent involuntarily upgraded, and 26 percent failed to upgrade (Table 1). The number of original owners in each group differed significantly from that of original tenants. A higher percentage of owners than tenants voluntarily upgraded their housing. One explanation for the difference may be that there is more incentive for a relocatee to upgrade a considerable amount when he purchases rather than when he rents a dwelling. Another reason is that those who purchased a replacement dwelling had to pay all of the relocation housing payment as a down payment on it. No such restriction was placed on the 43 respondents remaining tenants in the use of the rental housing payment. At any rate, 56 percent of the tenants either failed to upgrade or involuntarily upgraded compared to 34 percent of owners. But those who involuntarily upgraded formed the smallest group for both owners and tenants, leaving fairly large groups that either voluntarily upgraded or simply failed to upgrade.

Other tabular data, not presented in this paper, indicated that about 77 percent of the relocatees who lived in non-DS&S original housing moved into DS&S replacement housing. Also, about 79 percent of those who lived in non-DS&S original housing upgraded their replacement housing. Of those who lived in non-DS&S original housing, tenants were less likely to upgrade or move into DS&S replacement housing than were owners.

Housing value differentials were used to measure the extent that respondents voluntarily upgraded, involuntarily upgraded, or failed to upgrade their housing. The mean differential values of the 3 groups varied widely for original owners and tenants (Table 2).

Original owners of the 2 upgraded groups upgraded more, in relative terms, than the original tenants, but both owners and tenants who downgraded did so by about the same amount. Also, both owners and tenants of the voluntary upgraded group accomplished a greater percentage of upgrading than did those of the involuntary upgraded group, although the latter group lived in much lower valued original housing.

All owners grouped together upgraded their housing by a mean differential value of \$5,114, representing a 50 percent increase in the value of resources committed to housing (Table 2). In contrast, the owners in the 1961 Texas study upgraded their housing by a mean differential value of \$2,480, representing a 26 percent increase in the value of resources committed to housing (1, p. 17). All tenants grouped together upgraded their housing by a mean differential rent value of \$22, representing a 24 percent increase in the cost of housing.

The relation between the amount of upgrading and the original housing value was ex-

explored and measured by the use of a linear regression equation. Figures 1 and 2 show the relation of the 2 variables and the resulting regression line for owners and tenants respectively. There was very little relation between the amount that original owners upgraded and the value of the original dwelling (Fig. 1). Also, the variation of the observations about the positively sloped regression line is very large. For original tenants, a statistically significant relation existed between the 2 variables (Fig. 2). But only 13.6 percent of the variation in the amount of upgrading was explained by the rental value of the original dwelling. Yet this negative regression line suggests that tenant respondents who lived in higher valued housing tended to downgrade. Because of the lack of goodness of fit, the resulting regression equations would be unreliable for predictive purposes.

The relation between the amount of upgrading and the value of comparable replacement was explored and measured by the use of a linear regression equation. The results were highly similar to those shown in Figures 1 and 2. The relation between the amount of upgrading and the differential value of comparable replacement and original properties was also explored. The scatter diagram revealed only a random relation. The above differential was used to indicate whether the amount of upgrading, voluntary or involuntary, was dependent on the magnitude of the relocation housing payment.

Perhaps there are several reasons why so many relocatees voluntarily upgraded above the value of a comparable dwelling. There were those who thought that the comparable values were established on dwellings inferior to their original dwellings or on dwellings located in neighborhoods inferior to their original neighborhoods. Others felt that they needed more room than dwellings comparable to their original dwellings provided. Still others wanted replacement dwellings that were newer and in better condition than their original dwellings or they wanted replacement dwellings located in newer neighborhoods than their original neighborhoods. The results already presented indicate that many of the replacement dwellings were of higher value, higher quality, or larger size or all of these than the original dwellings. Some of these relocatees changed their tastes and preferences between the time they moved into their original dwellings and the time they were displaced. Consequently, they were just looking for a good opportunity to move.

Adequacy of Compensable Relocation Payments

Certain general conclusions can be made about the adequacy of relocation payments from the standpoint of covering actual relocation costs. The results given in Tables 3 and 4 indicate that the respondents, as a group, spent much more than they received. This was especially true for original owners. Most of this group upgraded their housing considerably (much of it voluntarily) in the process of relocation. In so doing, they incurred greater mortgage debt. This explains why the housing supplement and interest payment were not adequate to cover the increased principal and interest costs. However, these payments were not designed to cover that much upgrading.

