NATIONAL COOPERATIVE
HIGHWAY RESEARCH PROGRAM REPORT 216

THE NO-ACTION ALTERNATIVE
RESEARCH REPORT

TRANSPORTATION RESEARCH BOARD
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J. S. LANE, L. R. GRENZEBACK,
T. J. MARTIN, AND S. C. LOCKWOOD
David A. Crane and Partners/DACP, Inc.
Boston, Massachusetts

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

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FOREWORD

By Staff
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This report is the companion piece to *NCHRP Report 217,* "The No-Action Alternative—Impact Assessment Guidelines." That report defines the transportation planning and impact assessment process showing how the no-action alternative can provide a benchmark for the assessment of impacts and the evaluation of project alternatives. This report documents the research methods, procedures, and findings that led to the policy and procedural recommendations set forth in the guidelines. This report will be of special interest to agency administrators, project managers, and impact analysts responsible for project-level planning and impact assessment; it deals with both highway and transit projects. Although the work is oriented toward transportation planning, the research results can be readily applied by state, metropolitan, and local planning organizations to other types of development projects.

There are strong pressures today on transportation agencies to be rigorous in their assessment of transportation impacts and highly selective in investing in transportation projects. In this context, impact assessment and evaluation procedures must provide clear answers to two basic questions: Which of the proposed project alternatives best meets transportation needs? Is the total effect of investing in a project more beneficial, or less costly, than the total effect of not investing (that is, choosing no action)? In short, is the project worthwhile? NCHRP Project 8-11 had as its general objective the strengthening of transportation impact assessment and evaluation procedures; the mechanism for this was the no-action alternative. The research was to define the no-action alternative, determine its role in impact assessment and project evaluation, and review techniques available for assessing the impacts of no-action and other project alternatives. These objectives have been accomplished with the publication of two NCHRP reports: *NCHRP Report 216* highlights the findings of the research and documents the research procedures and activities; *NCHRP Report 217* sets forth policy and procedural guidelines showing how the research findings may be applied to strengthen impact assessment and evaluation.

The research was conducted in two phases. The first half of the study involved a literature search, a review of several hundred planning and environmental impact assessment documents, a nationwide survey of state transportation officials, and case studies of four major transportation projects for which no-action decisions were made. It was determined, for both legal and technical reasons, that the no-action alternative should be used as a benchmark against which the impacts of a proposed project and its alternatives can be compared, and that it should be used as a means of structuring the evaluation process. However, in reviewing agency procedures, it was found that current practices were inconsistent and confusing. Definitions of the no-action alternative varied widely and procedures for its use were often nonexistent. These findings were documented and published in an interim report in December 1975 (available from University Microfilms International, Document No. PB 2849). Included in that document were the four case studies

and an extensive state-of-the-art review of social, economic, and environmental impact assessment techniques.

During the second half of the research, policies and procedures were developed to deal with the no-action alternative. It was recommended that the no-action alternative be defined as the maintenance of existing facilities and services in the study corridor and the region. It was further recommended that the impacts of the no-action alternative be assessed at the same level of detail as other alternatives. These recommendations, the rationale for them, and a description of the role of the no-action alternative in impact assessment and project evaluation were incorporated into a set of guidelines intended for use by transportation agency administrators and planners. A procedure for impact assessment was developed and techniques for 13 categories of social, economic, and environmental impacts were recommended and included in the guidelines. The guidelines were then extensively tested in a pilot program undertaken with nine state transportation agencies. The revised guidelines were issued as *NCHRP Report 217*.

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ACKNOWLEDGMENTS

This report was developed as part of NCHRP Project 8-11 by David A. Crane and Partners/DACP, Inc., Boston, in association with Economics Research Associates, Inc. and Alan M. Voorhees and Associates, Inc.

Jonathan S. Lane and Lance R. Grenzeback were the co-principal investigators and major authors for the study. Jonathan S. Lane was a vice president of DACP when the study was conducted; he is now a principal in Lane/Frenchman, Inc. Lance R. Grenzeback is a Senior Associate with David A. Crane and Partners, Boston. Thomas J. Martin, Vice President, Economics Research Associates, Boston, supervised the work related to economic impacts. Steven C. Lockwood, Vice President, Alan M. Voorhees and Associates, Inc., McLean, Va., contributed materials dealing with transportation impact methodologies.

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Special appreciation is also extended to the state transportation agency personnel of California, Colorado, Kentucky, Maryland, Michigan, New Jersey, New York, Oregon, and Washington who participated in the review and pilot program phases of the project; their comments had a major impact in the eventual form and content of the guidelines.

THE NO-ACTION ALTERNATIVE
RESEARCH REPORT

SUMMARY

There are strong pressures today on transportation agencies to be highly selective in choosing new projects in order to make the most efficient use of available resources. These pressures come from many directions: diminishing public willingness to provide capital and operations financing at accustomed levels; the need to conserve scarce energy resources; and, the strictness of environmental procedures protecting natural and man-made resources. In this climate, it is essential that transportation agencies develop evaluation procedures and techniques which provide clear guidance in choosing among alternate transportation investments.

This research investigated a critical aspect of this problem of choice among alternatives: the need for a standardized method of comparing alternative project proposals. This report recommends the use of a *no-action alternative* as a benchmark against which all other alternative actions can be compared. Recommendations are presented for a standard definition of the no-action alternative, consistent procedures for use of the no-action alternative and its projected impacts to provide a means of comparison among alternatives, and evaluation of such comparative impact information in decision-making.

The research is reported in two reports: *NCHRP Report 216* "The No-Action Alternative—Research Report," which documents the activities and findings of the research regarding the use of the no-action alternative; and *NCHRP Report 217*, "The No-Action Alternative—Impact Assessment Guidelines," which is a practitioner's guide to the procedures and methods for using the no-action alternative in assessing alternatives and making resource allocation decisions.

The term "no-build alternative" has been used to describe a default situation—the case occurring when a decision is made not to construct a transportation facility. For this reason, the no-build alternative has been treated by agency administrators and project engineers as intrinsically inferior to other alternatives and has not been given serious attention. Largely because of this pejorative connotation, most practitioners do not clearly understand what role this alternative should have in transportation planning and impact assessment. This misunderstanding or disinterest can jeopardize the integrity and usefulness of the impact assessment process, and can result in products that are neither intelligible nor useful for decision-making.

In the course of the research, a determination was made that current state agency procedures defining the no-build alternative and incorporating it into the impact assessment process were inconsistent and irregular. The definition of a no-build alternative was found to vary widely, and its role in comparative assessment of alternatives was found to be perfunctory. Therefore, guidelines were developed to assist those charged with project definition, assessment, and evaluation in the use of a no-action alternative as an integral and essential part of the impact assessment process.

General Research Findings

1. Existing agency procedures regarding the "no-build" were found to be inconsistent and confusing. Extensive reviews with state transportation agencies revealed that definitions of the no-build alternative varied and that procedures for its use were often nonexistent. The phrase "no-build alternative" was found to describe a range of options, including no investment; maintenance; the spectrum of traffic operations and management strategies now classified as transportation systems management (TSM); and even construction alternatives, such as road widening and grade separation. This inclusive set of definitions has confused both transportation professionals and the general public and has obscured the purpose of a no-build alternative.

2. A standardized definition for a no-action alternative would alleviate the problem. Adoption of the term *no-action alternative* would eliminate the pejorative connotation of "no-build" and also would conform to the language in the policy guidelines issued by the Council on Environmental Quality. Most importantly, a standardized definition would encourage better use of the no-action alternative thereby improving the quality and responsiveness of transportation planning and impact assessment. The recommended definition of the no-action alternative is *maintenance of existing transportation facilities and services.* Professional judgments will still be required to define the specific set of actions constituting an appropriate maintenance policy for each individual situation; however, a standard nomenclature and definition will greatly assist in the effort to achieve uniformity of practice.

3. The no-action alternative provides a common benchmark, or standard, against which other alternatives may be compared. Such a benchmark can be used to: (1) identify and predict the impacts of the no-action alternative; (2) compare the impacts of the no-action alternative to other alternatives under consideration; (3) assist in selecting the appropriate alternative. Failure to define and assess a no-action alternative leaves no standard by which to measure, even approximately, the benefits of a proposed transportation investment. Decision-makers may be able to select from among the proposed alternatives the one which best meets transportation, environmental or community needs; but without a no-action alternative, they will be unable to determine if any of the proposed alternatives are worthwhile.

4. Comparison of alternatives requires assessment of the no-action alternative at the same level of detail as any other alternative. Absence of such a comparative assessment leaves the decision-maker or concerned reviewer without a common basis for identification of positive impacts, negative impacts, or the relative worth of each potential alternative. Techniques are available to assess the impacts of a no-action alternative. "The Impact Assessment Guidelines" (*NCHRP Report 217*) identify these and provide guidance for their use.

5. Use of a planning balance sheet is an effective format to communicate impact assessment results for project evaluation. Effective evaluation requires more than definition and assessment of the no-action and other alternatives. It requires intelligible communication of the results so that meaningful comparisons may be made among alternatives. The proper integration of the no-action alternative into the impact assessment and project development process can be an important means of improving the quality of transportation investment decisions.

Use of the Research Products

This report constitutes the first of a two-volume report. The "Research Report" (*NCHRP Report 216*) documents research methods, procedures, and the

broad findings of the work. It also includes summary reports of case studies, surveys, and pilot program activities undertaken with nine state agencies. These are in appendixes which document the analysis of the problem and justify the solutions proposed.

The "Impact Assessment Guidelines" (*NCHRP Report 217*) is included in a separate volume. These guidelines present recommended approaches for the definition and use of the no-action alternative and include methods for assessing impacts and evaluating the results. The guidelines provide information on broad policies and specific procedures that will be useful to agency personnel. Although the recommendations may require adjustment and "tailoring" to each user agency, the net effect of the guidelines should be to encourage standardization of practice and more effective use of the no-action alternative in transportation planning.

CHAPTER ONE

INTRODUCTION AND RESEARCH APPROACH

PROBLEM STATEMENT

The most prevalent problems relating to the current use of the no-action alternative are as follows:

1. The definition of the no-action alternative is inconsistent and confusing.
2. The no-action alternative is not effectively integrated into the impact assessment process.
3. Finally, because of (1) and (2), comparative information about alternative transportation investments is not made intelligible to decision-makers.

Definition of the No Action Alternative

In the context of transportation planning and engineering, the no-build alternative has been used to designate a default situation—the case occurring when a decision is made not to construct a transportation facility. The no-build alternative usually has been treated as intrinsically inferior to other alternatives and thus not given serious attention.

The phrase "no-build alternative" has been used to describe a range of options, including no investment, maintenance, the spectrum of traffic operations and management strategies now classified as transportation systems management (TSM), and even construction alternatives, such as road widening and grade separation. This inclusive set of definitions has confused both transportation professionals and the general public and has obscured the purpose of a no-build alternative.

A standardized policy for defining the no-build alternative could alleviate much of this confusion. Adoption of the term *no-action alternative* would eliminate the pejorative connotation of "no-build" and also would conform to the language in the forthcoming policy guidelines of the Council on Environmental Quality. Most importantly, a standardized definition would encourage better use of the no-action alternative in transportation planning and impact assessment. (At different stages of the research, the terms "no-build" and "NCTF" (an acronym for *N*ot *C*onstructing a *T*ransportation *F*acility were used. Since "no-action" is the recommended nomenclature, it is used throughout the balance of this report.)

Impact Assessment Process

Most practitioners do not clearly understand the role the no-action alternative should have in transportation planning and impact assessment. This misunderstanding or disinterest can lead to improper use of the concept jeopardizing the integrity and usefulness of the impact assessment process. Such misuse can result, at the extreme, in legal action to block projects; but, more commonly, it results in a product that is not highly intelligible or useful for decision-making.

The purpose of defining a no-action alternative and assessing its impacts is to create a benchmark against which other alternative actions can be compared. Such a benchmark can be used to: (1) identify and predict the impacts of the no-action alternative; (2) compare the impacts of the no-action alternative to other alternatives under consideration; and (3) select the appropriate alternative.

The Quality of Decision Information

When the no-action alternative is poorly defined, or when its impacts are improperly or inadequately assessed,

a decision-maker loses the ability to judge the ultimate worth of any of the alternatives under consideration. In comparing alternatives, three important questions must be addressed:

1. Which of the proposed alternatives best meets the transportation needs?
2. Which of the proposed alternatives offers the best balance between transportation needs and environmental considerations?
3. Is the total effect of investing in a project (i.e., taking an action) more beneficial than the total effect of not investing (i.e., choosing to take no action)?

The no-action alternative can be used in responding to each of these questions. For the first two, it serves as a benchmark in ranking alternatives, so that the best investment action can be selected. The no-action alternative also provides a means to answer the last question, to justify the selection or rejection of a proposed project. Failure to define and assess a no-action alternative leaves no standard by which to measure, even approximately, the benefits of a proposed transportation investment. Decision-makers may be able to select from among the proposed alternatives the one which best meets transportation, environmental, or community needs; but, without a no-action alternative, they will be unable to determine if any of the proposed alternatives are worthwhile.

Effective evaluation requires more than definition and assessment of the no-action and other alternatives. It requires intelligible communication of the results of that comparison to those charged with responsibility for decisions. The proper integration of the no-action alternative into the impact assessment and project development process can be an important means of improving the quality of transportation investment decisions.

RESEARCH OBJECTIVES

The general objective of this research was to strengthen techniques for the evaluation of the no-action alternative. The primary application of the resulting techniques was intended to be in the transportation planning and project decision-making process.

The project was divided into two phases. For the first phase, the following specific objectives were set:

1. Conceptualize a practical approach (analysis, evaluation techniques, and procedures) to determine the social, economic, and environmental consequences resulting from either a decision not to construct a transportation facility or a decision to delay construction.
2. Within this framework, evaluate the experience to date in analyzing and portraying the social, economic, and environmental consequences of the no-action alternative. This was to include a review of completed and on-going transportation, social, economic, and environmental impact analyses from both a methodological and decision-making viewpoint. Selected examples, covering situations where build and no-build decisions were made, were to be examined in depth to define the sufficiency of the evaluation of not constructing a transportation facility and the influence it had on the decision, as well as the consequences of that decision. This evaluation was to also include a review of state action plans, on-going research activities and any other appropriate literature and experience.
3. Identify deficiencies in current analysis of the no-action alternative.
4. Provide interim guidelines for the analysis of the no-action alternatives.
5. Prepare a research plan for Phase II to develop techniques to overcome deficiencies identified in objective 3. This plan was to specify both the technical approach and estimated costs.

The Phase II objectives included the following:

1. Identify and develop methods and procedures to meet the identified deficiencies.
2. Incorporate the results into a recommended approach for evaluating a no-action alternative at the project level.
3. Among user agencies, conduct a broad review of the suggested evaluation precedures and prepare final guideline recommendations.

RESEARCH APPROACH

Overview

The research took place over a 3-year period, with several changes in emphasis to respond to the information gathered. The effort was divided into two segments:

1. *Defining the Problem.* This included a search of published environmental documents, and collection of a broad range of primary data. Sources of primary data included surveys of practitioners throughout the country, interviews with transportation agency personnel in selected states, and attitudinal surveys of individuals who had been affected by decisions not to construct major facilities. The result of these investigations was an understanding of the current state of the art or usage of the no-build alternative and an identification of major problems in usage.
2. *Developing the Guidelines.* The final product of the research was to be a set of guidelines presenting recommendations for the treatment of the no-action alternative in impact assessment. To produce the guidelines, the research team first developed a draft set of guidelines, then set up a year-long pilot program to test the concepts with nine state transportation agencies. Based on the findings of that pilot program, the guidelines were revised and finalized.

The remainder of this section amplifies these research procedures.

Method of Problem Definition

Definition of No-Action Alternative

To assess current practices, a review was made of over 100 draft and final environmental impact statements (EIS's) submitted for a wide range of proposed transportation projects throughout the country. Contacts were made with personnel at the Department of Transportation,

the Federal Highway Administration, the Urban Mass Transportation Administration (UMTA) and the Council on Environmental Quality (CEQ) to identify and obtain EIS's for projects that had unique or well-defined no-action alternatives. Subsequently, a survey by telephone and by mail was undertaken to develop a full profile of how the no-action alternative was being defined. State transportation agencies in the 50 states, Puerto Rico, and the District of Columbia were asked to specify the general policy assumptions they made in defining the no-action alternative. Definitions also were reviewed for projects where decisions not to construct had been made.

Analysis was done to determine if the definition of the no-action alternative appeared to be systematically related to project context (i.e., degree of urbanization of the area affected by the project) or project scale (i.e., physical size, dollar costs, and significance of impacts). Concurrently, a review was made of the legal and administrative requirements for definition of the no-action alternative, including current guidelines and court decisions.

The conclusion of these investigations was that there was no consensus on definition of the no-action alternative, and that the absence of a standardized approach was a source of confusion to practitioners and an impediment to the productive use of the no-action alternative in the impact assessment process.

Impacts of the No-Action Alternative

The research effort identified the impacts of no-action alternatives and assessed the technical adequacy of currently available impact prediction methodologies. This was necessitated by the scarcity of published materials on the effects of no-action decisions. State transportation agency administrators and planners were asked to identify the major issues that surrounded projects for which no-action decisions had been made and to rate the importance of these issues to the decisions. To supplement these data, case studies were done on four projects for which no-action decisions had been made: Interstate 95 North in Boston, the Riverfront Expressway (I-310) in New Orleans, the Crosstown Expressway (I-494) in Chicago, and the Southern Bay Crossing bridge in San Francisco. In each case, the actual consequences of not constructing the proposed facility were investigated and compared with prior predictions.

Impact Assessment Methodology and Process

An investigation was made of the technical adequacy and consistency of use of the methodologies currently available to predict the impacts of no-action options. After review of EIS's and planning literature, a list of 26 impact categories was drafted. (These were later condensed to form 13 impact categories.) At the same time, a list of available, currently used impact assessment methodologies was developed for each impact category. Available information was reviewed for each methodology and its component techniques. Concurrently, an approach to evaluating the internal consistency and comprehensiveness of available impact analysis methodologies was developed, and information from two surveys was gathered. In the first survey, transportation agency administrators were asked to rank the methodological adequacy and importance to decision-making of each category of impact; in the second project, engineers were asked to provide similar information for specific projects where no-action decisions had been made. These survey results and the technical review of methodologies were used to identify impacts for which available methodologies were deficient or inadequate.

The foregoing analysis led to several major conclusions. First, many of the social and economic impacts were not well understood by those practitioners surveyed, as indicated by the highly judgmental and often subjective nature of their analyses. Second, many techniques were available to assess—with varying levels of confidence—social, economic and environmental impacts of no action alternatives. Third, the general techniques and methodologies for assessment of the no-action case were, in most cases, identical to those used for construction alternatives. Fourth, there was a need for a comprehensible guide to available techniques (particularly for social and economic impacts) so that practitioners could use state-of-the-art information to make comparative assessments of both "build" and no-action alternatives.

Development and Revision of the Guidelines

Based on these initial conclusions regarding the nature of the problem, a draft set of the guidelines was developed. Reviewed in detail with administrative and project personnel in three states represented in the research advisory panel (California, Maryland, and New York), the initial guidelines were found to contain useful concepts, but in poor format. The major problems identified were excessive length, lack of a clear recommendation for treatment of the no-action alternative, and hard-to-retrieve material on impact assessment techniques. Therefore, the guidelines were substantially revised and reissued in a form that was found satisfactory by the advisory panel.

The revised guidelines included several improvements:

1. A standardized definition was offered for the no-action alternative.
2. The function of the no-action alternative in the project development process was clarified.
3. An eight-step process model was developed as a framework for recommendation of appropriate techniques and methodologies for impact assessment of the no-action alternative.
4. A recommendation was made to use the "planning balance sheet" approach for evaluation of alternatives.
5. A "dictionary" was included, which cantained, for each assessment technique, a description and an evaluation of the degree of difficulty of using the methods and references.

Although the guidelines were well-received, it was decided that a substantial field testing of the contents was necessary with potential user agencies to ensure that the form and content responded to their needs. Therefore a pilot program was designed.

Overview of the Pilot Program

The purpose of the pilot program was to "field test" the revised guidelines. The objectives of the program were:

1. To accomplish a broad policy review of the guidelines.
2. To apply the guidelines to a substantial number of projects of different types at different stages in their development.
3. In conjunction with the application of the guidelines, to accomplish a detailed review of the recommended alternative analysis policies and impact assessment techniques.
4. To evaluate the guidelines in a variety of agencies, over a significant period of time, both with and without research team involvement.

