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SOCIAL, ECONOMIC, AND ENVIRONMENTAL
FACTORS IN HIGHWAY DECISION MAKING

by

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CONTENTS

ACKNOWLEDGMENT	ii
SUMMARY	iii
IMPLEMENTATION STATEMENT.	v
INTRODUCTION.	1
Background and Problem Statement	2
Organization of the Report	6
NOTES CONCERNING THE HIGHWAY DECISION PROCESS.	8
The Nature of the Decision Process.	8
Time and Timing in the Decision Process	11
Backlogs	12
Timing of Decisions.	13
Illustrations of Decision Problems.	14
Community Values.	14
Interpersonal Trade-Offs	16
CITIZEN PARTICIPATION.	20
Why Citizen Participation: Some Theoretical Background.	20
The Nature of Citizen Participation	23
Citizen Participation and Highway Decision-Making.	26
Increased Citizen Participation: Some Alternatives	27
Increased Citizen Participation: Some Problems.	31
Attention Spans of Citizens	33
Types of Citizen Interest.	35
Continuing Interest of Delegations.	37
Mini-Hearings.	38
Information Program.	40
CHECK LIST AND RATING SYSTEM	42
Purpose of the Form.	42
Explanations of Factors	44
Partially Completed Check List	62
Check List Form	64
SELECTED REFERENCES	78

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SUMMARY

This report is made pursuant to the overall study objective of developing a comprehensive decision framework that will permit the realistic incorporation of social, economic, and environmental factors into the highway decision-making process. It consists of two parts: (1) and examination of some of the elements and problems that are pertinent to an understanding of the changing nature of the highway location and design decision process; and (2) the presentation and explanation of a tentative check list and rating system to assist highway decision makers in the evaluation of complex location and design alternatives.

General in its overall approach, the discussion of the highway decision process points to some of the operational realities currently facing the state highway agency. Federal and state legal constraints, project backlogs, and the time dimension of the decision process substantially affect the decision process at both the program and project level. Additionally, some specific project-related topics (such as community values, interpersonal trade-offs, and public parks) are discussed. Finally, the relationship between the highway agency and the general public is presented in terms of citizen participation and the highway decision process.

The check list and rating system are presented to serve as guides to a systematic analysis of the alternatives in project location and design decisions. The check list is composed of a multitude of

factors that may require consideration in the decision process. These factors are presented under the general headings: (1) transportation; (2) environmental; (3) sociological; and (4) economic. The primary purpose of the comprehensive check list is to remind the analyst of the myriad of factors that may relate to the project. The rating system is a flexible tool for use in the evaluation of alternatives. It is not a substitute for thorough observation and analysis (indeed, proper use of the rating system can be made only after extensive information has been obtained and analyzed) but provides a framework for the presentation and choice among the alternatives being examined. Thus, the numerical rating of the check list items helps organize the subjective and objective aspects of project decision-making.

IMPLEMENTATION STATEMENT

There have been indications from several THD district engineers that they will make use of the check list and rating system as an aid in evaluating alternative highway location and design problems. Hopefully, the remainder of the report will be an accessory to understanding and adapting to the changing decision making framework.

INTRODUCTION

Study No. 2-1-71-148 has as its overall objective the development of a comprehensive decision framework which will permit the realistic incorporation of social, economic and environmental factors into the decision-making process involving highway locations and highway improvements. The study was started in September, 1970, in response to an awareness in the Texas Highway Department of the increasingly complex and time-consuming requirements in highway project planning and development.*

As provided in the study proposal, the study procedure has two major divisions. One of these consists of a series of field surveys aimed at generating information on the social, economic, and environmental impacts of highways as perceived by citizens, namely, residents and business operators. It is through the opinions and actions of such citizens that highway impacts are brought into focus. Technical aspects of the problem, such as scientific determinations of highway effects on environmental pollution as an example, are not within the scope of the studies. These field studies are designed to provide information for the decision framework named in the overall objective and also to serve as source documents for highway planners and decision-makers.

*Portions of this report were prepared prior to FHWA's issuance of PPM 90-4, which calls for a systematic interdisciplinary approach to evaluate social, economic, and environmental factors in systems planning and project development.

The second major division of the study procedure deals more directly with the decision framework. Its thrust is toward identifying social, economic, and environmental factors, translating them into meaningful elements and suggesting their proper place in the decision process. Work along this line has been concentrated upon a check list and rating system wherein the various factors can be systematically taken into account. By necessity, the work has involved a critical review of the highway decision framework in general and some of its precedents.

This report presents some of the general considerations that have received attention during the study and the present stage of the check list and rating system for freeway location and design factors. Results from the series of field surveys are reported separately.

Background and Problem Statement

At an earlier time, when the rallying cry was get the farmer out of the mud, highway projects were widely endorsed, and the variety of benefits brought by better roads were generally recognized and acclaimed. There were some detractors who blamed highways for the rural-to-urban population shift and the subsequent decline of small towns and villages. But this viewpoint gained little acceptance as it became evident that population redistributions were in response to powerful and pervasive economic and social forces. Good roads brought comfort in travel and accessibility to social services, friends, and relatives. They enabled tremendous marketing and operating efficiencies in both agriculture

and industry and introduced new freedom of movement of persons and goods. They also proved to be of great value in times of national emergency. They still perform these functions and others as well.

When the sharp population upturn of the 1940's was superimposed upon the national urbanization trend, a new type of highway came into development. Limited-access highways were conceived to accommodate a growing population with an increasingly intense pattern of social and economic activities. The early freeways also met with general approval, and their efficiency in relation to conventional roads and streets has not been challenged up to the present. Some few opposing voices seemingly argued not so much against the transportation form but rather the extent of it. The stated position was the fear that all of the countryside would be paved. Preponderantly, however, freeways were favorably regarded, and numerous studies were made that demonstrated their effectiveness and their beneficial social and economic impacts.

Freeways have not changed in their ability to generate such benefits except perhaps that they have been continuously improved. Other things have changed, however, among these being the inclination of both groups and individuals to challenge private and public programs and projects. This dissatisfaction, however narrow or broad it may actually be and whatever its foundations, is an effective force. It has encouraged a series of federal laws and directives that greatly complicate highway decision-making. It also has brought intensified governmental and private monitoring of the policies and actions of

highway agencies. At the same time, highway construction has become more costly due to more advanced designs, the disappearance of natural or easy corridors and locations, changes in the compensation system for rights of way, and the steepening inflation trend. Thus, the development of highways, and especially of urban freeways, now occurs in a changed and changing setting.

There is public frustration that highway agencies have not yet solved the complex problems of location and design of freeways. There seems to be insufficient appreciation of the fact that public demands have tended to outrun even the most salutary performance of highway planners and engineers. The continuously rising ideals, often termed the phenomenon of escalating expectations, in relation to automobile travel spur the highway department to build more and to build better, but they also represent an impatience because perfection is not achieved. This may be a ramification of the disappointment that technological advancement not only brings solutions but also discovers and creates problems.

There are other problems, however, arising from any technological discovery or innovation. These problems are caused by the manner in which developments, highways in this case, are introduced into the existing world. In other words, conscious and guided attempts can be made to assure that the solution of one problem does not result in the creation or worsening of other problems. This is the nature of the responsibility of highway planners and engineers.

Social, economic, and environmental effects of highways are being given increased recognition and weight as factors in the location and design of highways. Traditionally, many such factors have been considered in highway planning and have been discussed at public hearings. However, as intangibles and also because they were not much in the public mind, they usually were subordinated to the more tangible engineering-economic aspects of the decision-making process. By force of law and public attention, the highway agency and its decisionmakers are now required to include these externalities in deliberations of highway location and design. More importantly, from the standpoint of procedure, they must make conscious and revealed judgments in regard to them.*

This broadened framework of optimization, or reconciliation of trade-offs, has pointed out the need for additional information and documentation on the effects of highways on a broader public, its values, and its institutions. Many of the complaints concerning highways and much of the confrontation on highway matters relate to questions for which answers are inadequate or nonexistent. This situation can only lead to a slower-moving and more expensive highway program.

To help offset this possibility and, at the same time, to assure pursuit of the greatest public good and the least public harm from highways, two conditions must be met. First, it is obvious

*Formalized procedures developed in highway agency Action Plans are the latest development in this evolutionary process.

that decisions must be made. The increased complexity of the decision framework should not bar solutions or lead to solutions by default. Second, decision-making must be secured in the control of those who know how to make decisions and, in turn, have a lasting concern and responsibility for the consequences of their judgments. One of the requirements of these two conditions is that appropriate and adequate information be developed and made available to the decision maker. Furthermore, it is of critical importance that those who would restrict and monitor the highway program should have information to guide their instructions, reviews, and evaluations. The research problem is derived from the fact that information of the type needed is grossly insufficient for the requirements that are imposed.

Organization of the Report

The effort that has been directed to an understanding of the overall setting of highway development has not resulted, and perhaps cannot result, in a comprehensive functional outline of the assorted processes. Such an accomplishment is beyond the scope of the present study and perhaps beyond the capabilities of all the various agencies involved. The overview, however, has led to consideration of a number of important facets of decision-making. It further suggested that the current study be limited. This conclusion led to the dependence on the evolvement of a check list and rating system to be applied at the project level, as opposed to the policy level, of highway development.

The first portion of the report sketches some of the conclusions derived from the general overview. The final section presents the check list and rating system, detailed explanations of its elements and application, and an example of its use in comparing two alternative freeway locations.

NOTES CONCERNING THE HIGHWAY DECISION PROCESS

The Texas Highway Department has prepared a chart some 30 feet in length to display the steps and time requirements of the development of major highway projects. This chart shows the broad stages of highway planning. It emphasizes the numbers and kinds of administrative hurdles a proposed project faces and indicates the potential points at which intervention may arise. It only suggests, however, the extreme complexity of the planning and decision-making. The following notes of this section are not an attempt to further outline the project development framework. They are rather intended to illustrate other operational aspects that face the highway agency.

The Nature of the Decision Process

It is customarily regarded that district and division engineers and the highway department administration are the decision makers, and in the sense of ultimate responsibility this is true. This concession, however, does little to describe the decision process. In highway project development, planning and decision-making proceed parallel if not in intermixture. Each of the planning stages involves numerous sets of alternatives and thus of choices even within a well-defined policy framework. Dozens of persons in a variety of engineering and other specialties contribute their evaluative abilities. Decision-making literally pervades the entire agency structure, and the character of a completed highway project is

determined not only by the overall policy and guidance of administration but also by the quality of choice involved in thousands of detailed inputs.