Of the 5 types of relocation costs and payments analyzed, only the rental and moving payments, authorized under the 1968 and 1970 programs, adequately covered the expenditures actually incurred (Table 4). If spread over a much longer period of time, the rental payments would become insufficient to cover the increased rental costs incurred by many tenants. The maximum payment set by law prevented a few relocatees from collecting more money for moving, housing, and rental expenses. But in the case of down payments, nearly 50 percent of those who received a down-payment supplement paid an even greater down payment.

Financial Effects of Relocation

The selected indicators mentioned in the introductory section of the paper were used in the determination of the financial effects of relocation. The results are given in Tables 5 and 6, which show the number of relocatees experiencing a certain level of financial effect and the average and median dollar amounts for each type of economic change in housing.

The data indicate that 87 percent of the respondent relocatees experienced an in-

Table 1. Economic change in housing by original tenure of respondent.

Change	Owner	Tenant	Total
Voluntarily upgraded ^a	56	38	94
Involuntarily upgraded ^b	11	21	32
Other ^c	18	27	45
All respondents ^d	85	86	171

^aPurchase price or rent of replacement dwelling was greater than both purchase value or rent of DS&S comparable replacement dwelling and value or rent of original dwelling.

^bPurchase price or rent of replacement dwelling was less than or equal to purchase price or rent of DS&S comparable replacement dwelling, but was greater than the value or rent of original dwelling.

^cPurchase price or rent of replacement dwelling was less than or equal to value or rent of original dwelling.

^d $\chi^2 = 8.37^*$; χ^2 0.05 = 5.99; 2 d.f.

Table 3. Relocation costs and payments to respondents by type of relocation payment.

Relocation Payment	Respondents Whose Costs Versus Payment Were			Total
	Less	More	Equal	
Housing supplement ^a	26	51	1	84
Interest payment ^b	5	78	7	90
Down payment	0	13	17	30
Rent supplement ^c	40	23	0	63
Moving payment ^c	148	6	3	157

^aIncludes 14 respondents who received no housing supplement.

^bIncludes 78 respondents who received no increased interest payment, but does not include 5 whose interest costs were not determined.

^cIncludes 6 respondents who received no rent supplement.

^dDoes not include 14 respondents whose moving costs were not determined, but does include 11 who had no moving costs.

Table 2. Housing value differentials by economic change in housing and original tenure of respondent.

Economic Change by Original Tenure ^a	Housing Value (dollars)		
	Original	Replacement	Difference
Original owner			
Voluntarily upgraded			
Mean	10,709	18,534	7,825
Minimum	5,641	9,000	1,500
Maximum	14,925	34,200	22,125
Median	11,000	17,585	6,820
Involuntarily upgraded			
Mean	6,304	9,093	2,789
Minimum	3,587	5,900	712
Maximum	10,441	12,000	4,913
Median	6,000	8,750	2,879
Other			
Mean	10,817	8,919	-1,898
Minimum	4,785	3,790	-6,000
Maximum	14,900	13,000	0
Median	11,113	10,000	-1,070
All original owners			
Mean	10,162	15,276	5,114 ^b
Minimum	3,587	3,790	-6,000
Maximum	14,925	34,200	22,125
Median	10,925	13,750	3,749
Original tenant			
Voluntarily upgraded			
Mean	94	145	51
Minimum	40	79	15
Maximum	160	220	159
Median	90	148	45
Involuntarily upgraded			
Mean	65	86	21
Minimum	25	45	3
Maximum	125	148	50
Median	60	81	15
Other			
Mean	106	87	-19
Minimum	50	40	-75
Maximum	175	128	0
Median	113	87	-10
All original tenants			
Mean	91	112	22 ^c
Minimum	25	40	-75
Maximum	175	220	159
Median	90	105	20

^aNumber of respondents on which housing values are based was given in Table 1. For tenant dwellings, figures are monthly rent.

^b $t = 8.01^{**}$; $t_{0.01} = 2.58$; 84 d.f.