The general structure of the pilot program is illustrated in Figure 1. It involved three stages: review/orientation, field testing, and evaluation. Eight agencies participated in the review stage, and a visit of one to two days was made to each agency for this purpose. Four agencies were then selected for field testing of the guidelines. Several longer visits were made to each of these primary pilot program agencies over a period of 8 to 10 months in order to apply and test the guidelines' recommendations.

The other secondary pilot program agencies were encouraged to use the guidelines, but without the direct participation of the research team. At the end of the pilot program period, a visit was made to each agency to evaluate the program, assess the utility of the guidelines and review any recommended revisions.

During the period of the pilot program, additional review copies of the guidelines were distributed through the Transportation Research Board to other state transportation agencies and interested readers. Agency personnel were encouraged by letter or telephone to utilize the guidelines.

This approach created three groups of reviewers/users of the guidelines, each of whom could critique from a different vantage point.

- *Group I* was comprised of reviewers/users in the four primary pilot program agencies, who had a relatively high level of interaction with the research team. The focus with this group was on the detailed application of the recommended policies and techniques to a selected range of projects. Interaction with the primary agencies also

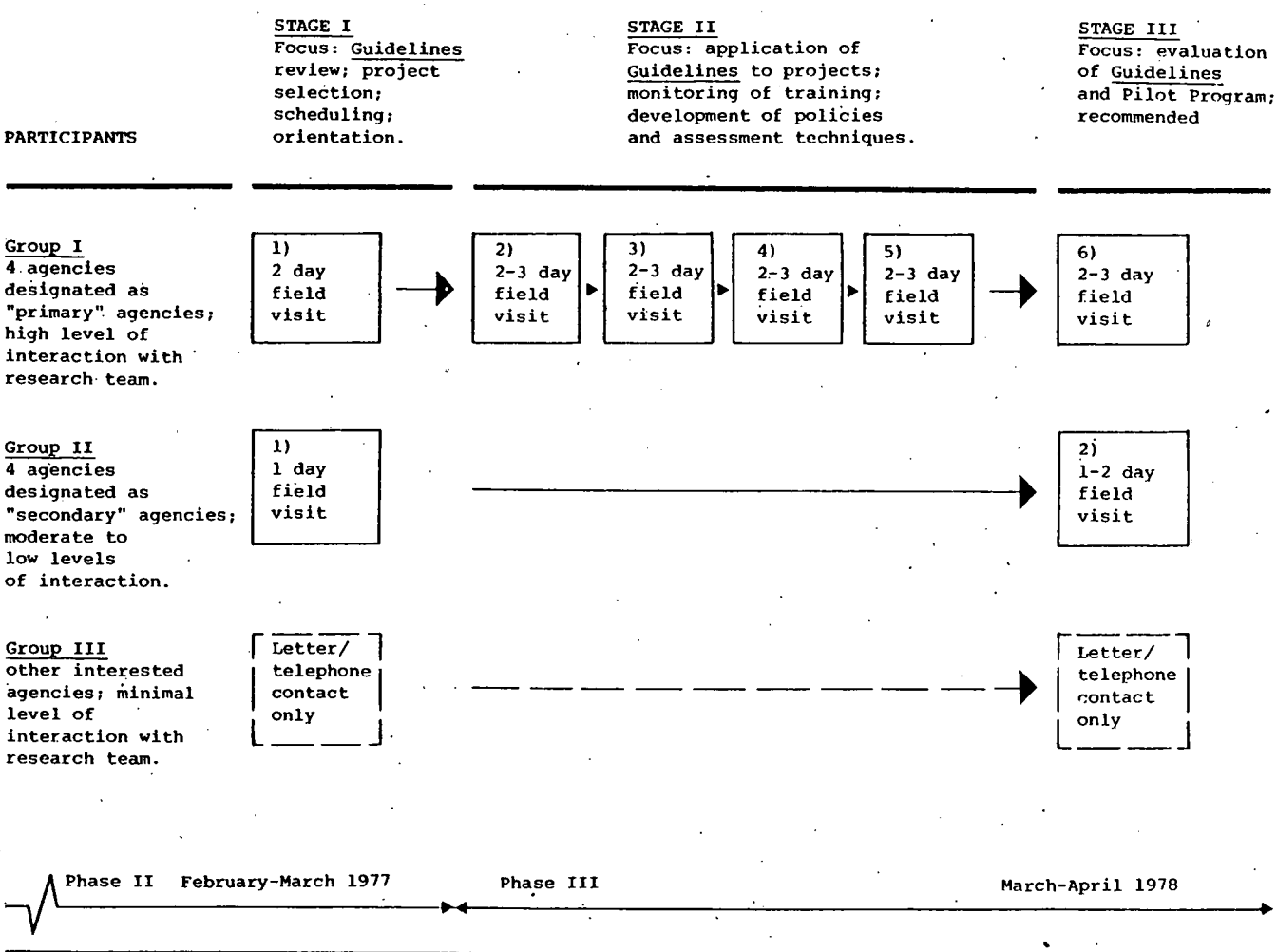


Figure 1. Pilot program activities.

provided the research team with an opportunity to identify more adequate social and economic impact assessment techniques. The primary agencies included state transportation agencies in California, Colorado, Maryland, and Michigan.

- *Group II* was comprised of reviewers/users in the secondary pilot program agencies, who had a moderate to low level of interaction with the research team. The focus with this group was on the utility of the guidelines: Were the guidelines, as written, intelligible? Were they useful? How? For whom? Could practitioners implement the recommended policies and techniques without reliance on the research team for orientation or clarification? Secondary agencies included New York, Oregon, Kentucky, and Washington. New Jersey also was visited, but towards the end of the pilot program.
- *Group III* was comprised of other reviewers/users, who had little or no interaction with the research team. The focus with this group was on obtaining the broadest possible review of the guidelines' utility and an assessment of the policies and recommended techniques.

This approach to the pilot program resulted in the research team acting as participant/observers in the four primary agencies and as distant observers in the secondary agencies. With the primary agencies, the research team provided resources and training as needed by the agencies; they also gained first-hand knowledge in the application of the guidelines to different projects. With the secondary agencies, the interaction was limited to introducing the research project and providing an orientation to the guidelines and the objectives of the pilot program. With both groups, the emphasis was on reviewing, testing, and revising the guidelines.

The mechanics of the program were straightforward. At the outset, review copies of the revised guidelines were distributed to transportation agencies in all 50 states. Agencies were selected to participate based on selection criteria which included agency interest, number and type of projects, regional location, etc. During the initial visit to each agency, interviews were conducted with administrative and project development personnel, and a very short reader's questionnaire was developed. The interview discussions concentrated on evaluating the guidelines with respect to their clarity, their utility to the practitioner, and the relevance of the recommended policies and techniques to agency needs.

Primary Agency Interaction

With the four primary pilot program agencies, projects suitable for field testing of the guidelines were reviewed and a program for applying and monitoring the guidelines was developed. This involved scheduling of visits by the research team, orientation of the project staffs to the purposes of the research, and orientation of the research staff to agency operations.

The research team then worked with the staffs of the primary agencies to apply the recommended policies and impact assessment techniques to specific transportation projects. These projects were selected so that among the four agencies there would be a range of different project types at different stages in their development, because it was not feasible to track any individual project through the entire assessment process. After review of a large number of candidate projects in the primary agencies, two or three projects per agency were selected for emphasis. The selection of projects was done to achieve the maximum possible diversity of project type, scale, and context so that the utility of the guidelines for a broad range of users could be gauged. Several review visits were made to each primary agency where discussions were held with project personnel who could comment on the type of problems encountered in the application of the guidelines.

Secondary Agency Interaction

For the agencies designated as secondary pilot program agencies the intent was to have agency personnel use the guidelines with minimum interaction with the research team. Part of the time during the review visit was set aside to encourage them to field test the guidelines; the purpose of the research was explained and a seminar conducted on the policies, recommended techniques, and probable effects of using the guidelines. No follow-up visits to the four secondary agencies were planned since these agencies were to determine if the guidelines were usable and effective without research team interpretation.

Evaluation of the Pilot Program and Revision of the Guidelines

The chief product of the pilot program was a set of specific recommendations for guidelines revisions. A second product was an evaluation of the effectiveness of the guidelines. This evaluation addressed three areas: effort, effect, and process.

The assessment of "effort" involved an accounting of the activities undertaken by the research team, including guidelines distributed, visits made, interviews held, recommendations collected, etc. The assessment of "effect" dealt with changes in agency attitudes, procedures, and products as a result of their use of the guidelines and their participation in pilot programs. The assessment of "process' analyzed why and how the changes or effects were achieved or not achieved. This assessment was particularly important in order to determine if the guidelines were sufficiently clear and compelling by themselves to help practitioners in alternative analysis and impact assessment.

Finally, the guidelines were revised. The findings of the pilot program concerning content and format are reported in subsequent sections of this research report. The actual revised guidelines are published in *NCHRP Report 217*.

READER'S GUIDE

Research Report

This report will be of most use to researchers or others concerned with the over-all design of the research effort, although it also highlights major findings. The organization of this document includes the following:

- *Chapter One* defines the problem which the research was designed to address and describes the research objectives and the procedures used to collect data and develop findings.
- *Chapter Two* has two segments. The first defines the state of the art for use of the no-action alternative, based on analysis of primary and secondary data. This segment amounts to a refined statement of the problem. The second segment highlights the procedures recommended to deal with the problem, extracting key concepts presented in full detail in the "Impact Assessment Guidelines."
- *Chapter Three* explains the form and purpose of the guidelines and identifies limitations on their use.
- *Chapter Four* presents conclusions and suggested future research.
- *References* are of necessity brief, because the literature contains few items that bear directly on the research topic. (The "Impact Assessment Guidelines" contains an extensive reference list used in the research which is divided into five categories: (1) general references on transportation planning and impact assessment; (2) social impact references; (3) economic impact assessment; (4) environmental impact assessment; and (5) environmental impact statements and planning documents that provide examples of many of the impact assessment techniques on actual projects.)
- *Appendix A* presents the findings of the administrative and project questionnaires used to determine the state of the art for use of the no-action alternative. These trace general procedures nationwide, identify methodological strengths and weaknesses in impact assessment, and identify characteristics of selected projects for which no-action decisions have been made.
- *Appendix B* reviews the effects of no-action decisions for major transportation facilities in four cities: Boston, New Orleans, Chicago, and San Francisco. Each case study includes the background of the project, the predicted and actual affects of the no-action decision, and the role of the no-action alternative in decision-making.
- *Appendix C* reviews the pilot program, where an interim version of the "Impact Assessment Guidelines" was reviewed by agencies in nine states, four of which field-tested the guidelines on actual projects. The appendix reviews the design of the pilot program, activities in the states, and results of the effort.

Impact Assessment Guidelines

The guidelines have been designed for a variety of users. Agency administrators will find assistance in defining the role of the no-action alternative and a review of the legal requirements for its use. Project managers will find overview information on how the no-action alternative fits into each step of the impact assessment process. And impact analysts will find materials that identify techniques for assessing each type of impact for both no-action and action alternatives.

The structure of the guidelines is as follows:

- *Chapter One—The No-Action Alternative* recommends use of the no-action alternative as a benchmark for impact assessment and comparison of alternatives. A standardized definition is proposed involving maintenance of existing facilities and services as well as recommended assumptions regarding planned improvements. The role of minor and major alternative in impact assessment also is discussed.
- *Chapter Two—Application of the No-Action Alternative to Transportation Planning* discusses how the concept can be integrated into the project development, impact assessment, and decision processes. Key project development decision points are identified where the no-action alternative can be used to strengthen agency planning activities. Specific techniques are recommended to assess impacts in 13 categories covering social, economic, and environmental impacts. Recommendations are made for a planning balance sheet approach to evaluation, which permits the no-action alternative to fulfill its proper role in the decision process.
- *Appendix A—Techniques Dictionary* describes the characteristics of each assessment technique cited in Chapter Two.
- *Appendix B—Case Examples* illustrates application of the guidelines to three hypothetical project cases representative of the types of projects many agencies are now facing: (1) transit corridor, (2) bridge replacement, and (3) rural highway upgrade.
- *Appendix C—Notes* presents the conceptual model used to develop the 8-step impact assessment process.
- *Appendix D—References* includes an extensive listing of general references as well as literature relating to the impact assessment techniques cited in Chapter Two and Appendix A.

CHAPTER TWO

FINDINGS

EXISTING STATE OF THE ART

Legislative and Administrative Requirements

The National Environmental Policy Act of 1969 (NEPA) stipulates that alternatives to a proposed action be considered "for major Federal actions significantly affecting the quality of the human environment" (42 U.S.C. 4332 (2) (C) & (D). Subsequent guidelines issued by the Council on Environmental Quality implementing the procedural provisions of NEPA state that "agencies shall: (a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which are eliminated from detailed study, briefly discuss the reasons for their having been eliminated. (b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits. (c) Include reasonable alternatives not within the jurisdiction of the lead agency. (d) *Include the alternative of no action* (Emphasis added). (e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference; . . ." (40 CFR 1500; effective date: July 30, 1979).

The reasoning behind these requirements is presented in the Federal Highway Administration's "Process Guidelines for the Development of Environmental Action Plans," which states "Alternatives considered should include, where appropriate, alternative types and scales of highway improvements and other transportation modes. The option of no improvement should be considered and used as a reference point for determining the beneficial and adverse effects of other alternatives . . . The Action Plan should identify the assignment of responsibility and the procedures to be followed to ensure that: (1) the consequences of the no-highway improvement are set forth, with data of a level of completeness and of detail consistent with that developed for other alternatives; and (2) a range of alternatives appropriate to the stages considered at each stage from system studies through final design." (*Federal Aid Highway Program Manual,* Vol. 7, Ch. 7, Sec. 1, Dec. 30, 1974.)

The Urban Mass Transportation Administration also emphasizes the consideration of a complete range of alternatives in *Major Urban Mass Transportation Investments: Statement of Policy* (41 FR 185, Sept. 22, 1976, pp. 41511-41514). In the accompanying "Draft Annotations Pursuant to Policy on Major Urban Mass Transportation Investment" (March 1976), UMTA states that: "The evaluation process should focus on the marginal effectiveness which would result from additional transit investment. There are three alternatives which provide a base for assessing marginal effectiveness and costs: the existing transportation system; the null future transportation system—which is defined as the existing transportation system modified solely to provide existing levels of service for changes in population and land use; and the TSM alternative. Therefore, the alternatives analysis should include a comparison of a given alternative to these baseline alternatives. . . . One last 'baseline' case could be examined in the analysis. The existing system without allowing for growth, could be projected into the future to serve demand. Primarily this would be done to assess the consequences of foregoing proposed investments, and to further underline the added benefits through goal attainment with the added investment."

Although the requirement for a no-action alternative has been clearly stated, its application has been inconsistent. Most transportation agencies have incorporated some form of no-action alternative into their project planning and assessment work, although the nomenclature varies—"no build," "do nothing," 'no action," "null," etc. By and large, these alternatives are used to designate a default situation—the case occurring if a decision is made not to construct a transportation facility. They generally imply an option involving no construction and little or no expenditure of time and money.

Purpose and Definition of the No-Build Alternative

Very few state-of-the-art assessments of current agency practice are available. One study, a 1972 review of environment impact statements (*3*), noted that fully one-third of the EIS's reviewed did not mention the alternative of not going ahead with the project. Of those projects that did define a "do-nothing" choice, 14 percent denied that any impact would occur, 47 percent asserted that negative impacts would result without providing supporting data, and only 7 percent provided data to back up predictions of negative impact. No positive effects of a decision not to construct were cited in the cases reviewed. Although EIS preparation has improved dramatically since 1972, the no-action alternative still is far from fully described in the majority of current EIS work.

Other sources of data for the review of existing practice included published environmental documents, interviews, and two research surveys conducted by the project team. Of these, the research surveys provided the most meaningful information which was corroborated by the other sources of secondary data. The two surveys were administered by mail: (1) a project questionnaire was used to identify and describe projects where decisions not to con-

struct proposed transportation facilities had been made, and (2) an administrative questionnaire was used to identify current practices in defining and assessing the impacts of the no-action option. Both surveys went to transportation agencies in the 50 states, the District of Columbia, and Puerto Rico. Most respondents devoted considerable time to the effort and expressed substantial interest in the research; a minority of agencies, however, made quite clear that they perceived their role to be that of "builders" and looked upon the no-action alternative as an exercise in negativism.

Survey Result—Definition of the No-Action Alternative

Agency respondents were asked to specify the assumptions they made about existing and proposed transportation facilities under the no-action alternative. Half (47 percent) reported that, for the purposes of defining the no-action alternative, they assumed that existing facilities in the corridor and region would be "maintained." A number of the agencies which submitted this response noted that they also assumed that any upgrade of capacity was an alternative in its own right. In contrast, almost one-third of the agencies assumed that existing facilities would not only be maintained but be given maximum upgrade under a no-action alternative. The remainder of the respondents either indicated that the no-action definition varied by type of project (11 percent) or gave no reply (11 percent).

Very few agencies made any mention about how they treated proposed facilities on the corridor or regional level; those that did, reported that the officially adopted system was normally assumed for no-action analysis.

Survey Result—Amount of Technical Effort Devoted to the No-Action Alternative

There was considerable variation in the reported effort given to no-action analysis. Twenty-nine percent of the agencies reported that they spent either a "minimal" amount or up to 10 percent of their technical effort on the no-action alternative. Another 20 percent of the agencies reported spending from 10 to 20 percent of their technical effort on the no-action case and 26 percent reported spending an "equal amount" of effort on all alternatives. Two agencies (5 percent) reported spending as much as half their technical effort on the no-action alternative. When asked to assess the adequacy of their allocation of technical effort, 63 percent of the agencies answered "adequate," 16 percent reported their efforts as "insufficient" or "somewhat insufficient," and 8 percent evaluated their efforts as "somewhat excessive" or "excessive" (that is, "more than is generally warranted by the situation").

Survey Result—Use of the No-Action Alternative in Decision-Making

While few agencies viewed the no-action alternative as a real choice for decision-making, many (63 percent) used it as a baseline against which to evaluate other "build" options. However, 21 percent of the agencies stated that current usage amounted to "pro forma" compliance with environmental requirements or the development of "straw-man" arguments to make projects look better. A sizeable number (16 percent) provided no opinion on this topic. Many respondents felt that, although the no-action case was currently being used in order to justify projects, they did not recommend this and hoped for change.

Pilot Program Observations

The pilot program offered an opportunity to check, by direct observation, the results of the research surveys regarding definition and use of the no-action alternative. The major conclusions regarding the current state of the art were as follows:

1. Every agency now uses some type of no-action or no-build alternative as part of the environmental assessment process.
2. Serious analysis of the no-action case, if performed, usually is not brought into play until toward the end of the process.
3. Many agencies assume a maintenance policy towards transportation facilities in the study corridor. Some agencies treat the no-action case as a low or moderately intensive improvement to traffic operations and safety.
4. Most agencies have no coherent policy regarding assumptions for other planned facilities or for transit services for the no-action case.

Clearly, the research found that procedures for defining and using the no-action alternative are not uniform.

Use of the No-Action Alternative in the Impact Assessment Process

A review of techniques available for the prediction of no-action impacts was undertaken. This was supplemented by the results of the administrative and project questionnaires which reported the opinions of knowledgeable professionals nationwide on impact assessment problems for the no-action alternative.

The administrative questionnaire was designed to provide two evaluations: first, an assessment of the technical adequacy of the methodologies generally used to predict various impacts under a no-build alternative; and, second, an assessment of the importance of the no-build impacts within the over-all transportation decision-making process. The list of impacts that might occur as a result of decisions to delay or not to construct a transportation facility contained 26 impact categories with a 1 to 5 rating scale for both adequacy and importance of each category. Ratings made for both were based on the following method:

1. Impact categories for which the average rating was not, by statistical calculation, significantly different from the center point, were listed as being of "uncertain adequacy" or of "uncertain importance."
2. Impact categories which shared statistically significant positive rating variation from the center point were listed as tending towards "adequate" or "important."
3. Impact categories which shared statistically significant negative rating variation from the center point were listed as tending towards "inadequate" or "unimportant."