As in most human activity, the attainment of the final result is not the only criterion by which a process is judged. Consequently, the planning and building of highways is of social concern as a means or process. This does not imply that highway agencies do not very effectively review and control the propriety of their methods. It is rather to suggest that the public is, or ought to be, concerned with how its wishes are interpreted, whether or not they are met, and the means used to meet them.

The Texas Highway Department attempts to accommodate the public in a number of ways, namely by (1) following the applicable laws such laws being the public's charge as to the purpose and permissible methods of the department, (2) working in partnership with county and municipal governments that express local desires to the state in relation to highway needs and share in the costs of projects and planning, (3) holding public hearings as the law requires as well as other public meetings that are not compulsory, (4) maintaining and encouraging the use of an open door policy as far as highway personnel and information are concerned, (5) meeting and dealing with the public in a fair and courteous manner, and (6) cooperating with other agencies whose purposes and missions are to serve the public. These programs and postures are not exhaustive, but they illustrate that the highway department is not, and does not propose to be, an isolated and insensitive super bureau.

There is a variety of literature which describes planning (and decision) models and strategies and their organizational and procedural requirements. The continuum of choices for a public agency ranges from a high degree of autonomy to just short of control by referendum. The positioning of an agency upon this scale depends upon a large number of factors, including technical complexities, mission independence, funding mechanisms, and the internal philosophy relating to preservation and perpetuation of the agency. Obviously, it also depends upon the public temperament, confidence, and trust at any given time.

Traditionally, highway agencies have tended toward the autonomy end of the scale. Within legal constraints and given local acknowledgment of problems, they decided and acted with a great deal of independence. But public temperament has changed so that what such a short time ago was accepted as a quality performance is no longer so accepted. Not all of the public has changed, but a sufficient proportion has challenged the performance criteria to bring about a reappraisal of public programs and their implementation. This shift of values and attitudes has been relatively sudden, and its results promise to be somewhat chaotic. In a sense, the public does not know what it wants but wants it badly. Governmental agencies, in the absence of knowledge of alternatives and their consequences and with limited resources, must through successive trials hope to obtain public reconciliation.

It would appear that this setting requires that the public be involved more directly in highway planning and thus in decision-making. Certainly such a consequence should be viewed deliberately, for the responsibility of the highway agency will not tend to decrease; in fact its legal accountability is being deepened and broadened. The segment of the public that makes its inputs, on the other hand, will tend to be disassociated from projects when all of the public shares the consequences.

What seems to be strongly indicated at the present time is that public sanction and reconciliation be sought early in the highway development process and, indeed, throughout its course. This involves keeping the public informed and, in turn, gaining information from the public. It also requires special preparedness to deal with questions that have not been asked before and with conflicts of interest that heretofore have not arisen or have been settled previously by majority considerations.

Time and Timing in the Decision Process

The time requirement of major highway project development has been increased to an average development period now exceeding eight years. This average, which is a conservative estimate, is about two years longer than the period needed less than ten years ago. The lengthening of project development time has a number of causes, one of which is the increased complexity of highway design. Other reasons are that costs per project mile and total project backlogs

are increasing faster than available funds. Another cause is the additional uncertainty that has been imposed on the public enterprise process by changes in the legal, institutional and social framework.

Backlogs

There are a number of other problems that bear heavily upon the time requirements of a highway project. One of these is the age old problem of budgeting; limited funds must be rationed among competing uses. As the demand for highway improvements continues to grow and the unit cost of providing them also increases, then the funds available for the purpose must also grow, at a rate equal to the sum plus the product of the two rates, if highway construction is to keep apace. If highway funds do not grow at the above described rate, then fewer and fewer projects can be programmed or the backlog will continue to increase. An increasing backlog will add to the time requirement from project inception to project completion, an event that likely will add further to increasing highway costs, especially in the right of way stage.

Thus timing at which particular improvements are moved into the action phase constitutes a device for controlling backlogs and time requirements of projects. Long range program planning deals with highway systems and has flexibility such that it can respond to changing conditions and needs. Once a project is committed to a system, however, much flexibility has been lost. The process of development has been begun, and the time requirement and cost linkage are established. The project can advance to completion only as

funds become available whatever the effect of other factors. Furthermore, once a project is programmed, any attempt to lower its priority because of more pressing needs is inhibited by delay and resultant cost factors.

Timing of Decisions

Elsewhere in this report, the importance of considering social, economic, and environmental factors in all stages of planning and decision-making is emphasized. The present note is aimed more at the timing and sequencing of the stages themselves. The following recommendations seem to be in order:

- (1) No matter how worthy a particular project may be, it should not be programmed until conditions prevail that promise an orderly and assured development. These conditions include the timeliness of the project from the standpoint of priorities, the availability of sufficient funds tied to various stages, and the certainty that county and local cooperation and funding will be forthcoming at the proper times;
- (2) Study of the feasibility and priority ranking of proposed projects could be authorized independently of the programming of such projects. Programming can be delayed until after the conditions named in (1) above prevail, perhaps even until after route public hearings are held;
- (3) Target dates for the use of the public, local officials, and highway department personnel should be set for each development stage. Planning that incorporates strategies

- for minimizing the effects of deviations could be employed; and
- (4) Progress reports for the same audience to explain project stages, including the causes for deviations from schedules, should be considered.

Illustrations of Decision Problems

The following brief discussions of community values, interpersonal comparisons, and public parkland are not meant to represent a cross-section of decision problems. They are presented rather to illustrate and hopefully to elucidate some of the highly subjective and somewhat imponderable aspects of the changing decision framework. Future work must take such problems as given and search for ways to accommodate them through systematic observation.

Community Values

A part of today's social environment is the contention that citizens in various groupings, as members of a community, for example, have a set of societal values and goals and some agreement on priorities. Whether or not this is generally true is not a useful point of argument here. A public agency must conduct its affairs as if the contention is always valid.

The process of discovering community goals and values is not easy to chart. The obvious, and perhaps also the best, recommendation is that information should be sought in a systematic and diligent fashion. Here again value judgments must play a major role. The discovery of community preferences versus the invention of them

either by aspirant citizen spokesmen or by the highway agency, are sometimes difficult to hold apart.

Because community values and goals often are of a nebulous nature and because communities ordinarily are not organized in a manner such that their preferences can be readily determined, it often falls into the province of the highway planner and in turn the decision maker to superimpose such goals upon community patterns. This is done by observing as objectively as possible the actual conditions in a area, listening to local officials and employees, community leaders, and the general citizenry, and then evaluating the findings in terms of various freeway impact factors. The experience of the highway-planner often will tell him the proper course in given circumstances. He quickly will recognize, for example, the disruption that will result from severing a rather homogeneous neighborhood. In other cases, he may need to sharpen his abilities to observe and evaluate social, economic, and environmental phenomena and the possible relationships of a proposed highway improvement upon the existing and changing patterns.

One case that suggests the varied and nebulous forms that community values may take may be helpful here. In a recent public meeting, one protester claimed that the selected location of a freeway would damage the culture of an area. No explanation was offered as to the fabric of culture that would be influenced. Rather, in response to questions about the cultural elements that

might be involved, the protester stated that the freeway would remove the area's leaders, thereby destroying the political power of the area's inhabitants. This result, whether real or imagined, may be a valid social concern. However, it does serve to illustrate the nature of arguments that are met in the highway planning and decisionmaking processes.

Note that while there is no expectation that such an argument would be allowed to stop permanently a public highway, nevertheless it could gain sufficient attention under present review processes to cause delay with its subsequent costs and deferred benefits. Furthermore, it could serve as a rallying point for more general opposition to a freeway. In the instance cited, this is essentially what has happened. To counter such a happening fairly and effectively, the highway agency must diligently study the community and the possible effects of the freeway upon it. Even this will not always avoid surprises in the course of project development, but it will aid materially in answering germane questions and thus in gaining public confidence and reconciliation.

Interpersonal Trade-Offs

Interpersonal shifts or transfers occur when one or more persons benefit at the expense of some one or more other persons. These are day to day phenomena that are cleared in private affairs by certain rules of order; for example, in the market place such transfers are "voluntary", and expenses and benefits are balanced through the

satisfaction of consumer preferences. In public affairs, market considerations generally are not adequate and may be totally absent. Thus in a public action such as highway building, when there are consequences that are not measurable, not compensable, and not collectible, decisions must utilize an accumulation of knowledge about potential effects upon groups of persons and finally upon value judgments.

In a microscopic sense, interpersonal comparisons are as complex as human personality itself. There is little point in trying to probe how interpersonal trade-offs should be made on a person-to-person basis. The situation that must be sought is that individuals not be neglected, despite the difficulty of deciding such trade-offs. For example, even if we know with certainty that on a given day one person feels much more strongly about his ancestral home than another person feels about his travel time, we have no measurement device for reconciling their positions. Besides, in so short a period as a few days, and certainly through the years, the intensities may change as may the individuals concerned. Thus the decision maker must try to evaluate overall situations, not to the neglect of individuals, but for the purpose of deciding to the advantage of groups of individuals over the foreseeable future.

In highway projects, the individual as a unit is nevertheless not neglected. There are many ways in which the individual person is regarded directly. One of these is that his opinions and concerns

may be voiced throughout project development. He may, in any number of reasonable ways and times, make his wishes known to the highway agency. He may speak and write his ideas, opinions, and questions in scheduled public hearings. Also, under a comprehensive set of laws, he may be entitled to compensation for his property and inconvenience. He has recourse as an individual through administrative reviews and through the courts. Thus, his individual rights are not only sometimes compensated according to appropriate laws, but they are protected and preserved, although his individual preferences may be overshadowed and denied by the preponderance of group preferences (even by a group with which he otherwise identifies).

The individual is bombarded by a series of personal problems and decisions. He also is normally faced with a number of public questions. It may be impossible for the individual to take into account all that confronts him and to reset, regularly and rationally, his preferences and priorities. Furthermore, it is often difficult for him to articulate the position he chooses on an issue. He must therefore depend upon help from outside himself. Such help comes from groups that he joins or supports. Also, there are many public agencies, including highway agencies that are concerned with his welfare from a variety of viewpoints.

Just as in engineering, or perhaps more accurately in other engineering decisions, value judgments must be made in weighing and choosing among alternatives relating to social and economic

factors. It is important to realize that no one knows how to add the values of the not-so-independent factors together. It is likely that for any one project there is a set of weights which, if assigned to all the influences identified, would lead to an optimum solution. The discovery of such proper mathematical weights, however, is not likely. Furthermore, such a set of weights would vary from project to project for the obvious reasons that the numbers of persons involved, their resources, and their value systems would not be the same in any two projects. Thus even the most detailed observations are not likely to furnish solutions per se but rather enhance the likelihood of insights into freeway phenomena and thereby help to evolve decisions that are generally more acceptable and defensible.