^c $t = 5.20^{**}$; $t_{0.01} = 2.58$; 85 d.f.

Figure 1. Relation of amount of upgrading with value of original dwelling occupied by respondent owner.

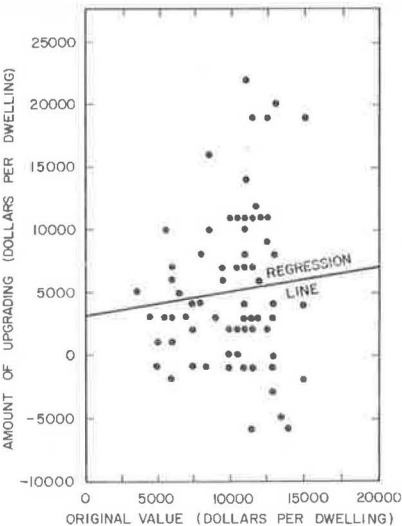
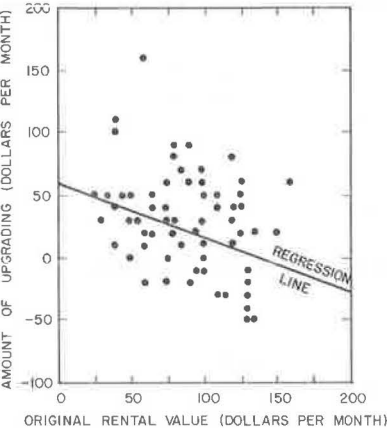


Figure 2. Relation of amount of upgrading with rental value of original dwelling occupied by respondent tenant.



crease in monthly cash flow costs (Table 5). The median increase was about \$48 (Table 6). Owners and tenants had similar experiences. The changes in monthly costs reflect, in part, the changes that respondent relocatees made in their housing costs. Tabular data not presented in this paper showed that 85 percent increased their monthly house payments. The median increase was about \$40. Relocatees of the 1971 Ohio study had a similar experience; 80 percent increased their monthly payments. The median increase was \$53 (6, p. 10). The other monthly costs reflect changes in transportation and utility expenses. About 48 percent of the respondent relocatees experienced an increase in the former and 67 percent experienced an increase in the latter.

When the number of relocatees experiencing monthly cash flow changes was cross tabulated with the number experiencing certain economic changes in housing, significant differences appeared for both owners and tenants (Table 5). Such differences were primarily due to the fact that most of those who failed to upgrade decreased their monthly costs whereas those who upgraded, either voluntarily or involuntarily, increased their monthly costs. The mean monthly cost differentials for those who failed to upgrade or involuntarily upgraded were considerably smaller than those who voluntarily upgraded (Table 6). However, all 3 groups showed an increase in monthly costs resulting from the relocation experience.

Changes in the relocatees' household cash balances were reflected by the difference between all cash payments received and all cash expenditures incurred during the relocation process. The payments consisted of all relocation payments and also the payment for the original property less any mortgage indebtedness. The cash expenditures included those required for searching for a replacement dwelling, down payment on replacement dwelling, moving, repairs and improvements on replacement dwelling, and miscellaneous expenses. The overall results of this financial measure show that 72 percent of the relocatees added to their cash balances (Table 5). The average was \$8,003 for owners and \$320 for tenants (Table 6).

When the number of relocatees experiencing changes in cash balances was cross tabulated with the number experiencing economic changes in housing, no significant differences occurred for either owners or tenants (Table 5). In terms of the dollar differential between payments received and cash expended, original owners who voluntarily upgraded had a smaller mean differential than those who failed to upgrade or involuntarily upgraded (Table 6). This group obviously banked less cash than the other 2 groups. Original tenants who voluntarily upgraded actually spent more cash on the average than they received in relocation payments. The reverse was true for the other 2 groups of tenants.

The financial effects of relocation were also determined by using the opinion of each relocatee. Each was asked to consider his or her savings in relation to debts and choose the best multiple-choice answer to describe the financial effects of relocation. About 42 percent of the owner relocatees believed that their financial position had worsened (Table 5). In the 1961 Texas study, 62 percent of the owners reached the same conclusion (1, p. 23). About 34 percent of the tenant relocatees reached the above conclusion. A cross tabulation by type of economic change in housing revealed no significant differences in opinion of financial effect due to upgrading of housing.