Statistical tests to determine significance of the ratings and to determine degree of deficiency are presented in detail in Appendix A. Cross-tabulations of "adequacy" and "relevance" ratings were used; an impact category for which methodologies were rated "inadequate" and which was "important" to decision-making was judged to be "deficient." Several tests were made to derive composite ratings of deficiencies and priorities for further research. The summary result of that process is given in Table 1. Based on the responses provided by administrators and transportation planners in the state transportation agencies, techniques available in the following impact categories were identified as methodologically deficient:

- *Definitely deficient* (socioeconomic and demographic changes, neighborhood and community cohesion and quality of neighborhood life, changes in neighborhood amenity).
- *Probably deficient* (economic impact of regional responsibility changes, impacts on business operations, impacts on land development opportunities, aesthetic impacts).
- *Possibly deficient* (changes in neighborhood facilities and services, changes in property values, effects on wetlands and aquatic ecosystems).

An additional question was designed to identify impacts that were not being given sufficient attention in current no-action assessment. Planning process impacts were most frequently mentioned (32 percent) as not being given sufficient attention. Agencies reported that in a number of cases a no-action decision had forced reassessment of other transportation projects or a reevaluation of an area's entire transportation system. Such reassessments often found that the decision had substantial negative effects on proposed facilities, but that no analysis to anticipate this type of impact had been done prior to the decision. They recommended that an analysis of a no-action alternative include an analysis of the impacts at a systems planning level. Socioeconomic impacts were felt to need more attention; and a number of specific impacts, including energy impacts and impacts on community tax base, were also mentioned.

Based on the survey results, an examination in detail was made of the available techniques for impact assessment in each of the defined impact categories. Three conclusions came out of this investigation:

1. The techniques which should be used for assessment of the no-action case were, in almost all cases, identical to those used to assess a "build" alternative.
2. These techniques often were not applied because the no-action alternative was poorly defined.
3. The sequence of activities in impact assessment was not clearly understood by many practitioners, so that even if techniques were available, they were likely to be used incorrectly or improperly.

The research team concluded that a critical need of practitioners was the development of a clear structure and process for impact assessment which could facilitate even-handed treatment of the no-action alternative along with other alternatives.

Actual Effects of No-Action Decisions

Early stages of the research included case studies of four major facilities where no action decisions had been made:

1. Riverfront Expressway (New Orleans).
2. Crosstown Expressway (Chicago).
3. Southern Bay Crossing (San Francisco).
4. I-95 North (Boston).

Appendix B describes the process by which these projects were selected for study and presents a detailed discussion of each. The case studies examined the predicted and actual impacts of no-action decisions through review of published reports and interviews with key individuals involved in each controversy.

The results of the four case studies shed some light on the actual effects of decisions not to construct planned facilities. The "unwinding effects" of such a decision were found to have real impacts and to cause institutional confusion. Decisions not to construct major facilities caused substantial delay when system plans and project priorities had to be modified. In the New Orleans case, uncertainty over regional transport plans and priorities resulted from the removal of the Riverfront Expressway, which, in turn, called into question many of the other fundamental precepts of the regional system design. In New Orleans, the no-action alternative was never really considered and its effects were not anticipated. Conversely, within 5 years after the decision in the Boston case, projects defined as part of an elaborate and thorough no-action scenario were being designed and constructed.

Delay in decision-making can also have a negative impact. Effects of the continued dispute over the Chicago Crosstown Expressway on the physical fabric of the affected communities and on the general business climate and investor confidence in the corridor were universally viewed as negative. In many cases, a final decision to build or not build might have had less negative impact than continued delay and uncertainty. Another dramatic effect of delay was continued inflation and the rising cost of construction. The Crosstown Expressway's estimated construction cost rose from $1 billion in 1971 to $2 billion in 1974.

Transportation Impacts

Increased congestion is an obvious consequence of decisions not to enlarge or build highways. The significance of the increased congestion is less clear. In the New Orleans case, for example, both opponents and proponents believed that congestion increased after the no-action decision. Nonetheless, pedestrian and transit improvements in the historic French Quarter have been successfully implemented even though they require more traffic restraint.

A major facility decision may also significantly influence transit/highway usage characteristics. In the Southern Bay Crossing case, if the new bridge had been completed in 1975, as projected, it is entirely possible that the reduction of congestion on the existing Bay Bridge might have lowered patronage on the partially operational Cross-Bay route of the BART system.

TABLE 1

ADMINISTRATIVE QUESTIONNAIRE—IMPACT ASSESSMENT DEFICIENCIES

IMPACT CATEGORIES	"ADEQUATE"	"USUALLY RELEVANT"	COMPOSITE RATING: PRIORITY FOR RESEARCH
TRANSPORTATION IMPACTS			
Net change in travel time	■	■	
Accident reductions or increases	■	■	
Changes in the quality of transportation services	■	■	
Effects on existing transportation facilities	■	■	
Changes in travel demand	■	■	
SOCIAL IMPACTS			
Changes in accessibility to community activities	■	■	
Changes in neighborhood facilities and services		■	3
Socio-economic and demographic changes		■	1
Actual and anticipated displacement effects	■	■	
Neighborhood and community cohesion and quality of neighborhood life		■	1
Changes in neighborhood amenity		■	1
ECONOMIC IMPACTS			
Impact of transportation capital expenditures on regional expenditures and employment			
Economic impact of regional accessibility changes		■	2
Resource and raw materials impacts			
Changes in property values		■	3
Impacts on business operations		■	2
Economic impacts due to relocation	■	■	
Impacts on land development opportunities		■	2
ENVIRONMENTAL IMPACTS			
Noise impacts	■	■	
Air pollution impacts	■	■	
Water resources and drainage impacts	■	■	
Impacts of natural features and land forms	■	■	
Open space and historic resource impacts (including Section 4(f) lands)	■	■	
Effects on wildlife and vegetation ecosystems	■	■	
Effects on wetland and aquatic life ecosystems		■	3
Aesthetic impacts		■	3
Totals 26 (100%)	14(54%)	24(92%)	10(38%)

N. = 38 State Transportation Agencies

Key: 1 = definitely deficient methodologies
2 = probably deficient methodologies
3 = possible deficient methodologies

Social Impacts

The major social impact of the studied cases was avoidance of the impacts associated with build alternatives. Aside from some perceived positive effects from the absence of direct displacement impacts and some negative "shadow" effects due to decision delay in Chicago, it was too early to accurately assess other positive or negative social impacts of the decisions in the subject cases.

Economic Impacts

In the cases studied, the decisions appear to have retarded development plans which were closely linked to improved access provided by the proposed facility. In Boston, industrial developments close to the proposed Interstate extension were delayed, and in San Francisco, developments on either end of the proposed bridge were delayed or stopped. Whether or not these delays were entirely attributable to the no-action decision was speculative.

Other secondary economic effects on development were also difficult to identify confidently. In Boston, those individuals contacted tended to view the lack of I-95 North through Lynn as having had a slightly negative effect on development and business in central Lynn, although its effects in neighboring Saugus, which was already served by a highway facility, tended to be viewed as slightly positive. The dropping of the Riverfront Expressway in New Orleans appeared to have prompted more aggressive planning and development activities by the New Orleans business community to compensate for the perceived loss of highway access. The Growth Management Program in downtown New Orleans, which was prompted by the loss of the Riverfront Expressway, appeared to have had a positive effect on the central area, although the long-term trend for the downtown was not discernible from available data. The adverse effects on economic development and the local business climate of the dispute over the Chicago Crosstown Expressway have already been noted.

Environmental Impacts

Major environmental changes were not observed in the San Francisco or Boston cases. In New Orleans, the major environmental effect noted was the indirect positive impetus to the local historic preservation movement given by the dropping of the Riverfront Expressway and the resulting regional priority placed on the Vieux Carre district.

Agency Requirements and Constraints

A major function of the pilot programs was to gain an understanding of typical agency activities, needs, and organizational structures. This information strongly influenced the approach to the guidelines and the expectations of the research team in using the materials. Comments from a broad spectrum of agency personnel at all levels also influenced the final guidelines' recommendations. These comments were received in direct interviews, in written form and via response questionnaires that were distributed to reviewers.

Who Are the Typical Guideline Users?

The agencies visited had many differences, in terms of organizational structure, depth of personnel and general receptivity to the subject matter. The major actors, however, were similar: project development and environmental staff, including section administrators; managers/coordinators for specific projects; and support staff. It was found that the most effective and direct means of propagating the concepts in the guidelines was through the director of the environmental analysis unit. This required, however, both receptivity to the concepts on the part of the individual and a sufficiently centralized administration to ensure that staff adhered to recommendations and policies. An alternate channel for implementing the guidelines' recommendation was the environmental staff—including project managers and specialists in various environmental disciplines.

Participants in the pilot program commented that the guidelines have the potential to be useful at several stages in the planning process, including programming, system planning and early alternative screening activities. In some agencies it was necessary for the technical guidelines' recommendations to win gradual acceptance, as procedures were shown to be useful on a case-by-case basis. Rarely were the agency's technical and decision processes tightly linked, offering the most suitable environment for guidelines use. Only one example of close linkage was found, where the interdisciplinary project team was charged with electing its own leader, who was then responsible for recommending appropriate action to the head of the agency at the conclusion of the environmental process.

In summary, there is a general problem of integrating results of this type of research into agency practice, which no report such as this could resolve. There are such a large number of prospective users, and such a diverse group of agency structures, that no single method of adopting recommended procedures is possible. Therefore, as many agencies may find the recommendations too specific as may find them too general. The final guidelines take a middle ground in terms of level of detail judged to have the highest potential for usefulness.

RECOMMENDED PROCEDURES

Recommendations of the research are embodied in the guidelines. Two types of recommendations are made with respect to the no-action alternative: recommendations that deal with its definition and use, and those that deal with its integration into the impact assessment process.

Definition and Usage

No Action Nomenclature

The research investigated a wide variety of terms and found each of the following deficient:

1. "No build" has a pejorative connotation and tends to be poorly used in current practice.
2. "Do nothing" is generally not correct, since main-

tenance is usually continued even if a proposed project is not built.

3. "Null" implies disinvestment in existing facilities. It is defined in confusing terms by UMTA as including extension of existing levels of service to accommodate new population and land use.

4. "NCTF" (an acronym for *N*ot *C*onstructing a *T*ransportation Facility) is not readily understandable.

The recommended nomenclature is "no-action" alternative. This was selected for several reasons:

1. Environmental guidelines deal with the evaluation of "alternative actions."

2. The Council on Environmental Quality guidelines (40 CFR 1500, July 30, 1979) clearly identify "the alternative of taking no action" as one that should be reviewed.

3. "No action" may eliminate the negative connotations that are associated with "no build" by many transportation agencies.

Recommended Policy Assumptions

The first draft of the guidelines proposed a definition of the no-action alternative that would represent it as a realistic option, including TSM-type improvements that might vary from case to case. This was found to be inappropriate, because it did not establish a consistent reference point for the evaluation of other alternatives. Therefore, the guidelines recommend that in transportation planning and impact assessment, the no-action alternative should be consistently used to mean:

1. *The maintenance of existing facilities and services in the study corridor and the region.* Maintenance is limited to activities that do not increase capacity or improve the level of service, and are not intended to meet future travel demand.

2. *The completion and maintenance of committed projects in the study corridor and the region.* Committed projects refer to planned projects in the study corridor and the region, which are under construction or reasonably sure to begin construction in the near future, and which will be operational in the period being studied for the proposed project. Definition of the committed network is necessary for travel demand forecasting and traffic assignment, as well as for the analysis of areawide environmental impacts.

3. *The continuation of existing transportation policies.* Such policies include road and parking pricing, public transportation subsidies, etc.

The Benchmark Function

In theory, any alternative can serve as a benchmark. In practice, however, there are a number of strong reasons for selecting a maintenance policy as the benchmark to which other alternatives—minor and major—can be compared:

1. Future service and operational characteristics can be predicted accurately; thus, traffic forecasting is based on detailed knowledge of the actual facilities and services.

2. The cost of maintenance—in money, time and resources—can be predicted with some accuracy based on historic lifecycle data.

3. Continued maintenance is implied by the need, in most cases, to protect previous investments and preserve a minimum level of service and safety.

4. Use of a maintenance policy as a benchmark minimizes the number of transportation changes that must be accounted for when predicting future conditions. Since it is the one alternative that allows direct extrapolation from existing trends, the prediction of future conditions is generally more reliable and valid than with benchmarks of zero investment, abandonment, or major alternatives

Therefore, the maintenance policy has been recommended for the no-action alternative. This provides a basis for determining the need for a proposed project by comparing each proposed action to the no-action case. (This analysis is required of all Environmental Impact Statements, regardless of the number and type of alternatives proposed.)

The role of the no-action alternative in setting this benchmark is shown in Figure 2. In assessment, existing conditions are used as a check for calibration of forecasts and as a gauge of severity of future impacts. Future conditions are forecast assuming adoption of minor and/or major action alternatives. The no-action alternative, with its maintenance policy assumption, holds the supply of transportation facilities and services constant while allowing other factors—population, land use, economic activity—to change. The comparison of a forecast of future conditions with a no-action alternative to existing conditions reveals the consequences of that option as conditions subject to impact change over time. A comparison of the impacts of major and minor action alternatives to the impacts of the no-action alternative provides a means of measuring the relative impacts of each alternative under consideration providing comparative information for decision-makers.

The Impact Assessment Process

Overview

The guidelines recommend establishment of a clear process of impact assessment. The important function of the no-action alternative in this process has been previously discussed. The following sections of this report highlight the recommended procedures that are detailed in *NCHRP Report 217*.

A thorough assessment of the impacts of proposed transportation alternatives (and of the existing transportation system) requires a systematic procedure. The activities involved in impact assessment include the following:

1. Establishing the framework for impact assessment
   - define alternatives
   - determine assessment time frames
   - determine scale of assessment
   - determine sequence of analysis
2. Establishing base conditions
   - forecast population

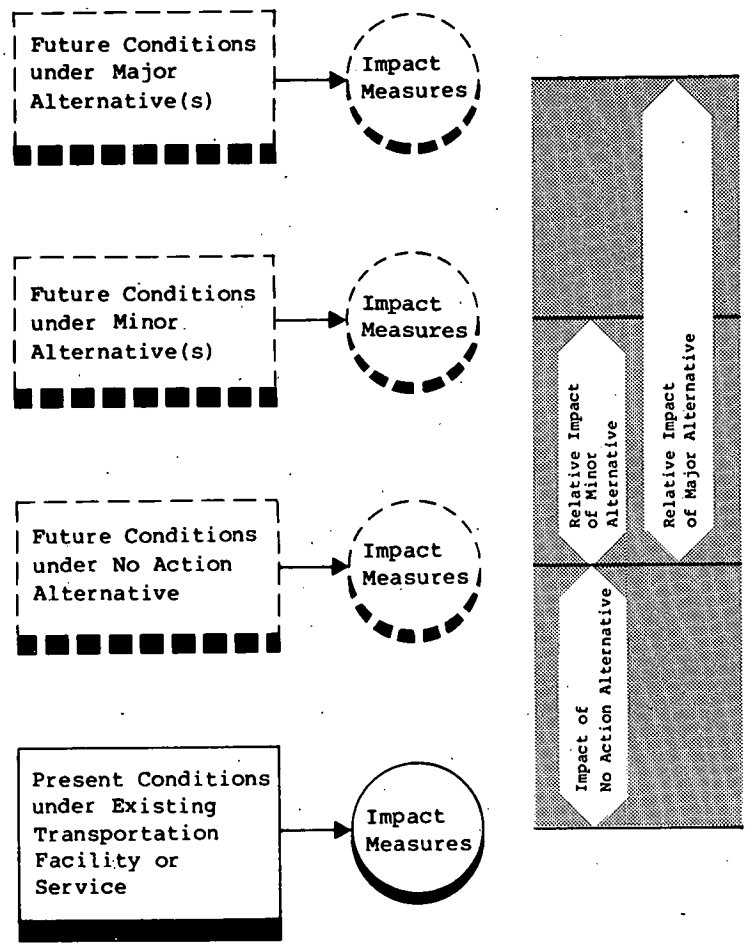


Figure 2. Benchmark function of the no-action alternative.

- forecast employment and economic activity
- forecast transportation factors
- forecast land use

3. Assessing specific impacts of concern
   - apply impact assessment methodologies to relevant impact categories
4. Comparing proposed alternatives
   - apply balance sheet method to display impacts of alternatives

Recommendations for each of these activities are included in the guidelines.

Establishing the Framework

The factors that must be defined for every new project include the alternatives to be assessed, the time frame and scale of analysis, and the sequence of the analysis. Definition of these factors forms the framework within which assessment will proceed. Major recommendations of the guidelines are as follows:

1. *Define alternatives.* The role and definition of the no-action alternative have been presented earlier. Usually, analysis should include one or several minor alternatives, transportation systems management actions that may or may not have significant impact. These minor alternatives should be defined at the same time as other alternatives under study. They should also be developed to a comparable level of detail as major alternatives, which involve significant expenditures of time and resources. The amount of information required to define each alternative should be appropriate to the nature of the project and the level of assessment being undertaken.

2. *Determine assessment time frames.* Ideally, each alternative should be assessed at two future points in time: at 3 to 7 years (short range) and at approximately 15 to 20 years (long range). In short-range assessment, the focus is on direct construction impacts and first year operating conditions; in long-range assessment, the focus is primarily on indirect impacts and design year operating conditions. Definition of the no-action alternative for the both short and long range assures an adequate basis for comparison of the effects of alternatives over time.

3. *Determine scale of assessment.* A transportation project may induce changes in regional, corridor, or local conditions. Although impacts may occur at one or all scales for any individual project, experience has shown that certain scales of analysis tend to be associated with each category of impact. Table 2 indicates the scale of analysis usually appropriate to different impact categories. Analysis of impacts of the no-action alternative will be required for those scales relevant to each project.

TABLE 2

IMPACT CATEGORIES AND SCALE OF ASSESSMENT

	IMPACT CATEGORIES	SCALE OF ANALYSIS: Regional	Corridor	Local/ Individual
SOCIAL IMPACTS	Community Cohesion		●	●
	Accessibility of Facilities/Services	●	●	●
	Displacement of People		●	●
ECONOMIC IMPACTS	Employment, Income and Business Activity	○	●	●
	Residential Activity	○	●	●
	Fiscal Effects	○	●	●
	Regional and Community Plans and Growth	○	●	●
	Resources and Energy	●		●
ENVIRONMENTAL IMPACTS	Environmental Design, Aesthetics and Historic Values		●	●
	Terrestrial Ecosystems	○	●	●
	Aquatic Ecosystems		●	●
	Air Quality	●	●	●
	Noise		●	●

● Analysis usually required
○ Analysis sometimes required

4. *Determine sequence of assessment.* A clear decision must be made regarding the special skills required for the assessment, the schedule of activities, and the interim and final products of the work.

Projection of Future Conditions

To assess impacts, it is necessary to forecast conditions for the short- and long-range future to describe the entire spectrum of social and economic conditions impacted by an existing or proposed transportation facilities. These forecasts are used to estimate the magnitude, incidence, and significance of all predicted impacts for all alternatives. The guidelines discuss the need for forecasts of population, employment, land use, and transportation conditions. Population and employment forecasts deal with basic socioeconomic information, often not highly sensitive to project decisions. Land-use forecasts deal with the distribution of activities in space—the nexus of socioeconomic forces and governmental regulations. Available land use and transportation forecasts often presuppose the presence of facilities that make these forecasts unusable for dealing with the no-action alternative. This issue is discussed in the following, and is reviewed in *NCHRP Report 217* as an illustration of the need to adjust available data to be consistent with a no-action alternative.

The forecast of future land use determines the location and distribution of residence, industry, commerce, and other types of activity affected by transportation services and facilities. A starting point for this forecast is the existing land-use patterns and the planned locations for future land uses, which are almost always available from local, regional and/or state planning agencies. Such traditional land-use plans are the graphic representation of the geographical distribution toward which regulatory agencies will guide future development. When land-use forecasts

are used for transportation planning and impact assessment, they should be carefully reviewed to assure that their underlying assumptions are consistent with current plans and policies. Two cases are typical. First, if the project being studied was proposed some time ago and is a major transportation project that could be expected to induce significant land-use shifts or activity changes, its effects may have already been accounted for by a regional or metropolitan planning agency. In that case, the projected land-use patterns will describe future conditions under the major alternative, not those assuming continued maintenance of existing facilities. Second, if the transportation project is a new proposal, the opposite situation will be the case. The planner will have future land use and activity patterns for the no-action alternative and not for the proposed major alternative. In either case, the missing information should be generated. The planner has two options: (1) to reforecast land use and activity patterns with a modfied transportation system, or (2) to judiciously adjust the available forecasts up or down as the case may require. For very large projects, the first approach is recommended; for smaller projects, where the amount of induced land-use change is more marginal, the second approach may be acceptable.