In the highway location and design process there are many different kinds of nonmarket costs and benefits, each of which has its own set of uncertainties, time distributions, and affected individuals. The individuals also have various resources (including information, other public agencies, etc.) with which to meet costs or to evaluate benefits, uncertainties, time problems, and preferences.

CITIZEN PARTICIPATION*

Why Citizen Participation: Some Theoretical Background

Highway investment activity is widely regarded as a public responsibility. Since the workings of a market mechanism are essentially absent, the decisions to produce highway transportation services must be made by some collective choice mechanism. As is the case with public goods (those goods not produced and sold in a market), the problem is to determine the level of production that, ceteris paribus, yields the largest net benefits to society.

In analyzing the problems involved with public goods and collective choice, economists have postulated theoretical conditions that will ensure an economically efficient level of output, i.e., a level at which the marginal social costs and marginal social benefits are equal. The familiar benefit-cost analysis is a widely used technique designed to permit calculation of the costs and benefits associated with public enterprise. The difficulty of identifying and then measuring the costs and benefits is a well-known limitation of benefit-cost analysis. Even if all the relevant costs and benefits could be identified and measured, the problem of collective choice still would not be solved. For while it would be possible to determine the economically efficient level of production for a public good, the socially efficient level would still be undetermined.

*A more complete discussion of citizen participation is forthcoming in TTI Research Report 148-5, soon to be published.

In addition to the efficiency condition, there is another that has to be satisfied -- the equity condition. What is implied is that there is some preferred distribution of costs and benefits, and public goods should be produced with the goal of achieving such a distribution.

The remaining problem is: what is an equitable distribution of costs and benefits, and how is it determined? Since there are no objective values that can be used to evaluate the goodness or badness of a given distribution of benefits and costs, the choice mechanism for decision has to incorporate more than just the technical and economic calculation of costs and benefits. What is indicated is a political, or non-market, resolution of the ethical questions surrounding the concept of equity. The usage of a political process does not ensure that equitable decisions will always be made. No social choice mechanism can do that. What is accomplished, however, is the provision of a process that resolves the equity condition in a manner that is acceptable to society. The role of the individual citizen and the extent of his participation in making these collective decisions is largely determined by the political process which society adopts.

As an ideology, active citizen participation is at the foundation of our democratic heritage. Indeed, the notion of citizens sharing responsibilities in public decisions that affect their lives and activities is a basic ingredient of the democratic decision-making

process. Yet, even the most devoted advocates of this process admit that citizens cannot participate in all decision-making functions. How, then, can the proper role of citizen participation be evaluated?

There are three important criteria for deciding whether a decision process is valid and rightful in deciding on matters that affect the individual (Dahl, 1970). These are personal choice, special competence, and economy. An individual will accept the results of a decision process when those results correspond to his personal choice. A majority rule of some form is adopted, and public decisions are made on the basis of the outcomes of elections. Without unanimity, the protection of the minority and the enforcement of the will of the majority become a part of political reality. While such a decision process with its element of coercion may still be acceptable, governing by referenda becomes more difficult as the size of the population increases.

Under the second criterion, special competence, individuals realize that some decisions will be better if made by persons who have a special competence. Application of specialized knowledge and technical expertise may obviate the need for a referendum on each and every social decision. The difficulty lies in establishing an acceptable relationship between the citizenry and those persons manifesting special competence. Taken by itself, the special competence criterion is a mandate for installing a decision-making elite, which, though benevolent it may possibly be, is an anathema to the ardent democrat.

The criterion of economy stresses the need to consider the amount of time, energy, and other resources devoted to the decision process itself. While a system of decision making may be the best according to the criteria of personal choice and/or special competence, it may be the worst according to the criterion of economy if it wastefully utilizes resources.

Devising a decision process that has an acceptable array of features based upon the three criteria is not an easy task. At any point in time, forces are at work that press for changes in the combination of the criteria of personal choice, special competence, and economy. More reliance on citizen participation will be demanded at one time, and more special competence will be demanded at another time. No optimal or ideal mix can be specified; such an optimum process would portend the solution of many of the dilemmas that all public agencies are currently struggling to resolve.

In summary, the above discussion, taken from economic and political theory, indicates that the individual citizen has both a legitimate interest and a right to participate in democratic, collective choices concerning public goods.

The Nature of Citizen Participation

The more provocative and difficult questions surrounding citizen participation are not related to the legitimacy of the activity but to the ways in which it is implemented. Given that the citizen has several layers of representative officials (city, county, etc.)

and a multitude of bureaus and agencies that have been elected or appointed to conduct the public's affairs, direct citizen involvement in the decision process signifies that the existing mechanism is under pressure to change.

The driving force behind the demands for change seems to be a desire to increase the private choice component in decision-making and reduce the control of persons having special competence. How is this higher level of citizen participation to be accomplished?

A brief description of several gradations of citizen participation will indicate the variety of possibilities that exist (Arnstein, 1969). The degree of effectiveness of citizen participation can be gauged by the influence that citizens have on the policy outcomes. Thus, citizen participation can be analyzed as a means of generating authority to those who participate. The amount of control they have over the results can range, theoretically, from none to complete citizen control of the decision-making. The gradations are:

- (1) manipulation - citizens are placed on advisory panels or otherwise used to prove that "grass roots" people are involved in the decision-process;
- (2) informing - citizens are informed of the plans, their rights, and options. Often this is a one-way information flow from officials to citizens. News media, pamphlets, posters, and responses to inquiries are methods used to transmit information;
- (3) consultation - attitude surveys, neighborhood meetings, and public hearings provide data and information to the officials, but no authority is obtained by the citizens;
- (4) placation - citizens have some degree of influence. Placement of citizens on planning boards and study teams,

where the officials are in the majority, keeps the decision-making in the hands of the officials;

- (5) partnership - authority is shared by citizens and officials using joint policy boards, planning committees, and mechanisms for resolving impasses;
- (6) delegated authority and citizen control - final approval of projects cannot be achieved without the consent of the represented citizen groups.

These constructs of degrees of citizen participation serve to focus attention upon the ability of citizens to affect, either directly or indirectly, the outcomes of a decision process. The degree of citizen participation that exists is a combination of at least two factors: (1) the desires of citizens to obtain influence in the decision-process and (2) the attitudes and policies of the agencies conducting the public's affairs. The change in the mix of personal choice and special competence is likely to produce disorder if (1) the citizens demand a drastic increase in the role of personal choice; or (2) if the agency is reluctant to relinquish some of its authority to non-specialist citizens. On the other hand, an orderly accommodation probably can be reached when: (1) citizens' desires for a reasonably larger role in the decision-process are coupled with (2) a willingness of the public agency to utilize citizen-generated inputs and judgments in the conduct of its activities. Some particular aspects of citizen participation in the decision process for locating and designing highways will now be examined.

Citizen Participation and Highway Decision-Making

Under present arrangements, the two-stage hearing process is the primary citizen-related feature of highway decision-making. To be sure, private citizens can be, and usually are, members of local delegations that request authorization and implementation of a proposed project. However, the general citizenry often is largely unaware of the project until the route hearing is announced. At the hearing, citizens' questions, suggestions, and objections become part of the documentation that is required for Federal approval of the route. The next officially recognized point of citizen participation is at the design hearing where, as with the route hearing, a verbatim transcript of the proceedings becomes a part of the proposed project to be evaluated by FHWA.

If citizen participation means "citizens are to be informed of an impending highway project," then the two-stage hearing process is probably fairly effective (although a professional, public relations campaign begun earlier in the planning stages would enhance such effectiveness). However, if citizen participation is to be operationally meaningful, then the hearing process alone is insufficient.

The minimum level of active participation requires that citizens provide information about their community and their attitudes at a sufficiently early time in the planning process that this information can be evaluated by the highway agency in its route and design analyses. The first public hearing, held after much of

the planning and analysis have been conducted, does not generate information early enough in the process. Even so, the public hearing is not too likely to provide any substantial information since the immediate interests of the citizens tend to be reflected in questioning that is personally specific, inconsequential, or unanswerable. Thus the public hearing format is not very effective in obtaining the information that may be useful.

Limitation of citizen participation to the two-stage hearing has another and not insignificant disadvantage. It enhances the possibility of a citizen-inspired opposition that can thwart even the most careful and judicious plans of the highway agency. Granted that administrative review of hearing transcripts exists, that review process may be considered by the citizenry as a combination of highway agencies soliciting and receiving approval one from the other. If that occurs and citizens are convinced that their position is tenable, a lawsuit is highly probable.

While a more active form of citizen participation does not necessarily preclude the occurrence of legal action, citizens are perhaps led to realize that direct inputs and persuasion constitute another option.

Increased Citizen Participation: Some Alternatives

At the outset, it must be recognized that not all citizens have the same prerequisites and resources to participate in the planning process. Low-income and minority groups have less experience and knowledge in effective group participation and leadership

than do the middle and upper income groups. There are differences among these groups in the emphasis placed on personal and societal interests (Bellush and Hausknecht, 1967).

While it may be true that low-income and minority groups possess fewer qualifications for participating in highway decisions, attention to their involvement is certainly warranted by at least three considerations. They have been very active in recent years in many forms of protest activities. Given their tendency toward an emphasis of personal interests, they tend to organize in opposition to real or imagined threats. Secondly, low-income and minority neighborhoods can be possible locations for highway projects. Finally, considerations of equity, the principal justification for a collective choice mechanism, are particularly important when trade-offs between these groups and the rest of the community may need to be evaluated. At a minimum, these groups should be strongly considered for representation when their direct interests are involved, e.g., when a proposed corridor lies in one of their neighborhoods.

The incorporation of citizen representatives into the planning and decision process envisions them as partners having the opportunity and responsibility to contribute, inquire, recommend, and dissent equal to the agency members of the project staff. However, the composition of the group must yield a clear majority for the highway agency in cases of a citizen vs. agency divergence, because the agency is legally charged with the responsibility of planning highways. What should be sought is not an abandonment by the agency of its role but a citizen-based extension of that agency.

The specification of such a modification immediately brings to mind the questions: how many citizen representatives should be selected; how should they be selected; and from what groups should they be selected? Although answers to these questions cannot be pervasively applied, some general observations can be made.

An important determining factor is the stage that planning has reached before citizen participants join into the decision process. Early in project planning, when the initial investigation and planning expense authorization is given, citizen representatives should be involved by the project staff. The number of participants will vary with the type and size of the project, but the number of participants probably should not exceed the number of active project staff members.