Other tabular data not presented in this paper revealed that more than 90 percent of the relocatees increased their net worth because of relocation. The average increase was \$1,485. Net worth was defined as total relocation payments less relocation expenses such as making home repairs and improvements, searching for dwellings, and miscellaneous items. The relocation experience had a very small negative or positive effect on the income or employment of the relocatees. Only 5 percent reported a change in household income as a result of relocation. In contrast, the 1961 Texas study reported that 20 percent experienced a change in income, and 17 percent reported a decline (1, p. 23). Although they may have had practically no change in income, many respondent relocatees chose to spend more on housing and related items and less on other items in the family budget. However, the majority of the relocatees were better off in terms of cash balances and net worth, the latter being directly attributable to the relocation payments.

Economic Effects of Relocation by Type of Relocatee

At the outset of the study, it was expected that the amount of economic upgrading, changes in monthly cash flow, changes in net worth, changes in cash balances, and opinions of relocatees used to measure the economic effects of relocation would vary according to the age and race or nationality of heads of household and the number and type of persons in the households. The results of the cross tabulations affirmed these expectations with respect to the amount of economic upgrading of housing.

The evidence indicates that the age distributions of the 3 levels of economic upgrading are independent of each other, i.e., the variations among them are statistically significant (Table 7). Most of those who involuntarily upgraded or failed to upgrade their housing were at least 50 years old. In contrast, most of those who voluntarily upgraded were under 50 years old. The results suggest that those over 50 had less need or incentive to upgrade their housing beyond the value of comparable replacement housing. Since their children were grown, many of them did not need a dwelling quite so large as that taken for right-of-way. Also, there may have been those who were not financially able to upgrade voluntarily.

Race or nationality of the head of household distributions for the 3 levels of economic upgrading are independent of each other. The results indicate that the majority of those who involuntarily upgraded or failed to upgrade were non-Anglos. Only 29 or 38 percent of the non-Anglos voluntarily upgraded beyond the comparable replacement value. On the other hand, 65 or 68 percent of the Anglos voluntarily upgraded. Apparently, the Anglos had more financial means or incurred more debt to upgrade voluntarily than did the non-Anglos.

The number of persons living in a household distributed across levels of economic change in housing revealed statistically significant differences. The tendency was that households with more than 2 persons voluntarily upgraded more readily than those with 1 or 2 persons. Those with larger families needed larger dwellings, and the relocation assistance program encouraged them to obtain such housing.

The distributions according to type of persons within households were also significantly different. The results indicate that those households that had a head of house with a spouse, particularly those with children, were more likely to voluntarily upgrade than those households that had a head of house with no spouse, especially if he or she lived alone. The latter group was less likely to have the financial means to voluntarily upgrade than the former group.

Cross tabulations with the other economic measures revealed no significant findings except between type of persons in household and changes in net worth. In this case, the results revealed that the households experiencing a decrease in net worth were married couples, especially those having no children or other persons living with them. Several in this group received no housing or rental supplements to cover additional housing costs.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study tended to confirm the following conclusions:

1. The extent of upgrading of housing by relocatees caused a significant increase in housing costs;
2. The extent to which relocatees upgraded their housing caused replacement housing payments not to cover adequately the increased housing costs to relocatees;
3. The ability of many of the relocatees to pay for additional monthly housing and operating costs declined;
4. The extent to which relocatees upgraded their housing varied significantly with selected characteristics of relocatees; and
5. Relocatees who originally lived in substandard housing tended to move into standard or better replacement housing.

The relocation programs apparently encouraged relocatees to upgrade their housing and thus were helpful in meeting the national goal of improving the standard of housing for persons in low-valued housing. Also, the relocation programs were helpful in reducing the amount of additional funds used in obtaining replacement housing, especially for those who involuntarily upgraded.

Table 4. Relocation cost and payment differentials by type of payment.