Transportation forecasts directly or indirectly influence social, economic, and environmental impacts. Since data on the transportation aspects of proposed facilities is a primary input to all of the impact assessment techniques, impact assessment can only be as accurate as the forecasts of transportation factors that cause impact. The guidelines identify two categories of transportation forecasts: (1) factors causing direct impacts on people and places abutting the facility, such as the physical design, maintenance, and traffic (usage) of the facilities; and (2) factors causing indirect impacts through changes in the relative costs of travel, such as changes in individual trip-making behavior because of relative costs and levels of service, or changes in aggregate accessibility because of comparative costs and travel times to and from specific origins and destinations. The guidelines indicate which of those factors is important for each impact category (Table 3) and suggest methods for accomplishing adequate future baseline forecasts of each of the five factors.

Assessing Impacts of Concern

The guidelines present procedures and techniques for assessment of 13 categories of impact; the categories are listed in Table 3.

For each impact category, techniques are recommended to determine existing conditions and to forecast future conditions for the no-action and other alternatives. Three distinct aspects of assessment are defined:

1. The magnitude of the impact. What is the anticipated change in the impact phenomena? For example, what is the increase or decrease in noise as measured in decibels, or the amount of regional income generated by transportation construction expenditures? What is its duration?

2. The incidence of the impact. Who is affected by this change? Who loses? Who benefits? By how much? Who are the receptors of the increased noise? Is there a net gain or loss? Is the impact redistributive in nature?

3. The significance of the impact. Given the magnitude of the change and its incidence, how important is it? A determination of the significance of an impact requires a value judgment as to whether the change and its effects are significant and acceptable. Do the anticipated noise levels exceed public health standards? Is the distribution of jobs and income generated by a project equitable?

To answer these questions, for the no-action and other alternatives, an 8 step "impact assessment methodology" has been developed:

- Step 1—Identify and forecast those project variables that cause the impact.
- Step 2—Identify and forecast external (i.e., nonproject related) variables that influence impact.
- Step 3—Identify and forecast intervening variables that influence impact.
- Step 4—Determine the magnitude of the impact.
- Step 5—Identify and forecast probable receptors of the impact.
- Step 6—Determine the incidence of the impact.
- Step 7—Identify and forecast the standards, norms, or values related to the impact.
- Step 8—Determine the significance of the impact.

The guidelines indicate appropriate techniques for each step, for each category of impact. Appendix C in *NCHRP Report 217* discusses in detail the theory of impact assessment which is addressed by these 8 steps. Figure 3 is a graphic representation of the impact assessment process discussed in Appendix C.

Comparing Proposed Alternatives

The guidelines recommend the planning balance sheet method of evaluation. The planning balance sheet is essentially a display matrix wherein the magnitude of each impact, by alternative, is shown in the units—dollars, quantities, or qualitative ratings—appropriate to each impact. It also indicates which groups will be affected by the various impacts. The planning balance sheet thus permits an immediate overview of impacts through comparison among impacts and alternatives.

Unlike scoring or ranking evaluation procedures, the planning balance sheet stops short of an attempt to derive a summary preferential score or ranking of alternatives. The method is based on the assumption that the final significance of impacts or weighting of the impacts—either mechanically or objectively—is accomplished through the political decision-making process. This insures personal responsibility and political accountability—both of which should characterize the final selection of alternatives.

The planning balance sheet is particularly well suited to use of the no-action alternative as an impact "benchmark." The no-action alternative functions as a basis for comparison among alternatives, facilitating the resolution of the two underlying analytical questions: (1) Which of the proposed alternatives best meets the transportation needs? (2) Is the total effect of investing in a project more

TABLE 3

TRANSPORTATION FACTORS—USE BY IMPACT CATEGORY

IMPACT CATEGORIES		Socio-Economic Factors: PHYSICAL FACILITY CHARACTERISTICS	MAINTENANCE CHARACTERISTICS	TRAFFIC CHARACTERISTICS	TRAVEL DEMAND CHARACTERISTICS	ACCESSIBILITY CHARACTERISTICS
SOCIAL IMPACTS	Community Cohesion	●		●		●
	Accessibility of Facilities/Services	●		●	●	●
	Displacement of People	●				
ECONOMIC IMPACTS	Employment, Income and Business Activity	●		●		●
	Residential Activity					●
	Fiscal Effects	●				●
	Regional and Community Plans and Growth	●			●	●
	Resources and Energy	●	●		●	
ENVIRONMENTAL IMPACTS	Environmental Design, Aesthetics and Historic Values	●				
	Terrestrial Ecosystems	●	●	●		
	Aquatic Ecosystems	●	●	●		
	Air Quality	●		●		
	Noise	●		●		

beneficial than the total effect of not investing (i.e., choosing the no-action alternative)?

The guidelines indicate generic and specific formats for the planning balance sheet and include case examples of its use. The format in each instance will vary, depending on the type of issues that confront the user and the findings to be communicated. In all cases, the following general principles should be followed for comparison of alternatives:

1. Impacts should be related to the stated goals or objectives of the project.

2. All significant impact categories identified for any one alternative must be included in the common evaluation process for all alternatives, including the no-action alternative.

3. Among alternatives, individual impact categories should be treated at an equivalent level of detail and for equivalent areal and temporal scales.

4. All impacts should be expressed—initially in the metric—which most clearly illustrates the magnitude of the impact; conversion of nonmonetary impacts to a monetary basis should be avoided.

5. The incidence of impacts on groups and areas should be identified for all impact categories.

6. Standards, values, or norms that can be used to assess the significance of an impact should be indicated where they are commonly accepted or required by law.

7. Uncertainties or probabilities associated with impacts should be expressed for each category.

8. The sensitivity of key impacts to variation in the major characteristics of alternatives should be indicated.

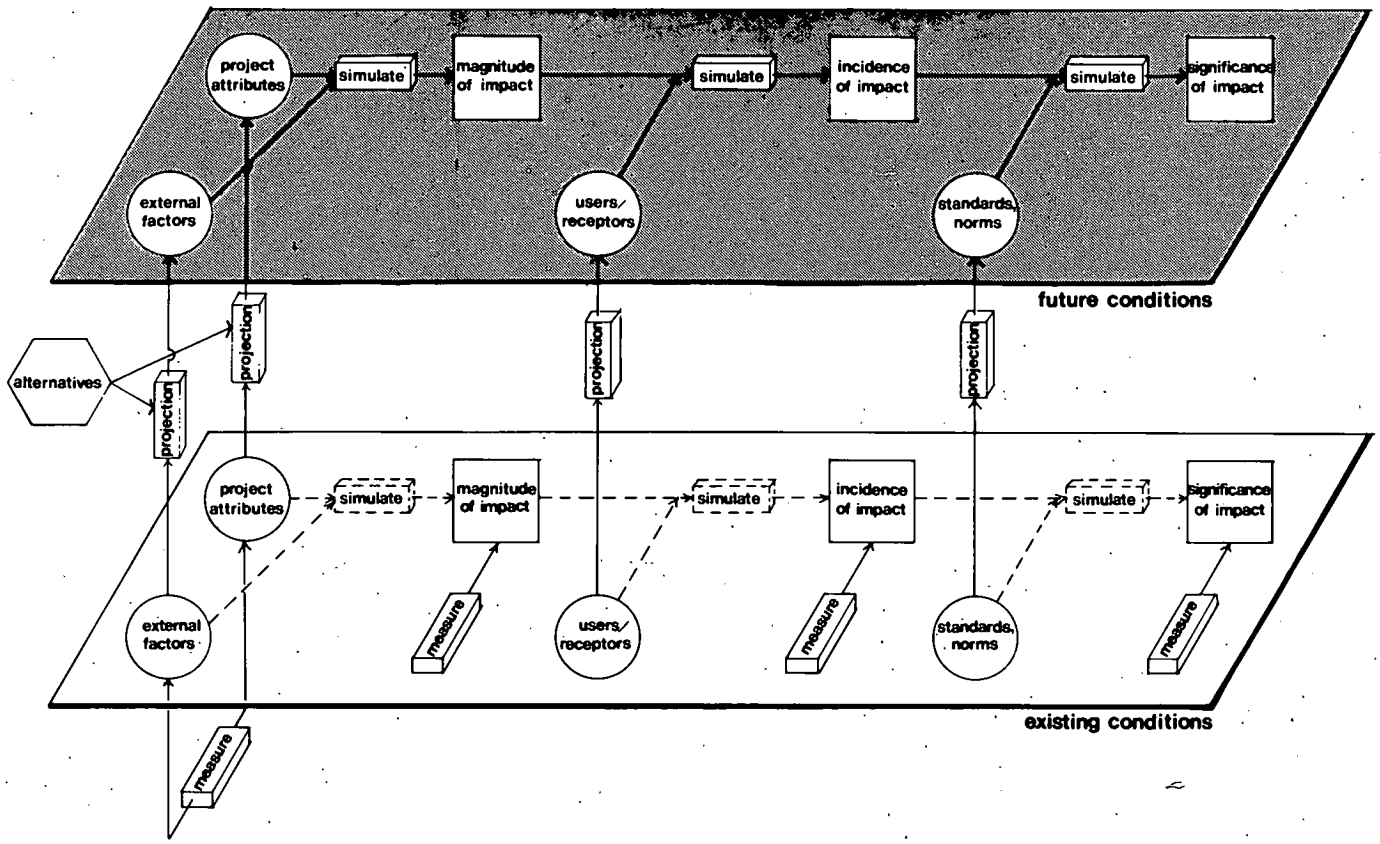


Figure 3. Conceptual model of the impact assessment process.

CHAPTER THREE

APPLICATION OF RESEARCH FINDINGS

FORM AND PURPOSE OF THE GUIDELINES

The "Impact Assessment Guidelines" (*NCHRP Report 217*) present the findings of the research in a form usable to professionals concerned with project development and impact assessment:

Agency Administrators will find guidance on the function and definition of the no-action alternative as well as its role in the planning process. The guidelines explain the legal requirements for assessment of no-action alternatives and show how the no-action alternative can be used to improve the assessment and evaluation process. This material will be particularly useful to administrators responsible for state Action Plans.

Project Managers will find recommendations that can be of assistance in most aspects of project planning. The material has been organized to give managers an overview of the impact assessment process and to provide specific guidance on the use of the no-action alternative.

Impact Analysts will find a description of impacts and a listing of current impact assessment techniques in the guidelines. This material will be useful to people who are new to transportation impact assessment as well as to experienced analysts who are looking for alternate techniques.

The guidelines are organized into two chapters and four appendixes. The topics and conclusions of each are summarized in the following.

Chapter One—The No Action Alternative. The first section of this chapter discusses the function of the no-action alternative and recommends its use as a benchmark for impact assessment and the evaluation of alternatives. There is a review of the legal requirements to assess the

no-action alternative; it concludes that the legislative and administrative mandates for the inclusion of no-action alternatives in transportation planning are clearly established and have been upheld in a number of court decisions.

The second section provides a standardized definition of the no-action alternative. The guidelines recommend that the no-action alternative be defined as the maintenance of existing facilities and services and the continuation of existing transportation policies.

Alternatives involving low or modest investments are designated as minor alternatives; this group includes many of the alternatives that now fall under the general rubrics of "low capital cost improvements" and "transportation system management (TSM) plans." The guidelines recommend that substantial attention be given to defining and assessing minor alternatives.

Those alternatives that involve substantial investment and cause significant increase in capacity or cause significant impact are designated as major alternatives; included in this group are primary construction alternatives.

Chapter Two—Application of the No-Action Alternative to Transportation Planning. The first section discusses when and where in transportation planning the no-action alternative should be used. A model of the planning process is used to specify the key decision points where the no-action alternative can help structure the evaluation of alternatives. Two stages of impact assessment are defined within the project location or alternatives analysis phase: a preliminary development of alternatives and impact screening, and a comprehensive development of alternatives and impact assessment.

The second section of the chapter addresses the need for an informed and rigorous use of the techniques available for impact assessment. In the first part, recommendations are made on the definition of alternatives, the choice of assessment time frames, the determination of the scope of assessment (impacts and study areas), and the development of work plans for impact assessment studies. This is followed in the second part by a brief discussion of the techniques used to project future conditions—population, employment, land use, and transportation.

The third part of the section recommends specific assessment techniques for 13 impact categories of concern in transportation planning. Each impact is described and a step-by-step process for assessing the magnitude, incidence, and significance of existing and future impacts is shown with suggested techniques for each step. The techniques are cross-referenced to Appendix A, which provides a summary description of each technique and references to sources, user manuals, and other technical literature.

The third section in Chapter Two deals with the evaluation of alternatives. Once the impacts of each alternative have been assessed, there is a need to clearly display this information in comparable terms intelligible to decision-makers and the public. This must be done at each key point in the development process. The guidelines recommend the use of the "balance sheet evaluation technique" and offer guidance on approach and format.

Appendix A—Techniques Dictionary. This appendix provides summary descriptions of the impact assessment techniques recommended in Chapter Two. The characteristics of each technique are briefly described and references to further technical information are listed.

Appendix B—Case Examples. Applications of the recommendations made in the guidelines are illustrated in three summary cases: an urban transitway project, a bridge replacement project on a suburban highway, and a relocation and upgrade project on a rural highway. Each case presents a description of the situation and the alternatives studied, and an outline of the assessment process and evaluation findings.

Appendix C—Notes. This appendix presents the conceptual model of impact assessment which was used to develop the 8-step impact assessment process shown in Chapter Two.

Appendix D—References. This final appendix provides full citations of the works referenced in the text and appendixes, as well as general literature on the impact assessment process.

LIMITATIONS

Research Report

This documents the process by which the "Impact Assessment Guidelines" were developed. It omits interim investigatory material which, in many cases, contains a high level of detail that was not judged essential to reproduce here. This material is available from University Microfilms International (see references), and was incorporated into an interim report dated December 1975(*2*). Covered in detail in that document were illustrations of alternate definitions for the no-action alternative; expanded discussion and illustration of alternative methods of plan evaluation and of techniques in current use for social, economic and environmental impact assessment; and a full reporting of the four case studies of facilities where no-build decisions had been made.

Impact Assessment Guidelines

This document is intended for use by agency personnel and others involved in impact assessment, project development, and the decision process for transportation investments. Limitations in its use are as follows:

1. The recommended definition of the no-action alternative may require modification of existing agency practices or policies. If so, it is recognized that such change takes time and that a process for achieving standardized practice must be developed. Many aspects of the no-action alternative—particularly the attitude toward other regional projects and definition of the "committed" network—will continue to require informed professional judgments. The guidelines are not intended to eliminate such judgments.

2. The recommended impact assessment techniques are not intended to be mandatory. They provide guidance for selection of an analysis approach that is sensitive to the unique circumstances of each project under study.

3. For many categories of social and economic impacts, the ultimate product of the assessment is a nonquantifiable or noncostable judgment. Such judgments will continue to be necessary for the foreseeable future, in the absence of reliable and valid assessment procedures. The guidelines should be viewed as an attempt to narrow the range of uncertainty that surrounds such judgments.

4. The guidelines are not a detailed manual of practice for comprehensive impact assessment. Therefore, use of other reference material for individual categories of impact will be required. The guidelines do serve as a source to other sources of impact assessment information.

5. The guidelines have been designed to conform to normal agency practices and procedures. Since this varies from state to state, interpretation will be necessary to align the specific procedures recommended as part of the project development process to the actual operating procedures and sequence of each user agency.

CHAPTER FOUR

CONCLUSIONS AND SUGGESTED RESEARCH

CONCLUSIONS

The research has benefitted from the involvement of many professionals, in many agencies. Based on the research and on the observations of the pilot program experience, several conclusions can be drawn:

1. The no-action alternative often is not well used in impact assessment and agency decision-making.

2. This misuse could be alleviated or eliminated if professionals and administrators shared a common understanding of the definition and purpose of the no-action alternative.

3. Procedures in operating agencies vary, making it very difficult to produce recommendations responding to the needs of all practitioners. The guidelines have been designed to serve the general needs of most practitioners and can be modified to conform to the needs of each user agency as appropriate.

4. The standard maintenance definition of the no-action alternative proposed by this research will assist in achieving uniformity of practice. However, agency staff will still have to use considerable professional judgment to ensure that the no-action alternative is used as a benchmark and that assumptions to define the no-action alternative are appropriate to the particular situation under study.

5. Techniques are available to assess the impacts of the no-action alternative at a comparable level of detail as other alternatives; the guidelines identify these techniques and provide guidance to their use. However, for many types of social and economic impacts, the techniques are either unreliable or require a level of expertise and effort generally not available. Therefore, assessments for these categories of impact will continue to require considerable expert judgment.

6. The planning balance sheet is the form of project evaluation that best ensures the comparability of impact data, and that uses the no-action alternative in the appropriate way. There are many forms in which a balance sheet can be prepared, suiting the circumstances of each project. At this time, the research team judges that adequate knowledge regarding the no-action alternative and its impacts is available. Therefore, no continuation of this research would be appropriate. Other topics of more general interest were noted in the course of the research; some of these are described in the following.

RESEARCH NEEDS

The present effort has reviewed general and specific aspects of transportation planning and project evaluation. Many of the research needs identified during the work would equally apply in the assessment of "build" and no-action alternatives. These needs are listed, as follows, in priority order:

1. Research is needed to examine how project evaluation techniques are used in decision-making. During the pilot program phase of the research, it was observed that state transportation agencies tended to generate detailed impact information on a project and then fail to summarize it and use it in the decision-making process. This failure to use and communicate available impact information, not the lack of analysis techniques, is the greatest weakness of the impact assessment and evaluation process. A review of the utility of various evaluation/display formats in distilling and communicating impact information and a review of the role that such technical information actually plays in decision-making might lead to greatly improved techniques. This work should include a review of scoring or plan ranking techniques and their effectiveness in arriving at decisions.

2. Research is needed on the social and economic impacts of traffic changes felt at the street, block, and neighborhood scale. TOPICS, TSM and similar programs increasingly are being used to adjust the capacity and traffic

flow characteristics of local streets and arterials, but little is known regarding the community, behavioral, and economic reactions to increased traffic or congestion at this scale. Research that has been done in this field does not seem to be widely used by practitioners. Additional research is required to identify traffic-related impact thresholds or levels of traffic at which substantial changes are perceived in community interaction and individual behavior. An integral part of this research should be the development of calibration interview procedures to determine thresholds in different socioeconomic and cultural contexts. Such an understanding of local traffic effects would be very useful in assessing the impact of the no-action alternative whose primary effects usually include increasing levels of traffic in existing rights-of-way.

3. Research is needed to develop transportation/land-use modelling techniques that can be applied at the corridor scale. Most of the macroscale and computerized modelling techniques available are too coarse-grained, too sophisticated, and too expensive to use on present day projects. Further, even when such techniques are feasible, their outputs are often in a form that is not readily comprehensible to the officials and property interests most concerned about transportation/land-use impacts. Techniques are needed that embody systematic procedures to arrive at judgments regarding land-use changes associated with different levels of transportation service. These techniques must be usable by a variety of personnel, should be workable with limited data, and should result in land-use predictions comprehensible to the officials and property interests most affected by such changes.

4. Research is needed to better define and measure impacts to neighborhood and community cohesion and quality of life. Community cohesion is generally understood to deal with group and individual social interactions at the neighborhood scale, but there is no generally accepted definition of the impact nor are there, as yet, accepted and reliable measurement techniques. Work is needed to standardize the definition of community cohesion, develop measures or indicators of impact, and indicate relative thresholds for determining significance.

5. Research is needed on the impacts of business displacement. There is a large body of economic literature dealing with the impact of accessibility changes on trade areas and retail sales, but relatively little literature on the effects of displacement in terms of the probability of liquidation versus successful relocation. Research in this area should differentiate impacts by type of firm and location context.

REFERENCES

1. ADAMS, G. R., "The No-Build Alternative: What it Is, Why it Is Necessary, and How it Can Be Handled." *HRB Special Report 138* (1973) pp. 46-48.
2. LANE, J., GRENZEBACK, L., MARTIN, T., and LOCKWOOD, S., "The No-Build Alternative: The Social, Economic and Environmental Consequences of Not Constructing Transportation Facilities." NCHRP Project 8-11, Interim Report (Phase I) (1975). Available from University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan 48106, Telephone (313) 761-4700; or 18 Bedford Road, WC1R 4EJ, London, England, Telephone 01-242-9485.
3. SULLIVAN, J. B., and MONTGOMERY, P., "Surveying Highway Impact." *Environment,* Vol. 14, No. 9 (Nov. 1972) pp. 12-20.