The method of selection and the source of citizen participants are somewhat interrelated. The method of selection could be by popular election in the community, self-appointed leader, random choice from voter registration files, selection by highway official, or appointment by an elected official, e.g., mayor, city councilman, county commissioner. It is preferable that the citizen participants have credentials that reflect some political legitimacy. Appointees chosen by an elected official to represent him and his constituency have several desirable features: (1) their loyalty presumably would be to the elected official, and through him, to the citizenry; (2) the elected official could transmit information about the concerns

and interests of his constituency; and (3) the motives of the appointed citizens would not tend to be suspect.

Minimal constraints should be placed upon the elected official in selecting his appointments. Once he has had explained to him the role of the citizen representative, his judgment should be relied upon. There is, however, one condition that should be pointed out: the importance of considering the selection of a representative from residential neighborhoods in the proposed corridor. This is particularly true if the corridor contains a low income, minority group neighborhood.

If the introduction of citizen participants into the decision process adds some new constraints, it also provides some new flexibility. Previously, the agency seldom had meetings with the public until the route location hearing. Given the presence of citizen participants, highway officials have a contact with the people in the proposed corridor. Such a contact could be used to identify and introduce other community and social leaders to the members of the project staff. These meetings could be informal, working sessions where additional exchange of views and information takes place. Coming prior to the first public hearings, these meetings or mini-hearings could produce information that would improve the alternatives to be presented at the public hearing.

At the public hearing, the citizen participants could be utilized to present the non-technical interpretation of the analyses to

their fellow citizens. This would tend to ameliorate somewhat the adversary milieu that agency officials frequently experience in public hearings. Continued activity by the citizen participant would proceed throughout the public hearings, intermittent meetings, and all the way through the project completion.

In such a lengthy and complicated process as highway location and design, it would be inexcusably naive to presume that the addition of citizen representatives would produce automatically an optimum in decision process. What is hoped for is a movement toward a better process; even this is probabilistic. In fact, the difficulties involved may prove insurmountable.

Increased Citizen Participation: Some Problems

A basic presupposition for this citizen-agency working alliance is good faith on the part of both. A highway agency official who is overly reluctant to share his authority or an intransigent citizen too eager to exercise his responsibilities can seriously deter or destroy any chance for success.

Given that good faith exists, some other very real problems remain. A basic one is an extension of the private choice of citizens vs. the technical competence of specialists. The actual duties of the citizen participant cannot be clearly defined and are likely to be somewhat dependent upon the personalities involved.

The citizen participant must be able to distinguish between his personal and the societal interests. He must be a public-regarding

rather than a private-regarding representative. Also, the amount of time that the decision-process demands may be too great for the citizen participant to afford. Meetings with agency staff members, mini-hearings, public hearings, etc., may prove to be a full-time job. If so, it may be difficult to get citizens to serve.

As the project moves along, sometimes imperceptibly, the interest of the citizen-participant may begin to wane. His commitment to the project will be reduced, possibly to the degree that he resigns. Another factor that is time-related is the changing composition of the citizenry and elected officials. Such effects will tend to produce a turnover among the citizen participants that destroys the continuity of the process.

Finally, the fact that the responsibility for final decisions remains with the highway agency may in itself be a sufficient motive for citizen disinterest in participating. If such an attitude is present in the general citizenry, then the more familiar highway-agency-vs.-the-people situation is likely to be reestablished.

The discussion thus far has emphasized the level of citizen participation that incorporates citizen representatives directly into the project decision process. As indicated earlier, several degrees or gradations of citizen participation are likely to exist at any point. Even though the citizen representative may be used, the highway agency cannot ignore the general citizenry that participates in other, more traditional ways. Some of the many aspects of the

the agency-citizenry relationship are: citizen attention spans, types of citizen interest, continuing interest of delegations, mini-hearings, and the highway information program.

Attention Spans of Citizens

One of the problems relating to citizen participation, and to interpreting it and responding properly to it, is the tendency for a citizen to lose interest over the project's long development period. Citizens, other than those with an intense personal interest, are not likely to maintain participation for very long. Most citizens with their thousands of problems, concerns, and decisions common to everyday living cannot be expected to have a long attention span for a single public action such as highway building.

Short attention spans constitute one of the reasons for the failure of efforts, such as political campaigns and fund-raising drives, that are started too soon and subsequently lose their headway. They also are a reason for somewhat elaborate campaign organizations to maintain citizen attention subsequent to gaining it. Organizations use a variety of motivational devices, one of which is to get people involved. The purpose here is to broaden membership, intensify concerns, and hold interest through the establishment of obligations. Keeping interest up is a motive for regular and persistent contacts.

Highway development periods of eight to ten years promise a very high rate of turnover of citizens. Net mobility in some neighborhoods may be as much as fifty percent in less than ten years.

This has implications not only for citizen participation but also for the continued interest of city and other local officials. Interest groups' memberships change; goals and priorities change; and the relationships among persons change. There is a succession among leaders and representatives, including elected ones. The wise and responsible course in the face of such social dynamics is to identify and to learn about the more stable elements, especially those values and goals that would seem to withstand the erosion of time and those agencies, organizations, and spokesman who can represent, on a sustained basis, various rational viewpoints.

Attention spans undoubtedly are lengthened by organization. Opposition can support its goals through the force of organized numbers, and it also can sustain its power through organization. Even during relatively dormant times, organized opposition can retain a strong potential for action. Just as allied groups are tools for opposition, so also are they opportunities for advocates of highway programs and projects. Here, the proponent delegations mentioned elsewhere in this report come to mind. If such delegations represent both official and citizen desires in their initial petition for a highway improvement, perhaps it is logical that they should wish to sustain their representation as the project develops.

Types of Citizen Interest

Citizen interest and participation in public affairs may be categorized into two types, personalized and societal. There is, of course, no firm and obvious boundary between the two categories. A personalized interest may be thought of as that which arises from concern for individual rights, property, comfort, and convenience. Societal interest may be characterized by sympathy and empathy for others and similarly for the general public welfare. Each kind of interest may take a variety of forms and have various degrees of intensity.

For most persons, a personalized interest is likely to be the more intense and long-lasting. Such an interest originates in and is oriented toward the possibility of private loss or gain. Examples in relation to highways are:

- (1) Will my property be taken?
- (2) How will I be compensated?
- (3) When will I have to move?
- (4) How much notice will I have?
- (5) Should I suspend repairs or alterations on my property?
- (6) Where can I or should I relocate?
- (7) Will my property be damaged?
- (8) Will I be compensated for my damage?
- (9) Will my home be less livable?
- (10) Will I be cut off from my friends (or other sources of contact and activity)?

- (11) How will construction affect me?
- (12) Will the highway displace or destroy resources of direct interest to me?
- (13) Will my business clientele and volume be affected?
- (14) How can I personally gain from the highway?

Among these and other possible examples, there is an element of uncertainty that at a proper time can be resolved. Also, there is often an element of opportunism, as is evidenced by real estate manipulation and speculation in advance of a highway development.

A societal viewpoint ordinarily takes a philosophical bent, and true or underlying motives may be obscure. Public as opposed to private goals are stressed. Identification is with groups or publics, ranging from the whole of society to small neighborhoods and from highway users to environmentalists. Collective influences are emphasized, and the positions that are taken relate to our or their advantage or disadvantage.

There is a strong tendency for coalitions of interests, either for or against a public action, to develop. A proponent of a highway motivated primarily for personalized reasons will often rationalize his desires as being for the good of the public, and ally himself with persons or groups with public goals to enhance his position. Similarly, those who oppose a project because of private reasons will tend to welcome aid from any source and join others who protest an improvement because of its potential social costs.

Thus the basic nature and strength of pressure groups are difficult to assess. Nevertheless, citizen interest is a necessary condition for public action. It is one of the gauges that an agency uses to evaluate its effectiveness. It must be dealt with realistically, however, if the greatest public good is to be achieved.

Continuing Interest of Delegations

Another role that petitioning delegations could be asked to take is that of continued interest in the planning of a highway project at least through the public hearing stages. If increased public participation is to be attained in a meaningful way, then the practice of delegations disassociating themselves from a project once it has been programmed cannot continue. Such a practice has been outmoded by the combination of legal and societal demands that have been imposed upon the highway decision maker. It is no longer infrequent that the highway agency, treated graciously as a guest and benefactor in the early stages of a project, is maligned and abused in the later stages, especially at public hearings. The fact that the benign group and the adversary group are comprised of different persons only supports the thesis that early supporters of a project should maintain their interest at least until controversial issues, including those encountered in federal review, are reconciled. Otherwise, such reconciliation becomes the responsibility of the highway agency as the only advocate.

It may be worthy of consideration that the delegations that

petition for highway projects be asked to present a substantive highway impact evaluation as a part of their proposal. There are two distinct advantages to such a procedure. First, the discovery and documentation task relating to social, economic, and environmental effects will be begun at the earliest practicable stage. Second, the citizen participation that is involved in requesting a highway improvement will similarly be involved in the necessity for considering the possible range of consequences of the action they endorse.

Mini-Hearings

The term mini-hearings has no great precision in meaning. Although its origins are not exactly known, it may be surmised that mini-hearings were originally conceived as a helpmate for formal public hearings. Taken in this context, mini-hearings may be either pre-hearing or post-hearing conferences or meetings.

Pre-hearing conferences may be used to gather information, including interests and opinions, and to impart information and explanations regarding the agency's recommendations. Where opposing factions and points of their disagreement can be identified, it may be useful to obtain workable and desirable compromises.

Post-hearing meetings may be held to sustain the public information program. Also, such conferences may be of value in supplementing those elements of the public hearing that were deemed to be less than fully satisfactory.

Although such purposes of mini-hearings or conferences appear to be creditable, there are a number of questions that should be raised regarding form and procedure. For example, mini-hearings, according to their name, are intended to involve a small number of people. Attendance should be held to few enough persons so that a free and candid interchange of information, ideas, and opinions can be obtained in a courteous atmosphere. How can attendance best be restricted? By invitation of the highway department? By invitation of the interest group? Will the meeting be open or closed? Will the press be invited or allowed? Another question is how many mini-hearings? How many and which interest groups should be accommodated? Many interest groups will in fact be special interest groups. Each of these will likely have one or more counterparts. How can all citizens be represented in mini-hearings unless they become members of an interest group and help select their representatives?