Relocation Payment	Relocation Cost Versus Payment (dollars)		
	Cost	Payment	Difference ^a
Housing supplement			
Mean	-5,272	1,866	-3,406 ^b
Minimum	-22,125	0	-22,125
Maximum	5,656	5,000	8,010
Median	-3,770	1,774	-1,826
Interest payment			
Mean	-2,839	75	-2,764 ^c
Minimum	-11,244	0	-9,417
Maximum	445	2,315	445
Median	-2,160	0	-2,043
Down payment			
Mean	-1,971	1,665	-306
Minimum	-4,000	458	-2,263
Maximum	-100	3,000	1,600
Median	-1,650	1,500	0
Rent supplement			
Mean	-739	877	138
Minimum	-4,560	0	-4,560
Maximum	-2,160	2,640	3,660
Median	-672	840	240
Moving payment			
Mean	-85	272	187 ^d
Minimum	-444	115	-75
Maximum	0	450	425
Median	-59	250	-195

Note: Number of respondents used to determine differentials includes those given in Table 3, except those for whom costs were not determined.

^aDifference was obtained through algebraic addition.

^bt = 4.79**; t(0.01 = 2.65; 77 d.f.

^ct = 10.67**; t(0.01 = 2.64; 89 d.f.

^dt = 24.23**; t(0.01 = 2.58; 157 d.f.

Table 5. Financial effect of relocation by type of economic change in housing and original tenure of respondent.

Financial Effect by Original Tenure ^a	Respondents by Type of Economic Change Experienced			
	Upgraded Voluntarily	Upgraded Involuntarily	Other	Total
Original owner				
Monthly costs ^b				
Increased	52	11	8	71
Decreased	2	0	9	11
Payments versus cash expenses				
Payments greater	38	9	17	64
Payments less	5	0	1	6
Not determined	13	2	0	15
Opinions of financial effect				
Improved	10	3	7	20
Worsened	28	3	5	36
About the same	18	5	5	28
Not determined	0	0	1	1
All original owners	56	11	18	85
Original tenant				
Monthly costs ^c				
Increased	36	21	21	78
Decreased	2	0	6	8
Payments versus cash expenses				
Payments greater	23	14	22	59
Payments less	9	1	3	13
Not determined	6	6	2	14
Opinions of financial effect				
Improved	7	3	8	18
Worsened	11	6	12	29
About the same	18	12	7	37
Not determined	2	0	0	2
All original tenants	38	21	27	86

^aChi-square tests excluded the "not-determined" data cells.

^b $\chi^2 = 28.96^{**}$; χ^2 0.01 = 9.21; 2 d.f.

^c $\chi^2 = 8.23^{**}$; χ^2 0.05 = 5.99; 2 d.f.

Table 6. Financial effect of relocation by amount of economic change in housing and original tenure of respondent.

Financial Effect by Original Tenure ^a	Amount of Economic Change (dollars)			
	Upgraded Voluntarily	Upgraded Involuntarily	Other	Total
Original owner				
Change in monthly costs				
Mean	73	25	12	54
Minimum	-37	1	-19	-37
Maximum	394	75	54	394
Median	61	22	4	43
Payments less cash expenses				
Mean	6,985	9,997	9,522	8,003
Minimum	-5,739	7,479	1,533	-5,739
Maximum	15,105	12,713	16,830	16,830
Median	7,210	9,535	8,981	8,580
Original tenant				
Change in monthly costs				
Mean	76	51	21	53
Minimum	-16	9	-99	-99
Maximum	188	127	110	188
Median	75	49	14	53
Payment less cash expenses				
Mean	-185	946	591	320
Minimum	-6,370	-221	-1,093	-6,370
Maximum	1,500	1,735	1,621	1,735
Median	292	940	673	549

^aValues were based on all respondents given in Table 5, except those for whom data were not determined.

Table 7. Economic change in housing by selected characteristics of respondent.

Characteristic	Respondents by Type of Economic Change Experienced			
	Upgraded Voluntarily	Upgraded Involuntarily	Other	Total
Age of head of household ^a				
Under 40	33	11	8	52
40 to 49	22	2	10	34
50 or more	39	19	27	85
Race or nationality of head ^b				
Anglo	65	13	17	95
Non-Anglo	29	19	28	76
Number of persons in household ^c				
1	10	11	10	31
2	29	4	16	49
3	27	5	5	37
4 or more	28	12	14	54
Persons in household ^d				
Head without spouse				
Head only	8	11	10	29
Children and/or others	16	6	11	33
Head with spouse				
Spouse only	22	2	10	34
Children and/or others	48	13	14	75
All respondents	94	32	45	171

^a $\chi^2 = 17.73^{**}$; χ^2 0.01 = 13.28; 4 d.f.