APPENDIX A

STATE-OF-THE-ART SURVEYS

In January of 1975, a survey was made of state transportation agencies to determine the state of the art in the use of the "no-build" alternative for project planning. The purpose of the survey was twofold: to determine how transportation agencies were defining the NCTF alternative; and to ascertain which transportation projects throughout the country had resulted in decisions not to build or to substantially delay construction. (NCTF is an acronym for *N*ot *C*onstructing *T*ransportation *F*acilities. Since the acronym was used in the research at the time of the survey, it has been used throughout this appendix.)

The major instruments for data collection in the state-of-the-art review were two questionnaires:

1. An administrative questionnaire was sent to the transportation agencies in each of the 50 states, Puerto Rico, and the District of Columbia. The purposes were to determine how transportation agencies were defining the NCTF alternative and analyzing its impacts, and to ascertain which transportation projects throughout the country had resulted in decisions not to build or to substantially delay construction.
2. Project questionnaires were mailed along with the administrative questionnaire. The purpose was to develop comparable information regarding the project characteristics, issues, evaluation techniques, NCTF definition, and decision-making context for those projects for which NCTF decisions had been made.

Copies of the questionnaires are included at the end of this appendix.

AGENCY PRACTICE FOR THE NCTF ALTERNATIVE

Admnistrative questionnaires were mailed to the chief administrators of each of 52 transportation agencies or departments of public works in the country. Thirty-eight (73 percent) of the agencies returned the questionnaires and another four states responded by letter to some of the questions. Despite the complexity of the survey, the questionnaires were adequately completed and, in many cases, were accompanied by letters that elaborated on particular approaches to the NCTF alternative or discussed specific projects.

Definition of NCTF Alternative

Agency respondents were asked to specify what assumptions they made about existing and proposed transportation facilities under an NCTF alternative. Half (47 percent) of the agencies responding to the question reported that for the purposes of defining the NCTF alternative they assumed that existing facilities in the study corridor and the region would be "maintained." A number of the agencies that submitted this response noted that any upgrade of capacity was regarded as an alternative in its own right. In contrast, about one-third (31 percent) assumed that existing facilities would not only be maintained but would be given maximum upgrade under an NCTF alternative. The remainder of the respondents indicated that the NCTF definition varied by type of project (11 percent) or gave no reply (11 percent).

Very few agencies mentioned how they treated proposed facilities on the corridor or regional level; those that did reported that the officially adopted system was normally assumed for NCTF analysis. These questions were asked in more specific form in the project questionnaire.

Amount of Technical Effort Devoted to the NCTF Alternative

There was considerable variation in the reported effort given to NCTF analysis among the agencies. Twenty-nine percent reported that they spent either a "minimal" amount or up to 10 percent of their technical effort on the NCTF alternative. Another 20 percent of the respondents spent from 10 to 20 percent and 26 percent reported spending an "equal amount" of effort on all alternatives including the NCTF alternative. Two agencies reported spending as much as half their technical effort on the NCTF alternative. When asked to assess the adequacy of this allocation of technical effort, nearly two-thirds of the agencies answered "adequate," another one-third reported their efforts as "insufficient" or "somewhat insufficient," and the remainder evaluated their efforts as "somewhat excessive" or "excessive" (that is, "more than is generally warranted by the situation").

Use of the NCTF Alternative in Decision-Making

While few agencies viewed the NCTF as a real alternative for decision-making, many (63 percent) used some kind of no-build option as a baseline against which to evaluate other "build" options. Twenty-one percent of the agencies stated that current NCTF use amounted to "pro forma" compliance with environmental requirements, or even the providing of "strawman" arguments to make projects look better. A sizeable number of agencies (16 percent) provided no opinion on this question. However, recent project studies and EIS's were more likely than older studies to include an NCTF option. Written comments on this question were frequent; many respondents who felt that the NCTF alternative was being used simply to justify projects emphasized that they did not recommend this and hoped for change.

Actual Experience with Projects Where NCTF Decisions Were Made

Respondents were asked to identify major transportation projects in their jurisdictions that had been proposed but for which decisions had subsequently been made not to construct the facility or to substantially delay its construction. During the course of earlier research work, about 50 such projects had been identified. The administrative questionnaires from the 38 responding state agencies identified 136 such projects. Twenty-four projects identified by the research team were not reported; most of these appeared to be large, highly controversial projects that had been delayed for some years but had not been deleted from official transportation plans.

In total, there were 160 named NCTF or delay projects. For the purposes of analysis, this list was pared down to 114 by eliminating projects for which only marginal or very conflicting data were available (Table A-1). It was assumed that the combined list of 114 was a reasonable sample of all NCTF projects.

For 63 of the NCTF projects, data were furnished by state respondents on the project characteristics and issues. These data, in the form of completed project questionnaires, were used to analyze the major characteristics of the NCTF projects discussed in the following.

Chronology and Reasons for NCTF Decisions

The effects of NEPA and EIS requirements are appar-

TABLE A-1

CHARACTERISTICS OF NCTF OR DELAYED PROJECTS

FACILITY NAME AND LOCATION	FACILITY DESCRIPTION			AREA DESCRIPTION			PROJECT CHRONOLOGY (YEARS ELAPSED)					DEFINITION OF NCTF ALTERNATIVE					
	MODE	TYPE OF ROAD	ESTIMATED COST	CONTEXT	SMSA SIZE	LAND USE	PROPOSAL	ENGINEERING STUDIES	EIS	NCTF OR DELAY DECISION	STATUS	NCTF ALTERNATIVE	TRAVEL DEMAND	EXISTING FACILITIES IN CORRIDOR	EXISTING FACILITIES IN REGION	PROPOSED FACILITIES IN CORRIDOR	PROPOSED FACILITIES IN REGION
East-West Expressway New England	H	Inter	580 M	R,W	Rural	All				3	NCTF	Yes					
Camden, Bypass Camden, ME	H	Bypass	2.5M	S	<0.5	Rs	9	9		8		No	Meet	Mnt +	Mnt +	None	Commit
High St. Ellsworth, ME	H	Arter	0.8M	U	<0.5	Co	8	8		5	Build	No	Meet	Mnt	Mnt	Commit	Plan
Ogunquit Bypass Ogunquit, ME	H	Bypass	1.4M	S,R	<0.5	Rc	4	4		3	Delay	No	Meet	Mnt +	Mnt +	None	Commit
River Road Brunswick, ME	H	Conn	0.8M	U	<0.5	Rs	5	5		5	NCTF	No	Meet	Upgr	Upgr	Commit	Commit
York Extension Connector York, ME	H	Res, Bypass	1.8M	R	< 0.5	Rs,Rc	9	8		7	Delay	No	Meet	Mnt +	Mnt	Commit	Plan
I-93 NH	H	Inter		R,W	Rural	Ag,Rc	25	10±	1-2±	5	Delay	Yes	Corr				
Rte 28 Alton to Wofeboro, NH	H	Bypass	5.2M	R	<0.5	Rs,Ag	3	3		2	Delay	No	Meet	Mnt +	Mnt +	Mode	Adopt
Rte 111 Windham to Salem, NH	H	Conn	4.8M	S,R	<0.5	Rs,Co, In,Ag	9	7-8	2	1	NCTF	No	Deny	Mnt +	Mnt +	NS	NS
Rte 67A, Replacement Bennington, VT	H	Conn	2.5M	S,R	Rural	Rs,Ag	10	9		7	NCTF	No	Meet				
Rte 100, Wilmington Bypass Wilmington, VT	H	Res	9.0M	R	Rural	Rs,Ag	10	8		5	NCTF	No	Meet	Mnt	Mnt	None	Plan
Rte 103, Chester Bypass Chester, VT	H	Bypass	3.5M	R	Rural	Ag	17	15-17	1	1	NCTF	Yes	Meet	Mnt	Mnt +	None	NS
Williamstown-Northfield Hwy VT	H	Conn	2.5M	R	Rural	Rs,Co, Ag	6	4- 5	1	1	NCTF	Yes	Meet	Mnt +	Mnt +	None	Plan
Lowell Connector Extension Lowell, MA	H	Loop		U	0-0.5	Rs,Co, In	10±	4- 5		1-2	NCTF						
I-95 N Boston, MA	H	Radial	150 M	S	2-4	Rs,Co, Rc	27	15	3	2-4	NCTF	Yes	Meet	Upgr	Upgr	None	Plan
I-95 S Boston, MA	H/T	Radial	350 M	U,S	2-4	Rs,Co, Rc,In	27	13	3	2-4	NCTF	Yes	Corr-Mode	Mnt +	Upgr	None	Plan
I-695, Inner Belt Boston, MA	H	Loop	307 M	U	2-4	Rs,Co, Rc,In	27	15		3-4	NCTF	No					
Rte 2 Extension Boston, MA	H	Radial		U	2-4	Co,Rs, In,Rc	15-25	7-10		3-4	NCTF	No					
Third Harbor Tunnel Boston, MA	H/T	Tunnel	600 M	U	2-4	Co,Rs	8	6- 7	3	1-2	NCTF	Yes	Corr-Mode	Mnt +	Upgr	None	Plan
Merritt Parkway CT	H	Inter, Radial		S	<0.5	Rs,Rc		3- 5		2	Delay	No					
Rte 44, Canaan to W. Hartford CT	H		120 M	S,R	0.5-1	Rs,Co, Rc	6	5		3	Delay	Yes	Meet	Mnt +	NS	No Imp	Adopt
Rte 66, Meriden to Portland CT	H		126 M	S,R	<0.5	All	6	5		3	Delay	Yes	Meet	Mnt +	NS	None	Adopt
I-291 Hartford, CT	H	Conn	112. M	S	0.5-1	All	15-18	12-15	3	1	NCTF	Yes	Meet	Upgr	Upgr	Commit	Adopt
Delaware-St. Lawrence Expressway NY	H	Inter		R	Rural		10±	5-10	2±	3	NCTF	Yes	(Varies with land use options)				
Hudson River Expressway NY	H	Inter		R	Rural			10		4	NCTF						
I-295, Clearview Expressway New York, NY	H		179. M	U	8+	Rs	12	7		5	NCTF	No					
Long Island Expressway NY	H	Radial		U,S	8+					1	NCTF						
Long Island Sound Crossing NY	H	Bridge	270. M	S	8+	Rs,Rc	11	9	3-4	2	NCTF	Yes	Meet	NS	NS	Mode	Adopt
Lower Manattan Expressway New York, NY	H	Loop		U	8+	Co,Rs, In,Rc	48	16		5-6	NCTF						
Niagra Street Arterial Tonawanda, NY	H	Arter	3.5M	U	< 0.5	Rs,Co, Rc	9		4	3	NCTF	Yes	NS	NS	NS	NS	NS

(Key: see last page of Table.)

TABLE A-1—(CONTINUED)

FACILITY NAME AND LOCATION	FACILITY DESCRIPTION			AREA DESCRIPTION			PROJECT CHRONOLOGY (YEARS ELAPSED)					DEFINITION OF NCTF ALTERNATIVE					
	MODE	TYPE OF ROAD	ESTIMATED COST	CONTEXT	SMSA SIZE	LAND USE	PROPOSAL	ENGINEERING STUDIES	EIS	NCTF OR DELAY DECISION	STATUS	NCTF ALTERNATIVE	TRAVEL DEMAND	EXISTING FACILITIES IN CORRIDOR	EXISTING FACILITIES IN REGION	PROPOSED FACILITIES IN CORRIDOR	PROPOSED FACILITIES IN REGION
Richmond Parkway New York, NY	H			S	8+		30±	15±		10	Delay						
Rte 9 Tarrytown, NY	H	Inter	70.-310. M	S	<0.5	Rs,Co, In	10	4-7	4	4	NCTF	Yes	Meet	NS	NS	Mode	NS
Chautauqua Lake Bridge Chautauqua County, NY	H	Inter, Bridge	40. M	R	Rural	Rs,Rc	10	9	2	1	Delay	Yes	Corr	Mnt +	Mnt +	Commit	Plan
Sunrise Highway Extension NY	H	Radial	80. M	S	8+	Rs,Co					Delay						
West Side Highway New York, NY	H/T	Loop	1.1B	U	8+		20	4- 5	2±	0	Delay	Yes					
Turnpike Extension NJ	H	Inter	300. M	S,R						4	Delay						
Cobbs Creek Expressway Philadelphia, PA	H	Radial		U	4-8		10-15			1	NCTF						
Crosstown Expressway Philadelphia, PA	H	Loop		U	4-8	Rs,Co, In	25-30	10		4	NCTF						
Germantown Bypass Philadelphia, PA		Bypass		U	4-8						NCTF						
I-78, Allentown, Bethlehem, and Easton, PA	H	Radial	220. M	R	1-2	Co,In Ag,Rc	13	12	4	2	Delay	Yes	Corr	Upgr	Upgr		Adopt
I-279 Pittsburgh, PA	H/T	Circ	47. M	U	2-4	Rs,Co, Rc	23	12	3	2	Delay	No					
I-476, Mid-County Expressway Philadelphia, PA	H	Circ	120. M	S	4-8	Rs,Co, Rc	20-25	15+	0	2	Delay	Yes	Meet	Mnt +	Mnt +	Mode	Plan
I-676, Vine St. Expressway Philadelphia, PA	H	Loop		U	4-8						NCTF						
Skybus Pittsburgh, PA	T			U	2-4												
US 20, 322, River Relief Route Harrisburg, PA	H	Arter	10. M	U,S	1-2	Rs,Co, Rc	12+	12	4	1	Build	Yes	Deny	NS	NS	Commit	Commit
US 22, 220 Relocation Altoona, PA	H		54. M	R	<0.5	Rs,Ag	7+	7	4	2,0	NCTF	Yes	Corr	NS	NS	Commit	NS
Dover Bypass Dover, DE	H	Bypass	33. M	R	<0.5	Rs,Ag	9	9	4	9,1	Delay	Yes	Meet	Mnt +	Mnt +	None	Commit
Dover East-West Connector Dover, DE	H	Conn	4.0M	U,R	<0.5	Rs,Co, In,Ag	10	5	4	1	NCTF	No	Corr	Mnt +	Upgr	Commit	Plan
Outer Wilmington Beltway Wilmington, DE	H	Circ		S	0.5-1	Rs,Co, Ag,Rc	4	3- 4		2	NCTF	No	Corr	Mnt +	Upgr	Commit	Adopt
Baltimore Expressway MD	H			U,S	2	All	31	20±		5	Delay						
I-95 Prince George's County, MD	H/T	Radial	100 M	S	2-4	All	20±	7-10		2	NCTF	Yes					
Three Sisters Bridge Washington, DC	H	Bridge		U	2-4					2	Delay						
APD 282, Corridor D Parkersburg, WV	H	Inter	20. M	U	<0.5	Rs,Co	10	9		6	Delay	Yes	Corr	Mnt +	Mnt +	Commit	Plan
APD 484, Corridor H Wymer, WV	H	Inter	210. M	R	<0.5		10	6- 8	1	5	Delay	Yes	Meet	Mnt +	Mnt +	None	Adopt
I-64 Charlestown, WV	H	Radial	78.8M	U,S,R	<0.5	All	15	10	1	6	Delay	No	NS	Upgr	Upgr	Commit	Plan
I-66 VA	H/T	Radial	637 M	S	2-4	All	20±	17		2-3	Delay	Yes					
Corporation Freeway Winston-Salem, NC	H	Circ	44.5M	U,S	<0.5	Rs,Co, In	10	8	4	2	NCTF	Yes	Corr	Mnt +	NS	Commit	Adopt
I-40 Winston-Salem, NC	H	Circ	9.5M	U	<0.5	Rs,Co	3	2	2	0	NCTF	Yes	Corr	Aband	NS	None	NS
Lumber River Bridge Lumberton, NC	H	Bridge	1.5M	U,R	<0.5	Rs,Ag	9	8- 9	4	1	NCTF	Yes	Meet	NS	NS	None	Adopt
Oberlin Road Raleigh, NC	H	Arter	1.5M	U	0.5-1	Rs,Co	7	6	3	3	NCTF	Yes	Meet	NS	NS	None	Adopt

TABLE A-1—(CONTINUED)

FACILITY NAME AND LOCATION	FACILITY DESCRIPTION			AREA DESCRIPTION			PROJECT CHRONOLOGY (YEARS ELAPSED)					DEFINITION OF NCTF ALTERNATIVE					
	MODE	TYPE OF ROAD	ESTIMATED COST	CONTEXT	SMSA SIZE	LAND USE	PROPOSAL	ENGINEERING STUDIES	EIS	NCTF OR DELAY DECISION	STATUS	NCTF ALTERNATIVE	TRAVEL DEMAND	EXISTING FACILITIES IN CORRIDOR	EXISTING FACILITIES IN REGION	PROPOSED FACILITIES IN CORRIDOR	PROPOSED FACILITIES IN REGION
Briarcliff Rd. Widening Atlanta, GA	H	Arter		S	1-2	Rc	14	12	0	5±	NCTF	Yes	Corr	Mnt +	Upgr	Commit	Adopt
I-485 Atlanta, GA	H	Loop	100. M	U	1-2	All	21	7-10	3	1-2	NCTF	Yes	Meet	NS	NS	None	Plan
La Vista Widening Atlanta, GA	H	Arter	2.2M	U	1-2	Rc	7	2- 3	2-3	1	NCTF	Yes	Deny	NS	NS	None	NS
Stone Mountain Tollway Atlanta, GA	H	Radial	50. M 90. M	S	1-2	Rc,Co, In	30	5- 6	4	2	NCTF	Yes	Meet	Upgr	Upgr	Commit	Adopt
Sunny Isles Causeway Miami, FL	H	Bridge	22. M	S	1-2	Rc,Co	10	5	4	3	Delay	Yes	Meet	Mnt +	Mnt +	NS	NS
Winkler Rd. Extension Fort Myers, FL	H	Arter, Bridge	6. M	R	<0.5	Rc,Ag	5	3	3	1	NCTF	Yes	Corr	NS	Mnt	Commit	Plan
Cross Basin Connector Cincinnati, OH	H	Circ		U	1-2	Rc	5-6				Delay	No					
Subway Cincinnati, OH	T			U,S	1-2					30±	NCTF						
I-264, Watterson Expressway Louisville, KY	H	Circ	150. M	U,S	0.5-1		4	2- 4	2	2	Delay	Yes	Meet	Mnt	Upgr	Mode, Commit	Adopt
I-40 Memphis, TN	H	Radial		U	0.5-1		18-20	14		6,2	Delay						
I-35 E St. Paul, MN	H	Radial	60. M	U	2-4	Rs, Co	20	18±	11	3	Delay	No	Deny	Mnt +	Mnt +	None	Adopt
I-94 Washington, County, MN	H		30. M	R	<0.5	Ag	20	10-15	0	2	Delay	No	Deny	Mnt +	Mnt +	None	Adopt
I-394 Minneapolis, MN	H	Radial		U,S	2-4	Rs,Co, Rc					Delay	Yes	Meet	Mnt	Mnt	None	Adopt
Dane County Freeway WI	H			R	0.5	Rs, Ag	9	6	4	3	Delay	Yes	Corr	Mnt +	Mnt +	Commit	Adopt
STH 59 Waukesha County, WI	H		7.4M	S,R		Rs,Co	8			3	NCTF	Yes	Meet	Mnt +	Mnt +	No imp	Adopt
Crosstown Expressway Chicago, IL	H	Circ	1.6B	U	4-8	Rs,Co, In	30,10	10±	4	1	Delay	No	Mode	Upgr	Upgr	Mode	Adopt
Rte 755 St. Louis, MO	H	Loop	3.5M	U	2-4	Rs,Co, In	16	16	4	5	Delay	No	Corr	Mnt	Mnt	None	Adopt
St. Louis Rapid Transit St. Louis, MO	T			U,S	2-4	All		5- 7		2	NCTF						
Columbia Rd RR Separation Grand Forks, ND	H	Arter	6.0M	U	<0.5	Rs,Co	6				Delay	Yes	Meet	Upgr	Upgr	No imp	Adopt
Lake Oahe Bridge Fort Yates/Linton, ND	H	Bridge	12. M	R	<0.5		5	3	3	1	NCTF	Yes	Corr	Upgr	Upgr	No imp	Adopt
Hwy 44 Pennington City, SD	H			R	<0.5		5	4	3		Delay	No	Meet	Mnt +	NS	NS	NS
Cambridge-Funk Expressway NB	H		24. M	R	<0.5	Ag	5	4- 5	4	4	NCTF	Yes	Meet	Mnt +	Mnt +	Commit	Commit
US 77, Crete Corner South Lincoln, NB	H		71.6M	R	<0.5	Ag	5	3±	2	0.5	NCTF	Yes	Meet	Mnt +	Mnt +	Commit	Commit
I-410 New Orleans, LA	H	Circ		S	1-2					1-2	NCTF						
New Mississippi Bridge New Orleans, LA	H	Bridge		U,S	1-2			4- 5			Delay						
Riverfront Expressway New Orleans, LA	H	Loop		U	1-2	Rs,Co, In,Rc	30	10-12		6	NCTF	No					
Riverside Expressway Tulsa OK	H	Radial		U	0.5-1	Rs,Co, Rc	21			5		No	Meet	NS	NS	None	Adopt
Rogers Lane Expressway Lawton, OK	H			U	<0.5	Rs,Co			4	4		No	Meet	NS	NS	NS	NS
San Antonio, TX	H				0.5-1												
I-90 Big Timber to Greycliff, MT	H		13.M	S,R	Rural	Rs,Ag	9	8	1±	5	Delay	Yes	Meet	Mnt	NS	NS	NS