Is a purpose of mini-hearings to identify interest groups and perhaps to encourage their formation? Is it to encourage citizen participation or merely to give would-be citizen participants a tacit role in planning? Or will each mini-hearing have a particular, more narrowly defined mission?

Finally, how official is a mini-hearing? Should its proceedings be only a part of the highway agency's contact log? Or should the minutes be verbatim and subject to review authority?

These and other questions should receive some attention and determination prior to the scheduling of mini-hearings. Open meetings and conferences that avoid charges of partiality also can be held on a pre-hearing or post-hearing basis and still serve many of the purposes construed for mini-hearings.

Information Program

Many commentaries on highway public hearings suggest that highway agencies fail to involve the public in their early planning. Thus when the agency comes to the hearings, whatever opposition it encounters is likely to be prepared for confrontation. Because of a lack of information from the agency, the opposition has been free to build its argument on misinformation, rumor, and emotionalized appeals. There is a tendency for such opposition to take a vehement stand and to lock itself in against agency information or persuasion, as well as the positions of any proponent groups.

Of greater importance, however, is that in the long-run a public action agency depends for its success not only upon the quality of its production but upon the public's awareness and understanding of its program and its manner of pursuing it.

One way to involve the public in highway affairs is an overall informational and educational program in regard to highway revenues, highway costs, highway purposes, highway effects, highway decision-making, and highway department procedures.

A second area of concern is created by the current shibboleths relating to public transit. Some of those who pose public transit alternatives are wont to found their case on highly idealized results. Little information has been put forth on the high fixed cost of certain mass transit systems and the fact that a city's solvency can be directly threatened by a multi-billion dollar system that attracts a low ridership. Since public transit has been represented as an alternative to highways, it would seem proper that it should be evaluated. This has special importance when it is remembered that in the foreseeable future there is no complete substitute for highways. Public transit, of whatever type and extent, must be complementary with highways, and the general citizenry will welcome knowledge of the actual relationships.

CHECK LIST AND RATING SYSTEM in Freeway Location and Design

Purpose of the Form

The CHECK LIST AND RATING SYSTEM (see pp.69-82) are intended to serve a variety of purposes. The check list is a reminder or guide relating to the numerous factors that may require consideration in the public hearing process, in the preparation of recommendations, in decision-making, and in the documentation and justification of decisions presented to reviewing parties and agencies. Thus, the check list can be an aid in conceptualizing a project and its alternatives as well as in the final recapitulation of the analyses. The freeway location and design process is so complex that it is likely that any one project will not involve all of the factors listed; on the other hand, for some projects there may be factors or their ramifications not adequately covered in the check list. Thus, absolute dependence upon the tool is not warranted. It should be merely a helpmate.

The rating system can be put into full use only after extensive information has been developed through observation and analysis. Furthermore, the final ratings may well be the result of a recursive procedure in the planning of a freeway location and design. In other words, as the evaluation of alternatives is being made, there is continuous discovery of ways to improve location and design. It

is suspected that very often when a badly rated item appears, its disadvantages can be cured or ameliorated at a favorable cost. The search for such items may characterize the decision process until the time of contracting (and perhaps beyond). Thus the rating system has a similar purpose to that of the check list except that it is intensified through more detailed evaluation.

The summaries for the parts of the form and the overall comparison develop a ratio of plus ratings. This measure is considered to be at least as important in summing and briefing the results as is the average rating. The absence of uniformly accepted criteria or standards for evaluation gives the algebraic sign of the rating great importance. Similarly, the difficulty of quantification and aggregation of the factors makes the determination of magnitudes for the numerical ratings highly inexact. The ratings, however, do allow for the bringing of more knowledge to bear than would positive and negative designations only.

The rating form allows for independent evaluations of two alternatives using the existing (including already assured changes and additions) street and road system as the base condition for each rating. Also only one series of ratings may be used, in which case the alternatives are rated against each other, again with a base condition of existing roads and streets.

Combining the recursive planning mentioned above with his prior knowledge, professional judgment, and familiarity with decision processes, the highway engineer-planner ordinarily will have evolved

a superior alternative by the time that final factor ratings are decided. In such a case, the two measures (the ratio of plus ratings and the average rating) should be highly compatible. Nevertheless, the trade-offs will be identified by negative numbers and their seriousness suggested. If the ratios of plus ratings are low (approaching .50), regardless of the average ratings magnitudes, he is aware that: (1) the alternatives are similar (at least on a gross basis); (2) the trade-offs are difficult and diverse among alternatives; and (3) the quantifiable costs and benefits may bear more heavily on the choice. Also, if a ratio of plus ratings is greater than .50 and the average rating is negative, it is known that there is a conflict in results. Again, a difficult trade-off situation is indicated.

The rating system, therefore, like its companion check list, is meant to be a flexible tool of evaluation. It is not meant as a standard or directive but as a guide to systematic analysis.

Explanations of Factors

IA. Transportation - Local Area

Transportation is referred to in the federal PPM 20-8 in items (1), (21), (22) and (23). In the check list, Part IA, to a large degree Items (1) and (23) relate to the local area, corridor, or community that the proposed freeway project would traverse. The distinction between local area and metropolitan area (general area) is not made in the PPM. This categorization appears in the check

list for three reasons: (1) the community or local area requires separate consideration under the present legal and institutional framework; (2) the local area as opposed to the general area is more directly subject to impacts spelled out in PPM 20-8; and (3) conceptually, at least, the distinction should facilitate the recognition and evaluation of the factors.

1. Passenger Car Service - A freeway can complement a local area's street system in varying degrees. If it removes unwanted traffic, there presumably is a local benefit. If it severs important arterials and collectors, it may remove traffic but through lowering the service quality of the streets. Paralleling the grid, if any, frontage roads, grade separations, interchanges, and freeway access ramps all may bear upon the freeway impact on local service. The boundaries of the problem are often suggested by traffic survey data as well as by obvious physical relationships and land uses. The degree to which local area activities are dependent upon passenger cars also is a consideration.

2. Truck Service - Trucks differ importantly from passenger cars in two respects. Usually, there are far fewer trucks than cars, and trucks depend less heavily on minor streets for their trip purposes. Nevertheless, a separate analysis for trucks may not always be warranted. They deserve special thought, however, if they are heavy users of local streets and/or if the area is heavily dependent upon truck movements.

3. Public Transit - If public transit is integrated into a freeway's design, the types of analyses required for its evaluation and justification will give ample evidence for ratings. In fact, this would be a case where the engineer-planner might wish to add supplements to the check list. On the other hand, for freeways that would make no special provision for public transit, the question concerns whether existing public transit is to be affected and in what manner. This determination will require knowledge of the type and patterns of transit service and of the nature of ridership. For the vast majority of cities, both existing and realistically potential public transit means buses and thus the use of streets and roads.

4. Pedestrian Movements - Pedestrianism is claimed by some to be making a comeback in American cities. Whether this is true or not, walking for a variety of purposes can be of great importance in everyday pursuits of local area residents. Almost all neighborhoods have some residents who must depend upon walking, and interference with walking should be minimized. The minimizing of interference may have beneficial by-products. Cleaner, lighter, safer, and more pleasant pedestrian facilities may offset any extra distances imposed. Such improvements may on balance be helpful to those who already walk as well as enhance the experience for others. The several trip purposes named in the check list will apply in different degrees from area to area and within local areas, and their investigation on an individual basis should lead to an adequate evaluation.

5. Railroad Effects - As used in this section, railroad effects refer to railroad operations and railroad customer service. For many freeways, such effects may be too obscure for analysis. In other cases, operating difficulties or improvements and loss, impairment, or enhancement of service may be detectable.

6. Airport Effects - It is unlikely that any proposed freeway alternative would interfere significantly with airport operations. Freeway location and design, however, could have a marked influence on the accessibility of airport facilities to a local area. The important comparison in this regard may well be simply any difference in the number of local area persons that would have airport access changes under each alternative freeway.

7. Waterway Effects - This factor is in regard to navigable or potentially navigable waterways. Thus, most freeway alternatives may not require its consideration. Accessibility may be the major question when the factor applies. However, attention to freeway conflicts with present or developable navigation may be indicated.

8. Other - In the event that a freeway alternative would affect pipeline or other transmission service, this item might be used.

IB. Transportation - Metropolitan or General Area

This section relates to the effects of the proposed freeway as a link in the general area's transportation system. More specifically, transportation effects upon persons and activities outside the local area and not previously evaluated in IA. are to be considered here.

1. Via Freeway System - The need for a proposed freeway undoubtedly is heavily based upon transportation demand outside the local area, that is, to serve numerous trips longer than the freeway segments proposed and also to give the general area accessibility to and from the local or corridor area. How well the alternative freeway locations and designs would serve these functions is the subject of this evaluation.

2. Via Other Streets - The freeway would in all likelihood alter the level of service and use of parts of the area's other road and street system. This effect may be concentrated in the local area and accounted in IA. However, arterials that the general area uses to meet its travel requirements also will be affected to some degree. For example, traffic relief on a major radial street located outside the local area might well result.

3. Railroad Service - Any effects of the freeway on railroad operations or service may extend out of the local or corridor area. For example, the elimination of railroad grade crossings could increase operational reliability and capacity in other parts of the rail system. Information of this type may be obtained from railroad management.

4. Airport Access - This factor relates to the improvement of airport access for the general area. Which freeway alternative offers the greater advantage is the question.

5. Waterway Effects - This factor is concerned primarily with

a freeway alternative's effect upon the general accessibility of waterway facilities. Navigation and maintenance effects seemingly would be rare.

6. Other - Any other transportation effects of a freeway alternative may be denoted here.

II. Environmental

Ordinarily the environmental changes associated with a freeway will occur in the local area or community. Some of these changes will be temporary, others will be permanent. Some will make a net difference in an overall sense, others will simply be shifts from one place to another. Some environmental impact may be beneficial. Some may be detrimental, at least to a few persons. There is a general bias which tends to correlate the environmental effects of a freeway with those of the automotive vehicle. In many respects, the freeway can be shown to be a mitigator of vehicular effects. This variety of possibilities is discussed in greater detail below.

A1. Noise - There is little doubt that freeways are noisy; that is, freeways generate unwanted sound. The pertinent facts, however, relate to the amount of noise, who experiences it, what can be done about it, and whether it is a net addition or a transfer. The amounts of noise at various distances from a freeway can be accurately predicted. These levels will vary with freeway design and the nature of adjacent terrain. The effects of the noise have varying severity according to ambient or generally prevailing

noise levels and the amounts and kinds of human activity in the area. Furthermore, much of the noise emanating from a freeway may have been transferred from previous routes. Such a transfer would be obvious, for example, if large volumes of traffic were attracted to the freeway from other routes. In this case, it is conceivable that the total nuisance consequence of noise is little changed, the difference being its shift in location and hearers. Although these variables make evaluation of noise effects rather complex, sufficient knowledge to compare location and design alternatives is generally at hand.