^b $\chi^2 = 17.15^{**}$; χ^2 0.01 = 9.21; 2 d.f.

^c $\chi^2 = 25.82^{**}$; χ^2 0.01 = 16.81; 6 d.f.

^d $\chi^2 = 25.56^{**}$; χ^2 0.01 = 16.81; 6 d.f.

The 1970 relocation assistance program would be more equitable to all relocatees if the statutory maximums on the size of housing, rent, and down-payment supplements were removed and only the comparable values allowed to control the level of these payments. Other ways in which the program might be made more equitable are as follows:

1. Allow relocatees who owned their dwellings at least 90 days prior to the initiation of negotiations for the acquisition of the property to have the option of receiving the down-payment supplement in lieu of the housing supplement for payment on replacement dwelling;

2. Make lump-sum payment to relocatees receiving the rent supplement instead of dividing the payment up into 4 annual installments; and

3. Allow all relocatees who lived in their original dwelling at least 90 days prior to initiation of negotiations for acquisition of the property to receive the relocation allowance in addition to the actual or estimated (using schedule) cost of moving personal property.

ACKNOWLEDGMENTS

The research on which this paper reports was performed under the sponsorship of and in cooperation with the Texas Highway Department and the Federal Highway Administration. The opinions, findings, conclusions, and recommendations expressed in this paper are not necessarily those of the state or the administration.

REFERENCES

1. Adkins, W. G., and Eichman, F. F., Jr. Consequences of Displacement by Right-of-Way to 100 Home Owners, Dallas, Texas. Texas Transportation Institute, College Station, Bull. 16, Sept. 1961.
2. Relocation: Unequal Treatment of People and Businesses Displaced by Governments. Advisory Commission on Intergovernmental Relations, Washington, D.C., Jan. 1965.
3. Barnett, J. Relocation of Tenants to Expedite Construction of Arterial Routes. Public Roads Administration, Federal Works Agency, Aug. 1947.
4. Boeckh, E. H. Boeckh's Manual of Appraisals, 6th Ed. E. H. Boeckh and Associates, Inc., Washington, D.C., 1963.
5. Besseman, F. P., Newsom, M. D., and Weaver, C. L. New Approaches to Compensation for Residential Takings. NCHRP Rept. 107, 1970.
6. Colony, D. C. Study of the Impact on Households of Relocation From a Highway Right-of-Way. Highway Research Record 399, 1972 pp. 12-26.
7. Cook, K. E. Summary of Conference on Relocation. HRB Spec. Rept. 110, 1970, pp. 1-9.
8. Downs, A. Urban Problems and Prospects. Markham Publishing Co., Chicago, 1970.
9. Ferber, R., and Vordoorn, P. J. Research Methods in Economics and Business. Macmillan, New York, 1962.
10. Hartman, C. The Housing of Relocated Families. Jour. of American Institute of Planners, Vol. 30, Nov. 1964, pp. 266-286.
11. McMichael, S. L. McMichael's Appraising Manual, 4th Ed. Prentice-Hall, Englewood Cliffs, N.J., 1951.
12. Perfater, M. A. The Social and Economic Effects of Relocation Due to Highway Takings. Virginia Highway Research Council, Charlottesville, Oct. 1972.
13. Pigou, A. C. The Economics of Welfare, 4th Ed. Macmillan, London, 1932.
14. Steel, R. G. D., and Torrie, J. H. Principles and Procedures of Statistics. McGraw-Hill, New York, 1960.
15. Stigler, G. J. The Theory of Price, 3rd Ed. Macmillan, New York, 1966.
16. Right-of-Way Manual, Rev. Ed. Texas Highway Department, July 8, 1971.
17. Highway Relocation Assistance Study. Hearings Before House Committee on Public Works, 90th Congress, 1st Session, U.S. Govt. Printing Office, Committee Print 9, July 1967.