TABLE A-1—(CONTINUED)

FACILITY NAME AND LOCATION	FACILITY DESCRIPTION			AREA DESCRIPTION			PROJECT CHRONOLOGY (YEARS ELAPSED)					DEFINITION OF NCTF ALTERNATIVE					
	MODE	TYPE OF ROAD	ESTIMATED COST	CONTEXT	SMSA SIZE	LAND USE	PROPOSAL	ENGINEERING STUDIES	EIS	NCTF OR DELAY DECISION	STATUS	NCTF ALTERNATIVE	TRAVEL DEMAND	EXISTING FACILITIES IN CORRIDOR	EXISTING FACILITIES IN REGION	PROPOSED FACILITIES IN CORRIDOR	PROPOSED FACILITIES IN REGION
Potomac-West Missoula County, MT	H		1.5M	R	Rural	Ag	7	5- 7	0	5	Delay	No	Meet	Mnt	NS	NS	NS
US 191, Spur Big Sky, MT	H	Res		W	Wild, Rural	Rs	5+	4- 5	4-5	2	NCTF	Yes					
Volberg N and S Custer County, MT	H		1.5M	R	Rural		7+	5	2	1+	Delay	Yes	Meet	Mnt	Mnt	NS	NS
Hwy 55 Boise, ID	H	Circ	7.0M	S,R	Rural	Rs,In, Ag	5	5	4	4	NCTF	Yes	Corr	Mnt +	NS	None	NS
Airport Corridor Wilson/Jackson, WY	H		2.0M	R,W	Rural	Ag,Rc	4	3		3	NCTF	No	Meet	Mnt +	Mnt +	No imp	Plan
Glenwood Canyon Interstate West Central, CO	H	Inter	77 M	R,W	Rural				4		NCTF						
I-470 Denver, CO	H	Circ	45.M	S	1-2	Rs,Ag, Rc		7		2-3	Delay						
I-15 Elwood to Plymouth, UT	H				Rural				3	3	Delay						
I-215 Salt Lake City, UT	H	Circ		U,S	0-0.5				2	2	Delay						
Provo Canyon Hwy Orem-Heber, UT	H				Rural				2	2	Delay						
I-10 Phoenix, AZ	H	Loop	400. M	U	1-2	Rs,Co, Rc	15+	8-10		1-2	NCTF						
Auburn-Bothell Corridor WA	H			U,S	4-8	Rs,Co, Ag	15-20	10		3	NCTF						
I-90 (SR 5 to SR 405) King County, WA	H	Rad, Bridge	500. M	U,S	1-2	Rs,Co, In	18	18	4		Delay	Yes	Reduce	Mnt +	Upgr	None	Adopt
I-90 (W. Snoqualmie to Tanner) North Bend, WA	H	Radial	30. M	R	1-2	Ag	5	5	3	3+	Build	Yes	Deny	Mnt +	Mnt	NS	Commit
I-80 N, Mt. Hood Freeway Portland, OR	H/T	Radial	443 M	U,S	1-2	Rs,Co, In	20	7-10	2-3	1-3	NCTF	Yes	Meet, Mode	Mnt	Mnt +	Commit	Plan
I-205 Portland, Or	H	Radial		U	1-2			10-15		1	Delay						
I-505, Spur Portland, OR	H	Spur	72. M	U	1-2	Rs,Co, In	12	11	2	3-5	Delay	Yes					
Embarcadero Freeway San Francisco, CA	H	Loop		U	2-4		20-25	15		7	NCTF						
Foothill Freeway San Francisco, CA	H	Radial	100. M	S,R	2-4					4	NCTF						
I-105 Los Angeles, CA	H	Radial	579 M	U,S	4-8	Rs,Co, In,Rc	15-20	10	1-2±	3	Delay	Yes					
Southern Bay Bridge San Francisco, CA	H	Bridge	500. M	U	2-4	Rs,Co, In.Rc	20-30	20±		3	NCTF	Yes	Meet	NA	Mnt +	NA	Adopt
Copper River Highway Cordova, AK	H	Inter, Rcs	39 M	W	Wild Rural				2		Delay	Yes	(Varies)	Aband.	NS	None	NS
Western Access Road Nome to Kobuk, AK	H	Rcs	91. M	R,W	Wild, Rural		4	2	2	1	Delay	Yes	Meet	NS	NS	Mode	Adopt
H-3 Expressway HI	H	Inter	300. M	R	Rural					3	Delay						

TABLE A-1—(CONTINUED)

KEY:

FACILITY DESCRIPTION	Mode	H = Highway T = Transit	
	Type of Road	Arter = Arterial Bridge = Bypass = Circ = Circumferential Conn = Connector	Inter = Interstate Loop Radial Res = Resource access Tunnel
	Estimated Cost	M = $ Million B = $ Billion	
AREA DESCRIPTION	Context	U = Urban S = Suburban	R = Rural W = Wilderness
	SMSA Size	Population in Millions	
	Land Use	Ag = Agricultural Co = Commercial In = Industrial	Rc = Recreational Rs = Residential
DEFINITION OF NCTF ALTERNATIVE	NCTF Alternative	Yes = NCTF Alternative Was Specifically Considered No = NCTF Alternative Was Considered Indirectly or Not at All	
	Travel Demand	Meet = Meet Travel Demand Corr = Divert Predicted Travel Demand to Other Corridors Mode = Divert Predicted Travel Demand by Policy Measures Reduce = Reduce Predicted Travel Demand by Policy Measures Deny = Deny Predicted Travel Demand NS = Not Specified	
	Existing Facilities In Corridor And In Region	Aband = Abandonment No mnt = No Maintenance Mnt = Maintenance Mnt + = " Plus Capacity, Safety, Operations Improvement Upgr = " Plus maximum Improvement of Selected Facilities NS = Not Specified	
	Proposed Facilities In Corridor	None = No Proposed Facilities Included in the Analysis Commit = Only Significantly Committed Projects Included Mode = Alternative Modes or New Technologies No imp = Lower Level of Service With No Significant Impact NS = Not Specified	
	Proposed Facilities In Region	Commit = Only Committed Projects Included in the Analysis Plan = Committed Projects and Some Planned Projects Adopt = Completion of Planned or Adopted System NS = Not Specified	

ent in the chronologies of the facilities reported in the project questionnaires. For smaller projects, the EIS requirements appeared to have stimulated final build or no-build decisions. The larger facilities, especially those in urban areas, had much longer histories, and it was very difficult to determine if the imposition of EIS requirements alone had a decisive impact; many such projects had tortuous and controversial backgrounds in which the requirement for the study of an NCTF alternative was but a recent chapter.

A variety of reasons were reported for NCTF decisions (Table A-2). One-half of the comments cited community or political opposition. Environmental, social, and economic factors were cited as the main reason 48 percent of the time, with environmental reasons being cited more frequently than the combination of social and economic factors. Since technical reasons generally underlie "community and political opposition," it was surmised that social, economic, and environmental issues generally were present in these cases.

Project Context and Scale

Facilities reported in the project questionnaires were classified according to two major attributes; context and scale. Context variations were reported as follows: urban (38 percent of reported projects), suburban (27 percent), rural (33 percent), and wilderness (3 percent). Scale definitions were more difficult to define. Since respondents were asked to complete project questionnaires for major NCTF projects only, the administrative distinction between major and minor actions was not used. The projects reported were nearly all major actions having the potential for significant environmental impact, but, within that group, differences in scale were substantial. Estimated project costs, which were used as a rough measure of project scale, ranged from under $1 million to over $1.5 billion. Since approximately 45 percent of the projects for which cost figures were available fell below $15 million, this figure was used as the dividing line between large-scale major projects and small-scale major projects. The majority of the small-scale projects was estimated at under $3 million. The resultant categories for project analysis were defined as follows:

- urban, large-scale projects
- urban, small-scale projects
- suburban, large-scale projects
- suburban, small-scale projects
- rural, large-scale projects
- rural, small-scale projects

Because of the small number of wilderness projects reported, these were included in the last two categories. These six project type categories were used to determine whether scale and context variations were strongly related to NCTF definition, major impacts, and project issues.

Definition of NCTF Alternative

There was wide variation found in the definition of NCTF alternatives, but the majority of projects assumed "continuing maintenance of existing facilities with operations and safety improvements" under the NCTF alternative. In some cases, maintenance plus small capital improvements (minor widening, intersection improvements, traffic operations, etc.) were assumed. Figure A-1 summarizes responses to this question for all project types.

Of the rural projects reported, many were designed to improve access to markets, reduce travel time, and increase user benefits; as such, an NCTF alternative that assumed "maintenance plus operations and safety improvements" was considered a viable option. For larger urban projects dealing with capacity and congestion problems, "maintenance plus maximum improvements to existing facilities" was the preferred option for defining the NCTF alternative. The NCTF option of "abandonment" of a facility was reported in only a few rural projects. The choice of a total "do-nothing" option (i.e., no maintenance) as the NCTF alternative was not reported in the project questionnaires.

The range of reported definitions extended from "no NCTF" to alternatives that defined the NCTF context in detail at both the corridor and system levels and dealt with existing and proposed facilities. However, highly articulated alternatives were in the minority and represented, for the most part, EIS work on large-scale, controversial, urban/suburban highway projects. Most projects in the sample did little beyond assuming that existing facilities in the study corridor would be maintained under an NCTF alternative. Minimal attention was given to specifying the role of other existing facilities at the system or regional level; the implicit assumption was that these would be maintained at their present level of service or upgraded if necessary. Proposed facilities outside the study corridor were treated as "built" in the NCTF alternative if they were part of the officially adopted transportation system. Within a study corridor, modifications were sometimes made to test "substantially committed" projects, but no such differentiation was made for proposed facilities at the regional level unless they were directly linked to the project under consideration. This lack of attention to the implications of NCTF alternatives at the systems level was specifically mentioned as a serious defect by a number of respondents.

Variations in the definition of NCTF alternatives appeared to correlate with both context and scale, but not with project type. For projects in densely urbanized areas which had highly complex transportation networks, a somewhat wider range of options was used for defining the NCTF alternative (i.e., alternative modes and technologies, diversion to other corridors, etc.). At the same time, projects in urbanized areas were constrained by the fact that "abandonment" and "maintenance only" options may not have represented reasonable alternatives in the face of congestion and capacity problems. With respect to scale, the larger the project, the more critical the need to take into consideration effects of the NCTF option on existing and proposed facilities at the system or regional level.

IMPACT ASSESSMENT METHODOLOGY

The administrative questionnaire was designed to pro-

TABLE A-2

PROJECT QUESTIONNAIRE—REASONS REPORTED FOR NCTF OR DELAY DECISIONS

Reasons	Subtotals Number of Times Reported	(%)	Totals[2] Number of Times Reported	(%)
Public opposition ("lack of support," litigation)			41	(35)
Governmental opposition (ref; change in plans, etc.)			16	
Economic costs (lack of monies; not economically feasible)			13	(14)
Social costs (disruption of neighborhoods; life style)			12	(10)
Environmental issues			32	(27)
a. EIS requested, contested or rejected	13	(41)		
b. 4(f) parklands involved	6	(19)		
c. conservation or preservation	2	(6)		
d. pollution	1	(3)		
e. waterways - wetlands	1	(3)		
f. open space, recreation aesthetics	5	(16)		
g. other or unspecified	4	(2)		
Other reasons			3	(2)
Total			117	(100)

[1] (N = 63)

[2] Multiple answers were recorded

vide two evaluations: an assessment of the technical adequacy of the methodologies generally used to predict various impacts under an NCTF alternative, and an assessment of the importance of the NCTF impacts within the overall transportation decision-making process. The list of NCTF impacts (that is, impacts that might occur as a result of a decision to delay or not to construct a transportation facility) contained 26 impact categories with a 5-point rating scale for both adequacy and importance of each category. Final ratings reported for both the adequacy and importance responses were organized as follows:

1. Impact categories for which the average rating was not, by statistical calculation, significantly different from the center-point, were listed as being of uncertain adequacy or of uncertain importance.

2. Impact categories that were statistically different from the center-point in a positive direction were listed as adequate or important.

3. Impact categories that were statistically different from the center-point in a negative direction were listed as inadequate or irrelevant.

Analysis to establish the significance of the ratings included various cross-tabulations of adequacy and relevance ratings; for example, where an impact category for which the methodologies were rated inadequate and the importance to decision-making was rated usually relevant, it was judged to be deficient. Several analyses were made to derive composite ratings of deficiencies and priorities for further research. Data in Table A-3 summarize the priorities obtained from the cross-tabulations. Based on the assessments provided by the administrators and transportation planners in the state transportation agencies, the following NCTF impact categories were suggested for research:

- *1st Priority* (socioeconomic and demographic changes; neighborhood and community cohesion and quality of neighborhood life; changes in neighborhood amenity).
- *2nd Priority* (economic impact of regional accessibility changes; impacts on business operations; impacts on land development opportunities).
- *3rd Priority* (changes in neighborhood facilities and services; changes in property values; effects on wetlands and aquatic life ecosystems; aesthetic impacts).

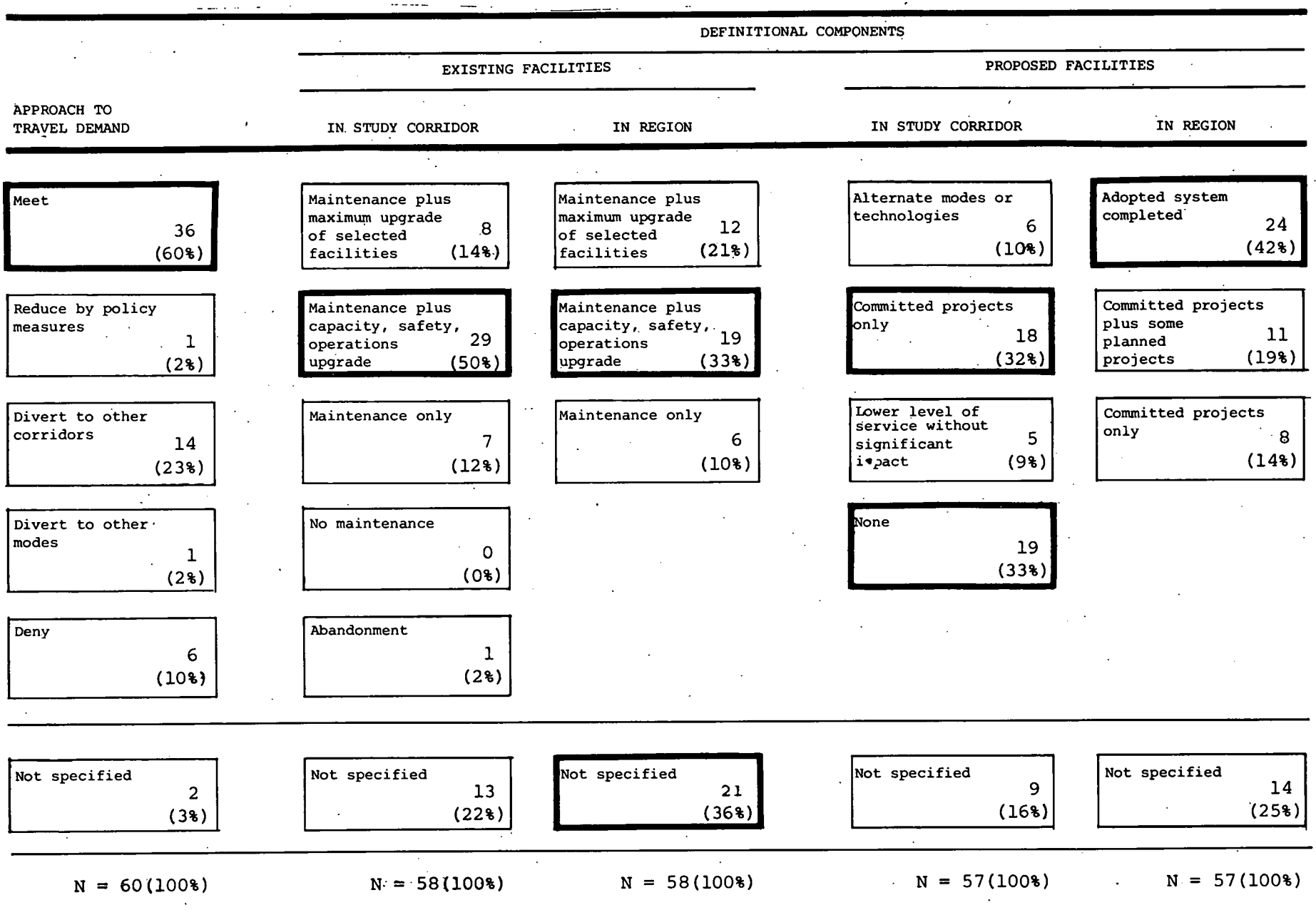


Figure A-1. Project questionnaire—assumptions used to define NCTF alternative.

TABLE A-3

ADMINISTRATIVE QUESTIONNAIRE—IMPACT ASSESSMENT DEFICIENCIES

IMPACT CATEGORIES	"ADEQUATE"	"USUALLY RELEVANT"	COMPOSITE RATING: PRIORITY FOR RESEARCH
TRANSPORTATION IMPACTS			
Net change in travel time	■	■	
Accident reductions or increases	■	■	
Changes in the quality of transportation services	■	■	
Effects on existing transportation facilities	■	■	
Changes in travel demand	■	■	
SOCIAL IMPACTS			
Changes in accessibility to community activities	■	■	
Changes in neighborhood facilities and services		■	3
Socio-economic and demographic changes		■	1
Actual and anticipated displacement effects	■	■	
Neighborhood and community cohesion and quality of neighborhood life		■	1
Changes in neighborhood amenity		■	1
ECONOMIC IMPACTS			
Impact of transportation capital expenditures on regional expenditures and employment			
Economic impact of regional accessibility changes		■	2
Resource and raw materials impacts			
Changes in property values		■	3
Impacts on business operations		■	2
Economic impacts due to relocation	■	■	
Impacts on land development opportunities		■	2
ENVIRONMENTAL IMPACTS			
Noise impacts	■	■	
Air pollution impacts	■	■	
Water resources and drainage impacts	■	■	
Impacts of natural features and land forms	■	■	
Open space and historic resource impacts (including Section 4(f) lands)	■	■	
Effects on wildlife and vegetation ecosystems	■	■	
Effects on wetland and aquatic life ecosystems		■	3
Aesthetic impacts		■	3
Totals 26 (100%)	14(54%)	24(92%)	10(38%)

N = 38 State Transportation Agencies

Key: 1 = definitely deficient methodologies
2 = probably deficient methodologies
3 = possible deficient methodologies

An additional question was included to identify impacts that were not being given sufficient attention in current assessment of NCTF. Responses are summarized in Table A-4. Planning process impacts were most frequently mentioned (32 percent). Agencies reported that in a number of cases, an NCTF decision has forced a reassessment of other transportation projects or a reevaluation of an area's entire transportation system. Such reassessments often found that the NCTF decision had substantial negative effects on proposed facilities, but that no analysis to anticipate this type of impact has been done prior to the NCTF decision. They recommended that an analysis of an NCTF alternative include an analysis of the impacts at a systems planning level.

Finally, socioeconomic impacts in general were felt to need more attention in the analysis of NCTF impacts. A number of specific impacts, including energy impacts and impacts on community tax base, also were frequently mentioned.