A2. Air Pollution - Traffic attracted from other roads and streets to a freeway very likely will emit less air pollution than previously. Thus, in a static sense, freeways may alleviate automotive pollution, and the problem in this framework involves transfers of effects, from one group of people to another. Such possible transfers are one reason for assessing the factor immediately adjacent to the freeway as well as at more distant points. In a dynamic framework, freeways have the power to generate traffic that otherwise would have been uneconomic and would not have appeared. This suggests higher absolute pollution levels and a trade-off with desirable freeway impacts. Nonetheless, there are identifiable differences between freeway location and design alternatives as far as air pollution is concerned. Comparative evaluations of these furnish information upon which to base trade-off decisions.

A3. Drainage - At sometimes great expense, highways ordinarily are prevented from creating or adding to drainage problems. This policy frequently leads to a drainage improvement that will vary in scope from area to area and among designs.

A4. Water Pollution - This possible effect of a freeway seems to be most imminent during the construction period. Run-off from bared soil before paving, stabilization of slopes, and control of drainage can result in muddy discharges into streams and lakes. On a permanent basis, oils, soot, and spillages on the freeway will be scoured by rain and enter into run-off. Salt or other materials used in winter maintenance are another source of water pollution. A major concern in this problem is care in construction and maintenance. Differences between freeway alternatives may depend primarily upon where the run-off is discharged, although ease of control during construction and maintenance after completion may warrant consideration.

A5. Waste Disposal - Usability of waste disposal facilities can be affected by highways. In most cases adverse effects can be offset at some cost. The questions are whether a cure can be feasibly expected, the amount of cost, and who shall bear the cost.

A6. Flora-Effects - Ordinarily this factor relates to trees. Upon occasion other plant life may be considered important. Ease of replacement should be considered. Conceivably there are benefits too as the freeway may be used as a protector (as versus private development).

A7. Fauna Effects - Loss of or impairment of habitat (breeding, nesting, feeding, protection, etc.) of socially valued species and the relative scarcity of such habitat is the concern here. A freeway, however, could yield benefits through isolation of an area from certain social or economic activities.

A8. Parks - Since park lands will almost never be taken under present constraints, this factor relates to additional parks, improved access to and other enhancement of existing parks, and proximity and ecological damage, if any.

A9. Playgrounds - Again the question usually will relate to enhancement of or proximity damage for this factor.

A10. and A.11. Archaeological Sites and Historical Sites - Ordinarily, direct damage to such sites will be avoided. However, the success of this policy, including salvage and restoration, can be assessed.

A12. Open Space - Despite the intensity of their use, freeways through their medians and right of way margins can introduce desirable open space into a high density urban area. This suggests effects upon visual aspects, another factor, but it also can be important as to light and air (and perhaps safety.)

A13. Visual Aspects - This refers to the appearance of the freeway from adjacent properties and also from greater distances.

A14. Safety - This factor can be quantified in some respects (as in Part V). However, any expected change in hazards as between

freeway alternatives is an important part of environmental concern.

A15. Other - The environmental aspects listed are not likely to be exhaustive for all freeway situations. Other important considerations may be identified and explained here.

B. Motorist Experience - As an environmental aspect, view of the freeway means the aesthetics of the roadway and right of way that the motorist experiences. His mental and physical comfort also may be considered (for example, views into the sun may be objectionable). His view of the adjacent area seemingly would not require a clear sight line but rather would involve the general appearance of whatever might be viewed. Panoramic views are a separate item because they may be compensations when adjacent areas cannot be seen or are unattractive. From the standpoint of freeway location and design, the motorist's environmental experiences would seem to be inextricably tied to safety. Furthermore, the economic trade-offs are quite obscure in nature. For example, it has been suggested that a sweep in a freeway might be considered in order to provide a view of a church steeple. The cost of such a decision, in money and perhaps in other trade-offs, undoubtedly would be formidable especially when so little is known about the benefits of such a view. The more reasonable approach is that a panoramic view (as the church steeple) might deserve a plus rating for one freeway alternative compared to another.

IIIA. Sociological - Community

In a broad sense, sociological aspects cover almost all freeway effects, for freeways are conceived as a device for improving human welfare. Present usage, however, seems to narrow the meaning to interpersonal comparisons (as neighborhood versus general area interests and users versus non-users, for example) and to highly personalized social services. The principle that seems to be put forth is that a public action should yield benefits with none being any worse off. This is highly idealistic and unworkable in practice.

It is mostly in regard to sociological aspects that citizen participation in freeway planning is being advanced. In fact, even environmental arguments usually are based on social goals and referred to the citizenry in this context.

Sociology, however, is far from an exact science. Therefore, there are any number of ways to classify sociological ramifications. The categories used in Part III should provide a cross-section of meaningful observations. Of course, they do not suggest how interpersonal trade-offs should be made.

A1. Neighborhood Severance - Several different definitions have been used to describe residential neighborhoods. Perhaps the definition most useful for highway planning is "a small residential area with similar type and value of housing, with similar life styles, with numerous common interests of residents, and with which the residents identify for a variety of purposes." As loose as this

seems, it is workable; one can do a very good job of recognizing and delineating a "neighborhood" using such a concept. Common aids to such delineation are natural barriers (as creeks), railroads, major arterials, home ages and styles, and ethnic composition. It is along neighborhood boundaries that freeways should be located if there is a reasonable choice. Severance leads to higher mobility and thus presumably to less solidarity. The strengthening of boundaries, contrarily, **separate** incompatible land uses and add identity and awareness to neighborhood values.

A2. Cultural Patterns - To some degree this is closely related to neighborhood severance. However, it is quite possible that a freeway located on a neighborhood boundary nevertheless could isolate the neighborhood from social institutions upon which it depends. A neighborhood, however stable and interdependent, is never socially independent. In other words, freeways can be disruptive of social organization and life styles, and care can be exercised to minimize these possible influences. On the other hand, freeways can also displace certain undesirable activities and land uses and give a neighborhood increased pride and togetherness.

A3. Crime - An aspect of public health and safety is police protection, which can be strengthened by increased practical availability or debilitated by the impairment of access. Some persons believe that freeways also can remove opportunities for

crime perhaps by the removal of certain land uses or by introducing more light and openness to an area. Also, if the possibility of improved police protection is a result of a freeway, crime thereby also may be deterred.

A4. Fire Hazard - A freeway can affect the possible sources of fire as well as the speed and certainty of organized fire protection.

A5. Health - Freeways conceivably can affect certain other hazards to health such as injury potentials and unsanitary conditions. Access to emergency and regular health care also may be improved or impaired.

A6. Religious Services - The displacement of churches or other places of religious instruction and practices generally may be objectionable. However, ease of relocation and perhaps enhancement of scope and usefulness of such facilities through improved sites also should be considered.

A7. Educational - Effects upon educational facilities (removal or proximity) as well as their accessibility and the operation of school districts constitute a PPM 20-8 item. The check list gives subclasses due to differences in size of districts (and thus distances) and ages of pupils.

A8. Recreational Facilities - Occasionally communities have recreational facilities other than parks and playgrounds (theaters and recreation centers) that might not be easily replaced or substituted

if removed. Access to these also may be either enhanced or impaired.

A9. Social Services - Gathering places or social services other than those mentioned already may be found in communities. Consideration should be given to any removal of other effects by freeways. (Community centers and homes or services for elderly are examples).

A10. Public Utilities - Cost of adjusting public utilities are covered in Part V. Under Sociological, this item concerns the quality of customer service.

A11. Neighborhood Livability - This factor overlaps considerably with Neighborhood Severance (A1), Cultural Patterns (A2), and other items. The added emphasis here is on disruption during construction. Also, an overall conclusion for the long run effects is permitted.

IIIB. Sociological - Metropolitan Area

The sociological aspects of a freeway reach beyond the immediate community or local area in which it is located. In addition, the general area may experience similar sociological impacts. National defense is added here even though its application goes far beyond the metropolitan area.

IVA. Economic Impact - Community

The overall economic impact of freeways has been demonstrated by a large number of studies to be beneficial. However, it is obvious that one freeway alternative can be preferable to another

from the standpoint of economic impact. Adverse effects such as job displacement often can be avoided if recognized. In addition, economic impact sometimes can be enhanced in the route selection process.

A1. Employment - This refers to removal of places of employment and improvement or impairment of access to employment and employment opportunity. Construction period means essentially the short run, during which there might be job disruption and temporary unemployment for persons working for businesses that are displaced. Over a longer run, job opportunity may be greatly enhanced due to improved access to a larger part of the urban area.

A2. Shopping Facilities - This factor covers both consumer and business viewpoints. Change in shopping ease and opportunity as well as loss or gain of business should be evaluated.

A3. Residential Values - Expected gains or losses of residential values, including potential for higher land uses, may differ among freeway alternatives.

A4. Other Property Values - Values of property other than residential may be affected differentially by freeway alternatives.

A5. Property Tax Base - The value of property removed from the tax rolls may be more than offset in the long run by area improvement. Problems may arise because early losses and later gains could occur in different tax jurisdictions.

A6. Displaced Residents - The real and supposed social ills

caused by the taking of low value housing are at least partially compensated by supplementary relocation payments. This should allow the analyst to take a rather pure economic viewpoint in considering the basic worth of residences to be taken. Since decent, safe, and sanitary (DSS) housing is a pursued national goal, the stock of such housing should be preferred, other things being equal, over that which will not qualify under DSS definitions. Ease of replacement concerns the availability of similar housing especially in the local area and any anticipated difficulty that could cause unusual delay in the highway project.

A7. Displaced Businesses - Another national goal is the encouragement and protection of small businesses (single proprietorships with six or fewer employees is a meaningful definition). However, there is relocation assistance for such business, and also the ease of relocation and perhaps location improvement may offset any long time detrimental effects. Other larger businesses may suffer uncompensated losses through loss of production and markets. Their disruption also has a direct bearing on the extent and permanence of job losses. The ease or difficulty of their relocation bears on these possible effects. If their premises are taken and they are of a footloose nature, businesses may move out of the local area and reduce its economic base at least temporarily.

A8. Remaining Businesses - The major questions in regard to these are disruption of business and loss of clientele versus the

perhaps longer run improvement of business climate. Effects along streets that lose or gain traffic should be considered.

A9. New Businesses - For some areas and locations, the potential for new businesses and their several advantages to a local area can be evaluated.