18. Uniform Relocation Assistance and Land Acquisition Policy. Hearings Before House Committee on Public Works, 90th Congress, 2nd Session, U.S. Govt. Printing Office, Committee Print 90-38, Sept. 1968.
19. Uniform Relocation Assistance and Land Acquisition Policies—1970. Hearings Before House Committee on Public Works, 91st Congress, 1st and 2nd Sessions, U.S. Govt. Printing Office, Committee Print 91-30, 1970.
20. Study of Compensation and Assistance for Persons Affected by Real Property Acquisition in Federal and Federally Assisted Programs. Select Subcommittee on Real Property Acquisition of House Committee on Public Works, 88th Congress, 2nd Session, U.S. Govt. Printing Office, Committee Print 31, 1965.
21. Watson, D. S. Price Theory and Its Uses. Houghton Mifflin, Boston, 1963.

DISCUSSION

D. C. Colony, University of Toledo

These comments are based on a comparison of the Texas study with the second portion of our Ohio project, which deals with relocatees who received relocation payments under the Federal-Aid Highway Act of 1968. Since about 75 percent of the respondents in the Texas study were relocated under the 1968 program, a comparison of the Ohio and the Texas projects should be of interest.

There are a number of similarities between the 2 studies. Ohio relocatees were asked to compare the new dwellings with their old ones. Nearly 63 percent of them liked their new homes at least "somewhat more" than their old ones. Buffington reports that 68 percent of the Texas relocatees thought they had upgraded the quality of their housing.

With respect to tenure changes (tenant to owner), Texas and Ohio agree on about 50 percent. Median increase in housing costs for original owners was \$51 and \$43 for Ohio and Texas respectively. Other parallel findings could be cited.

The Texas study pertained to relocatees who had occupied a dwelling or apartment unit valued at \$15,000 or less. Since the Ohio data covered a wider range of dwelling values, the tendency toward voluntary upgrading was more discernible in Ohio. The relatively conservative behavior of tenants with respect to upgrading was observed in both studies. There was no opportunity in Cleveland to study non-Anglos relocatees. One wonders from the Texas data whether residential segregation patterns played a part in the comparatively small degree of voluntary upgrading among non-Anglos.

We feel that the results of our work in Ohio tend to support the author's conclusions. The author's recommendations are considered desirable. In particular, the removal of statutory limitations on the amount of housing, rent, and down-payment supplements should be particularly helpful. Not only could more equitable treatment be given to special cases if payments were controlled only by comparable values but also the legislation would contain a built-in provision for inflation, thus obviating the necessity for periodic legislative adjustments of maximum payments. Our data indicate that, in the current market, there would be relatively few cases in which the removal of statutory payment limits would increase the payments to relocatees.

The writer's feeling is that both the Texas and Ohio studies show that existing legislation is generally adequate. A desirable goal of highway agencies seems now to be the complete assimilation at every organizational level of the importance of relocation assistance as an integral part of the highway building process and the continued enhancement of the professional skills of relocation personnel. Studies such as that reported by Buffington provide valuable data to assist highway organizations in responding to the challenge offered by this complex and relatively new task of relocation.

SPONSORSHIP OF THIS RECORD

GROUP 1—TRANSPORTATION SYSTEMS PLANNING AND ADMINISTRATION

Charles V. Wootan, Texas A&M University, chairman

SOCIAL, ECONOMIC AND ENVIRONMENTAL FACTORS SECTION

Floyd I. Thiel, Federal Highway Administration, chairman

Committee on Social, Economic and Environmental Factors of Transportation

Harvey R. Joyner, Barton-Aschman Associates, Inc., chairman

William G. Adkins, Sherry R. Arnstein, Malcolm F. Brennan, George V. Broderick, Jon E. Burkhardt, Leland S. Burns, Gibson W. Fairman, John W. Fuller, Hays B. Gamble, John C. Goodknight, Peter G. Koltnow, Anne G. Kriken, Paul R. Lowry, James M. Montgomery, Charles Thomas Moore, James R. Nelson, Robinson Newcomb, Robert W. Paterson, Norman Pearson, V. Setty Pendakur, Martin J. Redding, Gerald J. Reihsen, Arthur Saltzman, Owen H. Sauerlender, Margaret T. Shaffer, John H. Suhrbier, Floyd I. Thiel, L. Ellis Walton, Jr., Paul Weiner, Jim F. Young

Kenneth E. Cook, Transportation Research Board staff

The organizational units and the chairmen and members are as of December 31, 1973.