The project questionnaire was also used to assess the adequacy and importance of various categories of impact for the reported NCTF projects. For each project for which a questionnaire was returned, a 5-point rating scale for both adequacy and importance was filled out for the 26 impact categories previously described for the administrative questionnaire. By grouping the composite ratings with respect to project scale and context, an assessment of variation in methodological adequacy and decision-making importance by project type was derived. This is presented in Table A-5.

Several differences emerged from interpretation of the respective returns of the administrative and project questionnaires.

In general, social impacts were rated more deficient in the administrative questionnaire than for any individual category in the project questionnaire. This may have been a function of the universe of NCTF projects for which project questionnaires were returned.

Ratings from the administrative questionnaire tended to parallel returns from the large urban projects, indicating that they were weighted towards more complex situations.

Small projects had a lower frequency of deficiency ratings across transportation, social, economic, and environmental groupings than large projects. Inclusion of "deficient" ratings for both transportation and environmental categories for project prototypes may have indicated either age of projects (e.g., use of obsolete methodologies which have been superseded), inadequate analysis, or special problems for the projects that were assessed.

TABLE A-4

ADMINISTRATIVE QUESTIONNAIRE—ADDITIONAL IMPACTS REPORTED

Categories	Number of Reports	Subtotals	(%)
Planning process impacts		11	(32)
other modes	5		
system impacts	4		
change in "plans"	2		
Political or participatory impacts		5	(15)
changes in values	3		
citizen reaction	2		
Evaluation of alternatives		5	(15)
public benefits	2		
"externalities"	1		
low capital options	1		
positive impacts of NCTF	1		
General impacts		6	(18)
socio-economic changes	4		
"generally deficient"	1		
loss of "build" opportunity	1		
Specific impacts		6	(18)
energy	2		
tax base	1		
accidents	1		
maintenance	1		
change in demand	1		
Totals		34	(100)

[1] (N = 19 State Transportation Agencies)

CONCLUSIONS OF THE SURVEY

Results from the administrative questionnaire indicate a substantial diversity throughout the nation in the use of the NCTF alternative in project-related work. Approaches toward definition of the NCTF alternative, the percent of technical effort devoted to NCTF options, and the use of the NCTF alternative in decision-making varied greatly. The research team concluded that this reflected both a professional bias against the NCTF option and a lack of clear guidelines regarding the purpose of the NCTF alternative and methods for its analysis.

A review of the adequacy of the methodologies for NCTF impact assessment and the importance of various types of impacts to decision-making led to clear conclusions. Nearly all of 26 impact categories were judged to be important; however, only 14 categories were judged to have adequate methodologies available for prediction of NCTF impacts. By jointly evaluating the adequacy and importance ratings, 12 categories were identified for further research: three categories of social impact were assigned first priority as most deficient; three categories of economic impact were assigned second priority; and four categories of impact (including social, economic, and environmental) were assigned third priority.

QUESTIONNAIRE FORMS

Figures A-2 and A-3 are blank forms of the administrative and project questionnaires.

TABLE A-5

PROJECT QUESTIONNAIRE—IMPACT ASSESSMENT PROBLEM AREAS BY PROJECT TYPE

IMPACT CATEGORIES	COMPARISON OF RANK ORDERINGS						
	ADMINISTRATIVE QUESTIONNAIRE	PROJECT PROTOTYPES					
		URBAN		SUBURBAN		RURAL	
		LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
TRANSPORTATION IMPACTS							
Net change in travel time				3	3		
Accident reductions or increases				3	3		
Changes in the quality of transportation services		3		3			
Effects on existing transportation facilities						3	
Changes in travel demand		3	3	2	3	3	
SOCIAL IMPACTS							
Changes in accessibility to community activities		2		3	3	3	
Changes in neighborhood facilities and services	2			3	2	3	3
Socio-economic and demographic changes	1	2	3	3	3	3	3
Actual and anticipated displacement effects				3		3	
Neighborhood and community cohesion and quality of neighborhood life	1	2		3	2	3	3
Changes in neighborhood amenity	1	2		3	2	3	3
ECONOMIC IMPACTS							
Impact of transportation capital expenditures on regional expenditures and employment	3	3		2	2	2	3
Economic impact of regional accessibility changes	2	3	3	3	3	3	3
Resource and raw materials impacts	3	3				3	
Changes in property values	2	2	3	3	2	3	3
Impacts on business operations	2	2		3	2	3	
Economic impacts due to relocation		3		3		3	
Impacts on land development opportunities	2	3	3	3	2	3	3
ENVIRONMENTAL IMPACTS							
Noise impacts				3	2	2	3
Air pollution impacts				3	3	3	
Water resources and drainage impacts				3		3	
Impacts of natural features and land forms		2		2		3	
Open space and historic resource impacts (including Section 4(f) lands)				3		3	
Effects on wildlife and vegetation ecosystems		3			3	2	
Effects on wetland and aquatic life ecosystems	2	3		3		3	
Aesthetic impacts	2	3		2		3	

[1] Key: 1 = definitely deficient methodologies
2 = probably deficient methodologies
3 = possibly deficient methodologies

ADMINISTRATIVE QUESTIONNAIRE

NCHRP 8-11

THE SOCIAL, ECONOMIC AND ENVIRONMENTAL CONSEQUENCES OF NOT CONSTRUCTING A TRANSPORTATION FACILITY

Sponsor: National Cooperative Highway Research Program
Transportation Research Board
National Research Council
National Academy of Sciences
NCHRP Project Engineer - R. Ian Kingham
(202) 389-6741

Principal Investigator: Jonathan S. Lane, Partner
David A. Crane and Partners/DACP, Inc.
334 Boylston Street
Boston, MA 02116
(617) 262-0953

Instructions: To be filled out by the Commissioner, Director, or Chief Engineer of the State Transportation Agency.

NAME OF PERSON COMPLETING THIS QUESTIONNIARE: _____ POSITION: _____

TELEPHONE: _____

SECTION A: NCTF* (NO BUILD) PROJECTS

1 ARE YOU AWARE OF ANY MAJOR TRANSPORTATION PROJECTS WITHIN YOUR JURISDICTION WHICH WERE PROPOSED, BUT FOR WHICH A DECISION WAS SUBSEQUENTLY MADE NOT TO CONSTRUCT THE TRANSPORTATION FACILITY OR TO SUBSTANTIALLY DELAY CONSTRUCTION? (Please list them below.)

NAME OF FACILITY	TYPE OF FACILITY	APPROXIMATE LOCATION	TIME PERIOD

*Not Constructing a Transportation Facility

Figure A-2. Administrative questionnaire.

SECTION B: EVALUATION OF IMPACT ANALYSIS METHODOLOGIES

Instructions: A list of impacts which might result from an NCTF (no build) alternative are presented below by categories. We are interested in your assessment of two factors: the technical adequacy of the methodologies generally used to predict these impacts; and the importance of the various impacts within the context of the overall transportation decision-making process. Based on your experience and professional judgement, please answer the two questions below for each of the impact categories listed. Indicate your answer by putting an "X" in the circle that most nearly describes your assessment.

	2 WHAT IS YOUR BROAD ASSESSMENT OF THE TECHNICAL ADEQUACY OF THE METHODOLOGIES GENERALLY USED TO PREDICT THE FOLLOWING NCTF (NO BUILD) IMPACTS? inadequate 1 2 3 4 5 adequate	3 HOW IMPORTANT HAVE THE FOLLOWING NCTF (NO BUILD) IMPACTS BEEN WITHIN THE OVERALL TRANSPORTATION DECISION-MAKING PROCESS? usually irrelevant 1 2 3 4 5 usually relevant
TRANSPORTATION IMPACTS		
• Net change in travel times	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Accident reductions or increases	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Changes in the quality of transportation services	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Effects on existing transportation facilities	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Changes in travel demand	○ ○ ○ ○ ○	○ ○ ○ ○ ○
SOCIAL IMPACTS		
• Changes in accessibility to community activities	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Changes in neighborhood facilities and services	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Socio-economic and demographic changes	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Actual and anticipated displacement effects	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Neighborhood and community cohesion and quality of neighborhood life	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Changes in neighborhood amenity	○ ○ ○ ○ ○	○ ○ ○ ○ ○

(continued)

	WHAT IS YOUR BROAD ASSESSMENT OF THE TECHNICAL ADEQUACY OF THE METHODOLOGIES GENERALLY USED TO PREDICT THE FOLLOWING NCTF (NO BUILD) IMPACTS? inadequate 1 2 3 4 5 adequate	HOW IMPORTANT HAVE THE FOLLOWING NCTF (NO BUILD) IMPACTS BEEN WITHIN THE OVERALL TRANSPORTATION DECISION-MAKING PROCESS? usually irrelevant 1 2 3 4 5 usually relevant
ECONOMIC IMPACTS		
• Impact of transportation capital expenditures on regional expenditures and employment	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Economic impact of regional accessibility changes	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Resource and raw materials impacts	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Changes in property values	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Impacts on business operations	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Economic impacts due to relocation	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Impacts on land development opportunities	○ ○ ○ ○ ○	○ ○ ○ ○ ○
ENVIRONMENTAL IMPACTS		
• Noise impacts	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Air pollution impacts	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Water resources and drainage impacts	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Impacts on natural features and land forms	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Open space and historic resource impacts (including Section 4(f) Lands)	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Effects on wildlife and vegetation ecosystems	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Effects on wetland and aquatic life ecosystems	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Aesthetic impacts	○ ○ ○ ○ ○	○ ○ ○ ○ ○

Figure A-2—(Continued).

4 ARE THERE ANY IMPACTS THAT MIGHT RESULT FROM AN NCTF (NO-BUILD) ALTERNATIVE THAT YOU FEEL ARE NOT BEING GIVEN SUFFICIENT ATTENTION?

SECTION C: USE OF NCTF (NO BUILD) ALTERNATIVES

5 IN DEFINING THE NCTF (NO-BUILD) ALTERNATIVE, WHAT ASSUMPTIONS DO YOU NORMALLY MAKE WITH RESPECT TO EXISTING AND PROPOSED FACILITIES IN THE STUDY CORRIDOR AND THE REGION? DO YOU NORMALLY ASSUME, FOR EXAMPLE, THAT NO ACTION WHATSOEVER WILL BE TAKEN? MAINTENANCE ONLY? SELECTIVE IMPROVEMENTS? MAXIMUM UPGRADE? COMPLETION OF THE ADOPTED TRANSPORTATION SYSTEM? (Please explain)

6 IN THE ENVIRONMENTAL ASSESSMENT PROCESS, WHAT PERCENTAGE OF YOUR TECHNICAL EFFORT IN DEVELOPING AND EVALUATING ALTERNATIVES IS NORMALLY DEVOTED TO THE NCTF ALTERNATIVE? (Please explain)

7 GIVEN NORMAL CONSTRAINTS ON TIME AND STAFF WITHIN WHICH YOUR AGENCY MUST WORK, DO YOU CONSIDER THIS EFFORT LEVEL TO BE: (Circle one)

Insufficient to deal with the impacts fully		adequate/average		excessive (more than is generally warranted by the situation)
1	2	3	4	5

8 HOW DO YOU FEEL THE NCTF ALTERNATIVE IS MOST FREQUENTLY USED: (Circle one)

a. as a "benchmark" to determine the effectiveness of various alternatives?
b. as a procedural technique to identify the positive and negative aspects of a project?
c. as a "pro forma" compliance with environmental protection legislation and guidelines?
d. as a "strawman" argument to justify the need for a project?
e. other (please explain)

9 REQUEST FOR MATERIALS: IF YOU HAVE MATERIALS (SUCH AS ENVIRONMENTAL IMPACT STATEMENTS, STUDIES, REPORTS, ETC.) WHICH SHOW THE USE OF METHODOLOGIES PARTICULARLY SUITED TO THE ANALYSIS OF NCTF (NO BUILD) IMPACTS, WE WOULD APPRECIATE YOUR SENDING US A COPY. THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.

Figure A-2—(Continued).

PROJECT QUESTIONNAIRE

NCHRP 8-11

THE SOCIAL, ECONOMIC AND ENVIRONMENTAL CONSEQUENCES OF NOT CONSTRUCTING A TRANSPORTATION FACILITY

Sponsor: National Cooperative Highway Research Program
Transportation Research Board
National Research Council
National Academy of Sciences
NCHRP Project Engineer - R. Ian Kingham
(202) 389-6741

Principal Investigator: Jonathan S. Lane, Partner
David A. Crane and Partners/DACP, Inc.
334 Boylston Street
Boston, MA 02116
(617) 262-0953

Instructions: One copy of this Project Questionnaire is to be filled out for each major transportation project within your jurisdiction which was proposed, but for which a decision was subsequently made not to construct the facility, or to substantially delay construction. This Questionnaire should be filled out by a Project Engineer or other person knowledgeable about the specific project.

NAME OF PERSON COMPLETING THIS QUESTIONNAIRE: _____ POSITION: _____

TELEPHONE: _____

SECTION A: PROJECT CHARACTERISTICS AND CHRONOLOGY

(Please fill in the following information)

1

- NAME OF PROJECT OR FACILITY: _____
- DESIGNATION NUMBER(S): _____
- APPROXIMATE LOCATION:
  - AT (OR) FROM: _____
  - TO: _____
- STATE _____ _____
- COUNTY _____ _____
- CITY (TOWN) _____ _____
- MODE (HIGHWAY, TRANSIT, ETC.): _____
- SCALE (NUMBER OF LANES, TRACKS, ETC.): _____
- APPROXIMATE LENGTH: _____
- APPROXIMATE COSTS:
  - AS ORIGINALLY PROPOSED: $ _____
  - AT TIME OF NCTF* DECISION: $ _____
    (OR)
  - MOST CURRENT: $ _____
- TYPE OF AREAS INVOLVED: (Circle)

URBAN	RESIDENTIAL
SUBURBAN	COMMERCIAL
RURAL	INDUSTRIAL
WILDERNESS	AGRICULTURAL
	RECREATIONAL

*Not Constructing a Transportation Facility

Figure A-3. Project questionnaire.

2 BRIEF DESCRIPTION OF THE FACILITY'S PURPOSE:

3 PROJECT CHRONOLOGY: (As applicable; please note date and lead agency)

- o PROPOSAL: _____
- o LOCATION STUDY: _____
- o DRAFT ENVIRONMENTAL IMPACT STATEMENT: _____
- o PUBLIC HEARING(S): _____
- o FINAL ENVIRONMENTAL IMPACT STATEMENT: _____
- o DESIGN STUDY: _____
- o PUBLIC HEARING(S): _____
- o RIGHT-OF-WAY ACQUISITION: _____ STARTING DATE: _____ ACRES ACQUIRED: _____ DISPLACEMENT: _____
- o START OF CONSTRUCTION: _____
- o STOP OF CONSTRUCTION: _____
- o DATE OF DECISION (NOT TO CONSTRUCT) (TO SUBSTANTIALLY DELAY): _____

3

SECTION B: MAJOR ISSUES

4 WHAT WERE THE MAJOR ISSUES SURROUNDING THE PROJECT?

	ANTICIPATED BENEFITS	ADVERSE EFFECTS
TRANSPORTATION		
SOCIAL		
ECONOMIC		
ENVIRONMENTAL		

4

Figure A-3—(Continued)

5 WHY WAS THE DECISION MADE (NOT TO BUILD) (TO DELAY) THIS FACILITY?

6 WHAT IS THE PRESENT STATUS OF THIS PROJECT?

7 HAVE THERE BEEN ANY SUBSTITUTE PROPOSALS DEVELOPED FOR THIS FACILITY SINCE THE NCTF DECISION (INVOLVING, FOR EXAMPLE, A NEW LOCATION, A DIFFERENT MODE, SUBSTANTIAL REDESIGN, IMPROVEMENTS IN OTHER CORRIDORS, ETC.)?

8 DO YOU KNOW OF ANY SPECIAL STUDIES RELATED TO THIS FACILITY WHICH HAVE BEEN DONE BY OTHER AGENCIES, ACADEMIC GROUPS, ETC., OR DONE FOR TECHNICAL AND PROFESSIONAL JOURNALS? (Please list)

9 WHAT NEWSPAPERS WOULD HAVE CARRIED ARTICLES ABOUT EVENTS SURROUNDING THE PROJECT? (Please note name and location)

SECTION C: DEFINITION OF THE NCTF (NO BUILD) ALTERNATIVE

10 WAS THERE AN EXPLICIT NCTF (NO BUILD) ALTERNATIVE INCLUDED IN THE IMPACT STUDIES FOR THIS PROJECT?

Instructions: The next five questions are multiple choice questions that deal with the assumptions made in defining the NCTF (no build) alternative for this project. For each question, please circle the letter of the answer that most nearly describes that assumptions (either explicit or implicit) that were made. Write in any changes needed to make the answer accurately reflect the assumptions made for this project.

11 WHAT POLICY POSITION WAS TAKEN IN THIS PROJECT WITH RESPECT TO MEETING PREDICTED TRAVEL DEMAND? (circle one)

a. Meet predicted travel demand
b. Divert predicted travel demand to other corridors
c. Divert predicted travel demand to other modes
d. Reduce predicted travel demand by policy measures
e. Deny predicted travel demand
f. Not specified

Figure A-3—(Continued)

12 WHAT ASSUMPTIONS WERE MADE UNDER THE NCTF ALTERNATIVE ABOUT PROPOSED FACILITIES IN THE STUDY CORRIDOR? (Circle One)

a. No proposed facilities included in analyses
b. Only significantly committed projects included
c. Alternative modes of transportation or new technologies
d. Assumed proposed facilities would not have significant impact
e. Not specified

13 WHAT ASSUMPTIONS WERE MADE UNDER THE NCTF ALTERNATIVE ABOUT PROPOSED FACILITIES IN THE REGION? (Circle one)

a. Only committed projects included in the analysis
b. Committed projects and some planned projects
c. Assumed the planned or adopted system would be completed
d. Not specified

14 WHAT ASSUMPTIONS WERE MADE UNDER THE NCTF ALTERNATIVE ABOUT EXISTING FACILITIES IN THE STUDY CORRIDOR? (Circle one)

a. Abandonment
b. No maintenance
c. Maintenance only
d. Maintenance plus capacity, safety and operations improvements
e. Maintenance plus maximum improvement of selected facilites
f. Not specified

15 WHAT ASSUMPTIONS WERE MADE UNDER THE NCTF ALTERNATIVE ABOUT EXISTING FACILITIES IN THE REGION? (Circle one)

a. Maintenance only
b. Maintenance plus capacity, safety and operations improvements
c. Maintenance plus maximum improvement of selected facilities
d. Not specified

SECTION D: EVALUATION OF IMPACT ANALYSIS METHODOLOGIES

Instructions: A list of impacts which might result from an NCTF (no build) alternative are presented below by categories. We are interested in your assessment of two factors: the technical adequacy of the methodologies used to predict these impacts, and the importance of the various impacts within the context of the overall transportation decision-making process surrounding this project. Based on your experience and professional judgement, please answer the two questions below for each of the impact categories listed. Strike out those impacts that are not dealt with in this project. Indicate your answer by putting an "X" in the circle that most nearly describes your assessment.