A10. Multiple Use of Right of Way - There are a number of legal, institutional, and economic constraints to this practice. However, one location and/or design may have obvious potential in this regard as compared with another alternative.

IVB. Economic Impact - Metropolitan Area

A freeway will extend its economic impact beyond the local area, since it is not an isolated road but part of a transportation system. In fact, a freeway and the system that includes it are critical to general economic efficiency and comprise elements in the competition among metropolitan regions for economic activity.

B1. Employment Accessibility - For persons outside the local area, freeway alternatives may differ in access to employment opportunity.

B2. Shopping Accessibility - Again, outside the local area, one freeway location and design may improve accessibility to shopping more than the other alternatives would.

B3. Commercial Activity - This item is highly similar to accessibility to employment and shopping. Commercial activity

outside the local area can be spurred by a freeway link, but the effects can vary with location and design of the link.

V. Project Costs and User Benefits

For many proposed highway projects, not all the data called for in Part V of the check list will be reasonably available. This should not prevent a worthwhile economic analysis. The important requirement is that sufficient cost and benefit information be developed to assure overall justification and to facilitate trade-off decisions. Since many dollar estimates have low precision at the inception stages of an extended project, the primary purpose of analysis is to seek the best comparative relationships.

A. Initial Costs - These should give the least difficulty in costing, since they ordinarily are estimated for all highway projects.

B. Annual Costs - Maintenance and operation costs are desired on an annual basis only for convenience of deriving their present values. These are difficult estimates but obtaining their present value modifies their effect on the overall analysis. It is suggested that a six percent discount rate be used for whatever annual series is determined.

C. Salvage Value - This item is applied against initial costs. It is necessary if a benefit-cost ratio is to be developed. It is suggested that a six percent discount factor again be used.

D. Total Costs - As used here, this refers to the present value of costs $(A+B-C)$.

E. Benefits - Reducing user benefits (savings) to dollar values is a complex job. Yet traffic projections, level of service assumptions, and operating coefficients from AASHTO manuals and other publications permit development of quite informative estimates. For a benefit-cost ratio, these will need to be discounted to a present value basis (six percent discount factor as used for costs).

F. Benefit - Cost Ratio - This ratio is merely a result that may be obtained from data generated in previous items. For decision-making it has little importance per se in relation to its ingredients and to the social, economic, and environmental factors.

G. Other Considerations - There are several other characteristics of freeway alternatives that bear upon choices but that do not appear to need rating or dollar evaluation. Some of these are listed in this section; the freeway planner may wish to add others.

Partially Completed Check List

The following partially completed check list is presented to show the handling of rated items for an actual case. The findings are that Route 1 (depressed) should be a superior alternative to Route 2 (elevated) as far as social, economic, and environmental factors are concerned.

Some limitations of the example should be noted. Knowledge of the alternatives is not complete. The precise locations and designs are not known, and the many observations from which ratings are derived range from fairly well-determined to casual estimates.

Quantitative information (such as costs) has not been developed and is not estimated.

CHECK LIST AND RATING SYSTEM

Freeway Location and Design Factors

County _____ City _____ Hwy No. _____ Hwy Limits _____

Comparison: Route 1 depressed versus Route 2 elevated

Basis of Rating: Each route rated (+5 to -5) with existing roads and streets as base condition.

Factor	Definition or Explanation ¹	Rating ² Alternative			Comments
		1	2	3	
I. TRANSPORTATION	Movement of people, goods and services PPM 20-8 (1) and (23)				
A. Local Area Service	Effects upon corridor area				
1. Passenger cars					
(a) Circulation along free-way	Circuitry of travel and congestion from freeway	+2	0		Rte. 1 would improve Rte. 2 would have little effect.
(b) Circulation across free-way	Difficulty of getting back and forth across freeway	-2	-1		Rte. 1 would sever more minor streets.
(c) Movements in and out of area	To other parts of city. How much of local area served?	+5	+1		Rte. 1 very superior to Rte. 2 due to amount of area served.
2. Trucks					
(a) Circulation along free-way	See 1 (a)	+5	+1		Rte. 1 would improve a great deal more. (relief of traffic).
(b) Circulation across free-way	See 1 (b)	-1	0		Rte. 1 would close a few streets.
(c) Movements in and out of area	See 1 (c)	+5	+1		Rte. 1 very superior.

¹For detail, see discussions in EXPLANATION OF THE CHECK LIST AND RATING SYSTEM FOR FREEWAY LOCATION AND DESIGN FACTORS, PP. 47-68.

²For ratings, a scale from -5 to +5 is recommended (+5 being the highest score).

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
3. Public transit	Bus or other effects upon	X	X	X	
(a) Service with- in local area		+1	0		Rte. 1 would aid short trips to some degree.
(b) Service in and out of area		+5	+1		Rte. 1 would serve many more persons.
4. Pedestrian movements	Circuitry, safety, security, etc.	X	X	X	
(a) Work		-1	0		Rte. 1 would cut some minor streets.
(b) Shopping		-1	0		Rte. 1 would cut some minor streets.
(c) School		-	-		Uncertain due to busing.
(d) Church		-1	0		Rte. 1-walking distance increased.
(e) Social or recreational		-1	0		Rte. 1-walking distance increased
(f) Other _____		-	-		
5. Railroad service	Loss or improvement of, etc.	+2	0		Rte. 1 would help rr. operations.
6. Airport	Interference or improvement	0	0		See 1(c).
7. Waterway	Interference or improvement	0	-2		Rte. 2 possibly could interfere.
8. Other _____		-	-		

Part IA. Summary Rating

	Alternative				Alternative		
	1	2	3		1	2	3
No. of plus ratings	7	4		Algebraic sum of ratings	18	1	
No. of minus ratings	6	2		Average of ratings	1.38	.17	
Ratio of plus ratings	.54	.67					

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
I. TRANSPORTATION					
B. Metropolitan Area Service	PPM 20-8 (1)				
1. Via freeway system	Either route as part of system				
(a) Passenger cars		+5	+1		Rte. 1 shorter and serves greater area.
(b) Trucks		+5	+2		Rte. 1 shorter and serves greater area.
(c) Public transit		+5	0		Rte. 1 shorter and serves greater area.
2. Via other streets	Effect if one freeway is built				
(a) Passenger cars		+5	+1		Rte. 1 far superior in improving traffic
(b) Trucks		+5	+2		Rte 1 far superior in improving traffic.
(c) Public transit		+2	0		Rte. 1 may improve by making more certain.
3. Railroad service	Improvement or interference	+5	+2		Less motor vehicle conflict.
4. Airport access	Improvement or interference	+2	+1		Rte. 1 better access.
5. Waterway effects		0	-2		Possible problems, Rte. 2.
6. Other		-	-		

PART IB. Summary Rating

	Alternative				Alternative		
	1	2	3		1	2	3
No. of plus ratings	8	6		Algebraic sum of ratings	34	7	
No. of minus ratings	0	1		Average of ratings	4.25	1.00	
Ratio of plus ratings	1.00	.86					

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
II. ENVIRONMENTAL	NEPA and PPM 20-8	X	X	X	
A. Community (Local Area)		X	X	X	
1. Noise pollution	Relation to present levels PPM 20-8 (15)	X	X	X	
(a) Adjacent to freeway		-2	-1		Relief of street traffic helps offset.
(b) General area		+3	+1		Improves due to relief of street traffic.
2. Air Pollution	PPM 20-8 (15)	X	X	X	
(a) Adjacent to freeway		+2	+1		Relief of street traffic.
(b) General area		+5	+2		Relief of street traffic.
3. Drainage	Effects on chances of flooding, etc.	X	X	X	
(a) Adjacent to freeway		+1	0		Rte. 1 will help slightly.
(b) General area		0	0		
4. Water Supply		X	X	X	
(a) Water pollution	PPM 20-8 (15) Permanent or serious temporary	0	0		Little, if any, effect.
(b) Water Quantity	Interference with movement or level of ground water	0	0		Little, if any, effect.
5. Waste disposal	PPM 20-8 (9) Access to, interference, etc.	0	0		Little, if any, effect.
6. Flora effects	NEPA and PPM 20-8 (7) and (13) Irreplaceable losses, etc.	0	0		Little, if any, effect.
7. Fauna effects	NEPA and PPM 20-8 (7) Breeding or nesting, etc.	0	0		Little, if any, effect.

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
8. Parks	PPM 20-8 (5) Improvement or damage to	+5	+2		Improves access to.
9. Playgrounds	PPM 20-8 (5) Improvement or damage to	+5	0		Rte. 1 improves access to.
10. Archeological sites	NEPA and PPM 20-8 (14) Loss of or access to, etc.	0	0		None affected.
11. Historical sites	PPM 20-8 (14) Loss of or access to, etc.	+2	+1		Improves access to.
12. Open space		+3	+1		Opens area by removing structures, some undesirable.
13. Visual aspects	PPM 20-8 (7) Community view of freeway	X	X	X	
(a) Adjacent to freeway		+3	+1		Thru proper treatment areas will be improved.
(b) General area		+2	0		Rte. 1 would help. Rte. 2 not likely to help.
14. Safety	PPM 20-8 (1) Any change in hazards	X	X	X	
(a) Traffic		+3	+1		Rte. 1 gives more relief to streets & removes rr.
(b) Pedestrian		+5	+1		" Rte. 1 more persons involved.
(c) Other		-	-		
15. Other	PPM 20-8 (13) e.g., other resources				
B. Freeway Motorist Experience	PPM 20-8 (1) and (7)	X	X	X	
1. View of freeway	Appearance and security	+3	+1		Rte. 1 clearer and nicer view.
2. View of adjacent area	Aesthetics or special sights	0	+1		Rte. 2 could give special views on curves.
3. Panoramic views	Vistas	+1	+3		Rte. 2 good. Rte. 1 downtown area

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
4. Area hazards	Hazards to freeway users and vehicles	+3	-1		Rte. 1 would displace hazards. Rte. 2 would expose motorists to industrial smog, etc.

PART II. Summary Rating:

	Alternative				Alternative		
	1	2	3		1	2	3
No. of plus ratings	15	12		Algebraic sum of ratings	44	14	
No. of minus ratings	1	2		Average of ratings	2.75	1.00	
Ratio of plus ratings	.94	.86					

III. SOCIOLOGICAL

Social relationships PFM 20-8					
A. Community (Local Area)	PFM 20-8 (10)				
1. Neighborhood severance	Violation of neighborhood boundaries	0	-5		Rte. 1 along boundaries. Rte. 2 cuts several neighborhoods.
2. Cultural patterns	Ethnic cohesion, stability, life style	+1	-3		Rte. 1 could protect. Rte. 2 can be disruptive.
3. Crime	Assault, robbery, breaking, etc.				
(a) Rate	Change in opportunity for	+3	+1		Rte. 1 open and lights area more than Rte. 2
(b) Police protection	Availability and speed	+3	+1		Rte. 1 should aid access in general area.
4. Fire hazard	Type and density of land uses PFM 20-8 (6)				
(a) Hazards	Dwellings, trash, etc.	+5	0		Rte. 1 will remove hazards.
(b) Fire protection	Available equipment and time	+3	+2		Both routes should help. Rte. 1 involves more people.
5. Health	PFM 20-8 (9)				
(a) Health factors	Sanitation, dangerous spots, etc.	+5	0		Rte. 1 would remove rr, poor dwellings and clean up trash.
(b) Medical services	Time to reach health facilities or obtain services	+3	+1		Rte. 1 better access for more people.

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
6. Religious services	PPM 20-8 (11) Opportunity to attend	X	X	X	
(a) Loss of places	Removal of churches	-1	0		Rte. 1 takes one small church.
(b) Access to	Isolation of members	0	0		Neither should effect much.
7. Educational	Loss of or effect on access to	X	X	X	
(a) Elementary	PPM 20-8 (18)	-	-		Unknown due to busing.
(b) Junior H.S.	PPM 20-8 (18)	-	-		Unknown due to busing.
(c) High School	PPM 20-8 (18)	-	-		Unknown due to busing.
(d) Trade and College		+3	+1		Rte. 1 better access for more people
8. Recreational facilities	Other than parks and playgrounds PPM 20-8 (5)	0	0		Few, if any, effects.
9. Social services	Gathering places other than previously considered	0	0		Few, if any, effects
10. Public utilities		0	0		Few, if an, effects.
11. Neighborhood livability	Pleasantness of surroundings	X	X	X	
(a) Construction period	Disruption	-3	-1		Rte. 1 involves more people.
(b) Long run	Cleanliness, repairs, etc.	+5	+2		Rte. 1 should have greatest potential for improvement.

PART IIIA. Summary Rating:

	Alternative				Alternative		
	1	2	3		1	2	3
No. of plus ratings	9	6		Algebraic sum of ratings	27	-1	
No. of minus ratings	2	3		Average of ratings	2.46	-.11	
Ratio of plus ratings	.82	.67					

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
III. SOCIOLOGICAL					
B. Metropolitan Area	Loss of and effects on access to				
1. Police protection	PPM 20-8 (9)	+4	+2		Rte. 1 improves access more and serves more people
2. Fire protection	PPM 20-8 (6)	+4	+3		Rte. 1 improves access more and serves more people
3. Medical services	PPM 20-8 (9)	+3	+1		Rte. 1 improves access more and serves more people
4. Educational services	PPM 20-8 (19)	+5	+2		Rte. 1 serves more places and people.
5. Parks	PPM 20-8 (5)	+2	0		Rte. 1 improves access. Rte. 2 does not.
6. Recreation	PPM 20-8 (5)	+2	0		Rte 1 improves access. Rte 2 does not.
7. Historical sites	PPM 20-8 (14)	+2	0		Rte. 1 improves access. Rte. 2 does not.
8. National defense	PPM 20-8 (2)				
(a) Evacuation	As a link in system	+5	+2		Rte. 1 preferred. Rte. 2 easy to disable.
(b) Military movements	As a link in system	+4	+2		Rte. 1 preferred. Rte. 2 easy to disable.
(c) Hazards to critical industry		0	-5		Rte. 2 would expose industry to damage objects from

PART IIIB. Summary Rating:

	Alternative				Alternative		
	1	2	3		1	2	3
No. of plus ratings	9	6		Algebraic sum of ratings	31	7	
No. of minus ratings	0	1		Average of ratings	3.44	1.00	
Ratio of plus ratings	1.00	.86					

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
IV. ECONOMIC IMPACT		X	X	X	
A. Community (Local Area)		X	X	X	
1. Employment	PPM 20-8 (4)	X	X	X	
(a) Construction period	Change in place or access	-2	-5		Rte. 2 would disrupt several large employers, Rte. 1, a few.
(b) Long run	Change in place or access	+5	+1		Rte. 1 has a great deal more potential for increase.
2. Shopping facilities	PPM 20-8 (3)	X	X	X	
(a) Construction period	Change in place or access	-3	-1		Rte. 1 would affect more people and shopping.
(b) Long run	and loss of customers	+5	+2		Greater potential from Rte. 1
3. Residential Values	PPM 20-8 (16)	+3	-1		Rte. 1 would help. Rte. 2 would damage
4. Other Property Values	PPM 20-8 (16)	+5	+2		Rte. 1 far superior.
5. Property Tax Base	PPM 20-8 (12)	X	X	X	
(a) Construction period	Loss of taxable values	-2	-4		More loss on Rte. 2.
(b) Long run	Potential for change	+5	+2		Greater potential for Rte. 1.
6. Displaced residents	PPM 20-8 (18) and (20)	X	X	X	
(a) Owners		X	X	X	
(1) DSS housing	DSS = decent, safe and sanitary	-5	-2		Rte. 1 would take more.
(2) non-DSS housing		+3	+1		Rte. 1 would take more.
(b) Renters		X	X	X	

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
6. Displaced residents (con't)					
(1) DSS housing		-4	-2		Rte. 1 would take more.
(2) non-DSS housing		+3	+1		Rte. 1 would take more.
(c) Ease of replacement	PPM 20-8 (18)	-2	0		Rte. 2 easier because of fewer to replace.
7. Displaced businesses	PPM 20-8 (20)				
(a) Small businesses					
(1) Number		-3	-1		Rte. 1 would take more
(2) Number of jobs	PPM 20-8 (4)	-3	-1		Rte. 1 would take more
(3) Ease of relocation		-1	-1		Comparatively easier on Rte. 1
(b) Other businesses	PPM 20-8 (20)				
(1) Number		-1	-5		Rte. 2 very disruptive
(2) Number of jobs	PPM 20-8 (4)	-1	-5		Rte. 2 very disruptive
(3) Ease of relocation		-1	-5		Rte. 2 businesses would take longer to relocate
8. Remaining businesses	Effects on jobs PPM 20-8 (20)				
(a) Small businesses	and solvency				
(1) Construction period	PPM 20-8 (3) and (4)	-5	-2		Rte. 1 more disruptive.
(2) Long run	PPM 20-8 (3) and (4)	+5	+2		Rte. 1 has greater potential.
(b) Other businesses	PPM 20-8 (20)				

Factor	Definition or Explanation	Rating Alternative			Comments
		1	2	3	
8. Remaining Businesses (con't)					
(1) Construction period	PPM 20-8 (3) and (4)	-1	-4		Rte. 2 more disruptive.
(2) Long run	PPM 20-8 (3) and (4)	+5	+4		Full recovery on Rte. 2 Rte. 1 should improve.
9. New business	Potential for PPM 20-8 (3) and (4)	+5	+2		Rte. 1 has more potential.
10. Multiple use of ROW		+1	+5		Greater potential for Elevated section of Rte. 2.
B. Metropolitan Area	Outside of local area	X	X	X	
1. Employment, access to	PPM 20-8 (4)	+5	+2		Rte. 1 would serve more people and places.
2. Shopping, access to	PPM 20-8 (3)	+3	+1		Rte. 1 would serve more people and places.
3. Commercial activity	PPM 20-8 (3)	+3	+1		Rte. 1 would serve more people and places.
4. Property values and tax base	PPM 20-8 (12)	+5	+2		Rte. 1 would serve more people and places.

PART IV. Summary Rating:

	Alternative				Alternative		
	1	2	3		1	2	3
No. of plus ratings	15	14		Algebraic sum of ratings	27	-11	
No. of minus ratings	14	14		Average of ratings	.93	-.39	
Ratio of plus ratings	.52	.50					

Factor	Definition or Explanation	Quantity			Comments
		Alt.1	Alt.2	Alt.3	
V. PROJECT COSTS AND USER BENEFITS	PPM 20-8 (1), (12) and (22)				
A. Initial Costs					
1. ROW land costs					
2. ROW improvement costs					
3. Relocation costs					
4. Utility costs					
5. Engl'g costs					
6. Constr. costs					
B. Annual Costs					
1. Maint. costs	Present Value of				
2. Operations costs	Present Value of				
C. Salvage Value	Present Value of				
D. Total Costs	Present Value: A+B-C				
E. User Benefits					
1. Travel time savings	Present Value of Annual Savings				
2. Vehicle op. costs savings	Present Value of Annual Savings				
3. Accident costs	Present Value of Annual Savings				
F. Benefit-Cost Ratio	E/D				

Factor	Definition or Explanation	Quantity or Rating			Comments
		Alt.1	Alt.2	Alt.3	
G. Other Considerations	PPM 20-8 (1), (2) and other				
1. ROW acquisition time					
2. ROW clearance time					
3. Construction time					
4. Project life					
5. Freeway vulnerability to disablement					
6. Number of families to be displaced	PPM 20-8 (20)				
(a) DSS housing					
(b) non-DSS housing					
7. Number of businesses to be displaced					

OVERALL COMPARISON OF RATINGS:

Part	No. of Plus Ratings	No. of Minus Ratings	Total No. of Ratings	Algebraic Sum of Ratings	Ratio of Plus Ratings	Average Rating
IA. Transp., Local Area						
Alt. 1	7	6	13	18	.54	1.38
Alt. 2	4	2	6	1	.67	.17
Alt. 3						
IB. Transp., Metropolitan Area						
Alt. 1	8	0	8	34	1.00	4.25
Alt. 2	6	1	7	7	.86	1.00
Alt. 3						
II. Environmental						
Alt. 1	15	1	16	44	.94	2.75
Alt. 2	12	2	14	14	.86	1.00
Alt. 3						
IIIA. Socio, Community						
Alt. 1	9	2	11	27	.82	2.46
Alt. 2	6	3	9	-1	.67	-.11
Alt. 3						
IIIB. Socio., Metropolitan Area						
Alt. 1	9	0	9	31	1.00	3.44
Alt. 2	6	1	7	7	.86	1.00
Alt. 3						
IV. Economic Impact						
Alt. 1	15	14	29	27	.52	.93
Alt. 2	14	14	28	-11	.50	-.39
Alt. 3						
All Ratings						
Alt. 1	63	23	86	181	.73	2.10
Alt. 2	48	23	71	17	.68	.24
Alt. 3						

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