	16 WHAT IS YOUR ASSESSMENT OF THE TECHNICAL ADEQUACY OF THE METHODOLOGIES USED TO PREDICT THE NCTF (NO BUILD) IMPACTS FOR THIS PROJECT? Inadequate 1 2 3 4 5 adequate	**17** HOW IMPORTANT HAVE THE FOLLOWING NCTF (NO BUILD) IMPACTS BEEN IN THE DECISION-MAKING PROCESS FOR THIS PROJECT? Irrelevant 1 2 3 4 5 relevant
TRANSPORTATION IMPACTS		
• Net change in travel time	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Accident reductions or increases	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Changes in the quality of transportation services	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Effects on existing transportation facilities	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Changes in travel demand	○ ○ ○ ○ ○	○ ○ ○ ○ ○
SOCIAL IMPACTS		
• Changes in accessibility to community activities	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Changes in neighborhood facilities and services	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Socio-economic and demographic changes	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Actual and anticipated displacement effects	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Neighborhood and community cohesion and quality of neighborhood life	○ ○ ○ ○ ○	○ ○ ○ ○ ○
• Changes in neighborhood amenity	○ ○ ○ ○ ○	○ ○ ○ ○ ○

Figure A-3—(Continued)

(continued)

	WHAT IS YOUR ASSESSMENT OF THE TECHNICAL ADEQUACY OF THE METHODOLOGIES USED TO PREDICT THE NCTF (NO BUILD) IMPACTS FOR THIS PROJECT? (1 inadequate to 5 adequate)	HOW IMPORTANT HAVE THE FOLLOWING NCTF (NO BUILD) IMPACTS BEEN IN THE DECISION-MAKING PROCESS FOR THIS PROJECT? (1 irrelevant to 5 relevant)
ECONOMIC IMPACTS		
• Impact of transportation capital expenditures on regional expenditures and employment	1 2 3 4 5	1 2 3 4 5
• Economic impact of regional accessibility changes	1 2 3 4 5	1 2 3 4 5
• Resource and raw materials impacts	1 2 3 4 5	1 2 3 4 5
• Changes in property values	1 2 3 4 5	1 2 3 4 5
• Impacts on business operations	1 2 3 4 5	1 2 3 4 5
• Economic impacts due to relocation	1 2 3 4 5	1 2 3 4 5
• Impacts on land development opportunities	1 2 3 4 5	1 2 3 4 5
ENVIRONMENTAL IMPACTS		
• Noise impacts	1 2 3 4 5	1 2 3 4 5
• Air pollution impacts	1 2 3 4 5	1 2 3 4 5
• Water resources and drainage impacts	1 2 3 4 5	1 2 3 4 5
• Impacts of natural features and land forms	1 2 3 4 5	1 2 3 4 5
• Open space and historic resource impacts (including Section 4(f) Lands)	1 2 3 4 5	1 2 3 4 5
• Effects on wildlife and vegetation ecosystems	1 2 3 4 5	1 2 3 4 5
• Effects on wetland and aquatic life ecosystems	1 2 3 4 5	1 2 3 4 5
• Aesthetic impacts	1 2 3 4 5	1 2 3 4 5

18 REQUEST FOR MATERIALS: IF YOU HAVE MATERIALS (SUCH AS ENVIRONMENTAL IMPACT STATEMENTS, STUDIES, REPORTS, ETC.) WHICH SHOW THE USE OF METHODOLOGIES PARTICULARLY SUITED TO THE ANALYSIS OF NCTF (NO BUILD) IMPACTS, WE WOULD APPRECIATE YOUR SENDING US A COPY. THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.

Figure A-3—(Continued)

APPENDIX B

CASE STUDIES

INTRODUCTION

Appendix B contains case studies of four projects for which decisions were made not to construct a transportation facility (NCTF) or to delay construction. (NCTF is an acronym for *N*ot *C*onstructing *T*ransportation *F*acilities. Since the acronym was used in the research at the time of the case studies, it has been used throughout this appendix.) The case study projects were:

1. I-95 North, Boston, Massachusetts (NCTF).
2. Riverfront Expressway (I-310), New Orleans, Louisiana (NCTF).
3. Crosstown Expressway (I-494), Chicago, Illinois (delayed).
4. Southern Bay Crossing, San Francisco, California (NCTF).

The case studies were done to supplement the state-of-the-art review by providing a close look at a variety of projects where NCTF decisions were made. The case studies contributed to the over-all understanding of the phenomena surrounding NCTF decisions and were used to aid in the formulation of the guidelines.

The selection of the cases was carried out with the advice of the NCHRP Panel. The four cases previously listed were picked to achieve maximum breadth of coverage of NCTF experience in terms of type of facility, city size, and geographic location. The analysis plan for the case studies and the selection rationale are presented in the following section.

RESEARCH QUESTIONS, CASE SELECTION, AND ANALYSIS DATA

This section contains detailed discussions of the following:

1. Research questions for the case study effort. This provides an explanation of the research purposes and an outline of the questions that were addressed.
2. Case selection. During the early phases of the research, a number of possible approaches to the selection of case studies were drafted and presented to the NCHRP Panel for review and comment. As a result, the four cases documented here were designated for study. This section reviews the options that were reviewed and presents the choices that were made.
3. Analysis procedures. This general review of the approach to the case studies includes comments on problems encountered and a short review of the procedures used to analyze the case survey forms. Copies of the survey forms are included at the end of this appendix (see Fig. B-5).

Research Questions for the Case Study Effort

The case study involved a review and documentation of actual experience with NCTF decisions. The case studies were intended to include projects where actual NCTF decisions had been made and where the effects of the NCTF decisions could be perceived. The in-depth analysis of the case studies focused on three topics of concern: the predicted and actual effects of the NCTF decision; the methodological approach and adequacy of data used in describing the NCTF alternative; and the use of the NCTF alternative in the decision-making process.

Within each of these general topic areas, specific research questions were delineated:

Topic Area 1—Predicted and Actual Effect of NCTF Decisions

This topic involved the following research questions:

- 1.1 What impacts of NCTF were studied? What impacts were predicted?
- 1.2 What were the actual impacts of NCTF? How did these compare to predicted impacts?
- 1.3 What NCTF impacts were perceived as significant after the NCTF decision? How did these compare to those impacts that were anticipated prior to the decision?
- 1.4 After an NCTF decision, were there any differences between perceived and measured impacts?

Definitive determination of the actual impacts of an NCTF decision was infeasible within the framework of the present project. Too few cases existed for a controlled evaluation approach, and, for most of the projects, sufficient time had not elapsed to accurately assess the effects of the NCTF decision. Given this, attention was focused on answering question 1.3. Where quantified predictions about the effects of an NCTF decision had been made, they were evaluated; however, these were infrequent.

Topic Area 2—Impact Prediction Methodologies

This topic involved the following research questions:

- 2.1 What methodologies were used to predict NCTF impacts?
- 2.2 Which were reliable?
- 2.3 Which were valid?

Three of the four projects (the Riverfront Expressway, the Crosstown Expressway, and the Southern Bay Crossing) were planned prior to the institution of NEPA. As a result, documentation of an NCTF alternative was generally not included in project reports. Where analysis of

NCTF alternatives was done, as in the Boston case, the findings concerning NCTF impact prediction methodologies were incorporated into the guidelines, where applicable.

Topic 3—Role of NCTF in Decision-Making

This topic involved the following research questions:

- 3.1 Was there an NCTF alternative, and if so, how was it defined?
- 3.2 Was the NCTF alternative, as defined, perceived as a real decision choice? Were the impacts predicted "believable" and taken into account in the decision?
- 3.3 What transportation improvements have been or will be implemented as a result of the NCTF decision?

Figure B-1 summarizes the analytical approach proposed for each of the research questions. Changes were made where data were not available; in all cases this was in the direction of less rigorous analysis. This shift was in accord with the NCHRP Panel conclusion, after review of initial information on NCTF projects throughout the country, that there was a substantial need for documentation of a wide variety of NCTF cases during Phase I of the research, rather than an attempt at detailed analysis of a few impacts.

Case Selection

Case Search Procedure

The case selection process is shown in Figure B-2. The case search was initiated through contact with knowledgeable personnel at DOT, UMTA, FHWA, and CEQ. Additional sources included transportation literature, prior case studies, and review of the newspaper coverage in the *New York Times,* the *Wall Street Journal,* and elsewhere. After formulation of a master list, a search was undertaken relying on local newspapers to derive an up-to-date status report on each project, determine whether or not an NCTF decision had been made, and identify major issues or concerns that surrounded each project.

Based on the press search and review of available technical literature, characteristics of the potential NCTF cases for detailed study were summarized as an aid to deciding which cases would be selected. This is summarized in Table B-1 and included the following categories of information, judged to be relevant to the case selection process:

- *Facility description*—including scale of facility, functional type of facility (radial, circumferential, etc.) and mode.
- *Area description*—including SMSA size and area type (urban, rural, etc.).
- *Documentation*—including presence of EIS, whether or not NCTF alternatives and analysis had been performed, and a general evaluation of the over-all status of documentation for each case.
- *Decision sequence*—summarizing the actual status of the project (delay versus NCTF) and the time elapsed since project conception, detailed engineering studies, and the actual decision.

Because of the large number of cases, information in all categories was not found for each case; however, the information available was adequate to support the basic determination of cases which should be selected for detailed study. It should be noted that Table B-1 was developed prior to receipt of all returns for the project questionnaires reported in Appendix A.

Of the cases reviewed prior to case study selection, the following observations were made. Almost all were major actions. A broad variety of facility types were represented. The great majority were highway projects because of the comparatively small amount of transit planning and construction in the last 20 years.

Over 80 percent were located in urban or suburban areas because of the relatively less controversial nature of rural highway construction. Over half had environmental impact statements prepared.

In general, projects originally were proposed 15 to 30 years ago, were engineered in preliminary form 10 to 20 years ago, and had an NCTF decision or substantial delay within the last five years. And the cases were relatively evenly divided between NCTF and delay status.

Based on review of the foregoing information, 23 projects were chosen prior to selection of four to eight cases for detailed study. Since the case studies clearly could not include all the characteristics in Table B-1, the list of 23 projects was formulated based on exclusion of cases with the following characteristics:

- *Minor action projects,* because the overwhelming number of the cases were major actions and the level of documentation surrounding minor action projects was limited.
- *Interregional facilities,* because development effects are extremely long term and substantially different in character from the urban/suburban type of facilities which comprise the large majority of cases.
- *Transit projects,* because the level of analysis and examination of alternatives have tended to be far less rigorous than highway projects, and because of the relative scarcity of major transit project planning during the past 20 years.
- *Facilities in rural or wilderness areas,* because the problems associated with these areas appear substantially less common-place than those found in urbanized areas.
- *Facilities for which available level of documentation was judged to be poor.*
- *Facilities which had been delayed only,* because nearly all of the facilities for which distinct NCTF decisions were made had undergone substantial delay periods, and it was judged that the limitation to NCTF cases only would include the delay factor and would also give comparability to the cases to be studied.

The distribution of the remaining 23 cases by type of facility and SMSA size is shown in Figure B-3.

Case Selection Options and Recommendations

Four alternative approaches were defined for organization of the case study phase of the work. The approaches

[1] "SECONDARY" DATA CASES ONLY

[2] "FIELD AND SECONDARY" DATA CASES

( ) = OPTIONAL DATA, DEPENDING ON SPECIFIC CASE & IMPACT

RESEARCH TOPICS	SPECIFIC RESEARCH QUESTIONS	TABLE OF DATA COLLECTED: BEFORE NCTF — ACTUAL MEASURED CONDITIONS	BEFORE NCTF — PERCEIVED CONDITIONS	BEFORE NCTF — PREDICTED IMPACTS OF NCTF	BEFORE NCTF — ANTICIPATED IMPACTS OF NCTF	AFTER NCTF — ACTUAL MEASURED CONDITIONS	AFTER NCTF — PERCEIVED CONDITIONS	AFTER NCTF — PERCEIVED CHANGE DUE TO NCTF	AFTER NCTF — RETRO-ACTIVE PREDICTIONS	AFTER NCTF — RECOLLECTIONS
TOPIC AREA PREDICTED AND ACTUAL EFFECTS OF NCTF DECISIONS	1.1 WHAT IMPACTS OF NCTF WERE STUDIED?, PREDICTED?			1						
	1.2 WHAT ARE THE ACTUAL IMPACTS OF NCTF?	1,2 (3),(8)				1,2 (3),(8)				
	HOW DO THESE COMPARE TO PREDICTED IMPACTS?	1,2 (3),(8)		1		1,2 (3),(8)				
	1.3 WHAT ACTUAL NCTF IMPACTS ARE PERCEIVED AS SIGNIFICANT?							5		
	HOW DO THESE COMPARE TO IMPACTS WHICH WERE ANTICIPATED PRE-NCTF?							5		5
	1.4 AFTER NCTF: WHAT ARE THE DIFFERENCES BETWEEN PERCEIVED & MEASURED IMPACTS?	1,2 (3),(8)				1,2 (3),(8)		5		
TOPIC AREA 2 IMPACT PREDICTION METHODOLOGIES	2.1 WHAT METHODOLOGIES WERE USED TO PREDICT NCTF IMPACTS?			1						
	2.2 WHICH ARE RELIABLE?			1,4						
	2.3 WHICH ARE VALID? APPROACH "A"	1,2 (3),(8)		1		1,2 (3),(8)				
	APPROACH "B"			1						
	APPROACH "C"			1				5		
TOPIC AREA 3 ROLE OF THE NCTF ALTERNATIVE IN THE DECISION PROCESS	3.1 WAS THERE AN NCTF ALTERNATIVE, AND HOW WAS IT DEFINED?			1						6
	3.2 WAS NCTF PERCEIVED AS A REAL DECISION CHOICE WITH BELIEVABLE IMPACTS?			1						6
	3.3 WHAT TRANSPORTATION IMPROVEMENTS HAVE BEEN/WILL BE IMLEMENTED AS A RESULT OF THE NCTF DECISION?					7				

DATA COLLECTION ACTIVITY LEGEND

SECONDARY DATA SOURCES
1. REVIEW PUBLISHED PROJECT DOCUMENTS
2. READILY AVAILABLE SECONDARY DATA (e.g. CENSUS, PREVIOUS STUDIES, ETC.)
3. "DERIVED" SECONDARY DATA (e.g. UTILITY CO. RECORDS, CASE RECORDS, ETC.)

PRIMARY DATA SOURCES
4. DACP SURVEY OF 50 STATES
5. INTERVIEW PLUS QUESTIONNAIRE OF 12-15 PARTICIPANTS REPRESENTING A VARIETY OF VIEWPOINTS, AGENCIES, & COMMUNITIES FOR EACH FIELD STUDY CASE
6. INTERVIEW OF DECISION MAKERS, TECHNICIANS, PARTICIPANTS FOR FIELD STUDY CASES
7. INTERVIEW WITH TRANSPORTATION AGENCY PERSONNEL
8. OTHER PRIMARY DATA SOURCES (VARIES BY CASE)

Figure B-1. Case analysis procedures.

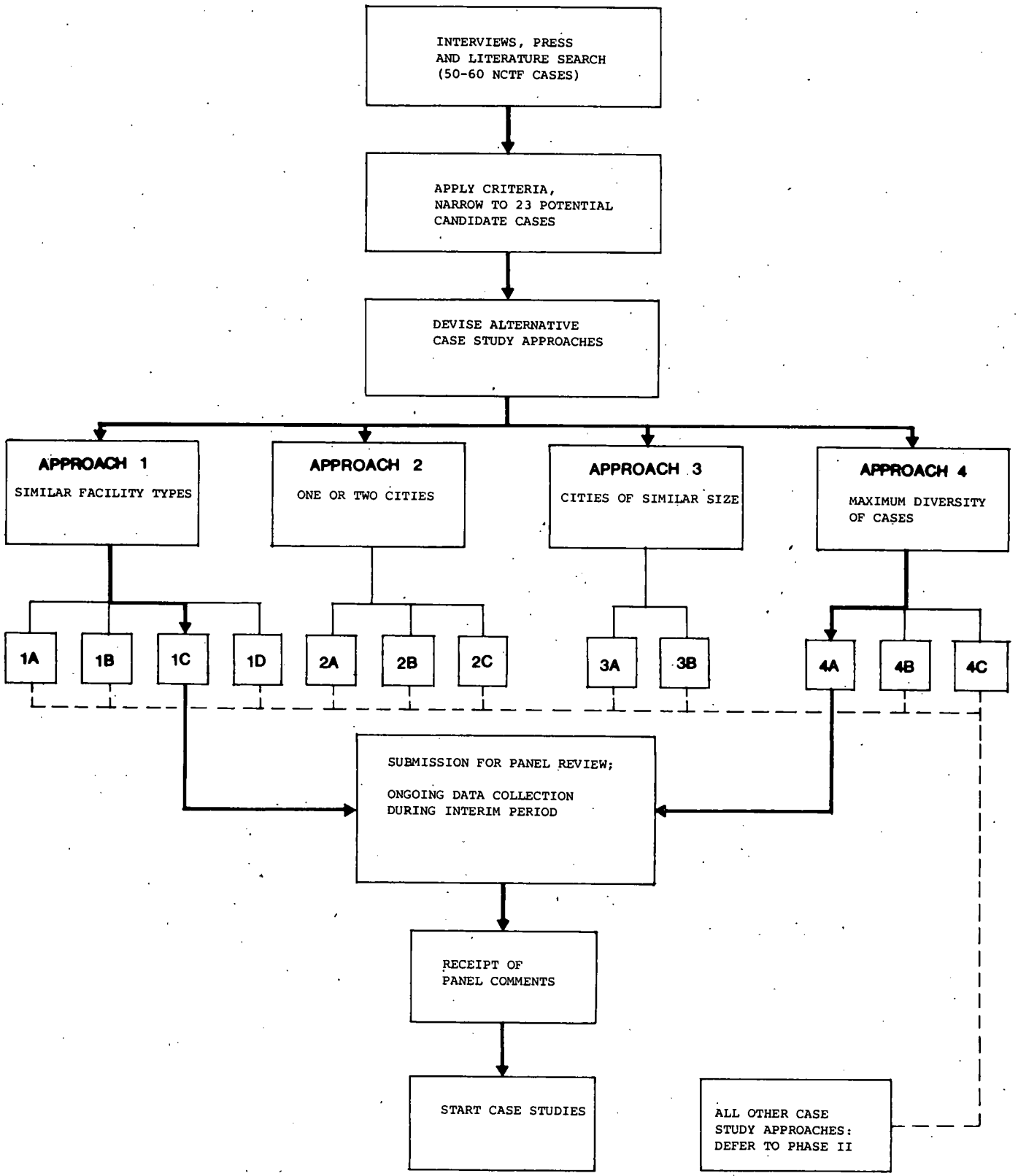


Figure B-2. Case selection process.

TABLE B-1

CHARACTERISTICS OF POTENTIAL CASES

	FACILITY DESCRIPTION			AREA DESCRIPT'N		DOCUMENTATION			DECISION SEQUENCE (YEARS ELAPSED)			
	SCALE	TYPE	MODE	SMSA SIZE	TYPE	EIS	NCTF ANALYSIS	OVERALL DOCUMENTATION	ORIGINAL PROPOSAL	DETAILED ENGINEERING STUDIES	NCTF OR DELAY DECISION	STATUS
East-West expressway (New England)	M	Inter	H	NA	W	N	N	G			3	NCTF
I-93 (N.H.)	M	Inter	H	NA	R	Y	N	P		10±	5	D
Lowell Connector Extension (MA)	M	L	H	0-.5	U	N	Y(T)	F	10±	4-5	1-2	NCTF
I-95 North (Boston, MA)	M	R	H	2-4	S	Y	Y	G	27	15	2-4	NCTF
I-95 South (Boston, MA)	M	R	M	2-4	U/S	Y	Y	G	27	13	2-4	NCTF
I-695 Inner Belt (Boston, MA)	M	L	H	2-4	U	N	Y(T)	G	27	15	3-4	NCTF
3rd Harbor Tunnel (Boston, MA)	M	SP	H/M	2-4	U	Y	Y	G	8	6-7		D
Rt. 2 Extension (Boston, MA)	M	R	H	2-4	U	N	N	G	15-25	7-10	3-4	NCTF
Meritt Pkwy. (CT)	M	Inter	H	NA	S/R	N	N			3-5	2	D
I-291 (Hartford, Ct)	M	C	H	.5-1	S	Y	Y	G	20-25	5-10	1-2	D
Hudson River Expressway (N.Y.)	M	Inter	H	NA	R	N	N			10	4	NCTF
Delaware St. Lawrence Expressway (N.Y.)	M	Inter	H	NA	R/W	N	Y	G	10+	5-10	3	NCTF
West Side Highway (N.Y.C.,N.Y.)	M	L	M	8+	U	Y	Y	G	20	4-5		D
Lower Manhattan Expressway (N.Y.C.,N.Y.)	M	L	H	8+	U	N	N		48	16	5-6	NCTF
Long Island Sound Bridge (N.Y.)	M	SP	H	8+	S	Y				9	2	NCTF
Long Island Expressway (N.Y.)	M	R	H	8+	U/S						1	NCTF
Sunrise Highway Extension (N.Y.	M	R	H	8+	S	Y	Y	G				D
Richmond Parkway (N.Y.)	M	Inter	H	8+	S	N			30±	15±	10	D

TABLE B-1—(CONTINUED)

	FACILITY DESCRIPTION			AREA DESCRIPT'N		DOCUMENTATION			DECISION SEQUENCE (YEARS ELAPSED)			
	SCALE	TYPE	MODE	SMSA SIZE	TYPE	EIS	NCTF ANALYSIS	OVERALL DOCUMENTATION	ORIGINAL PROPOSAL	DETAILED ENGINEERING STUDIES	NCTF OR DELAY DECISION	STATUS
Crosstown Expressway (Phila, Pa.)	M	L	H	4-8	U	N	Y	G	25-30	10	4	NCTF
Cobb's Creek Expressway (Phila., Pa.)	M	R	H	4-8	U	N	N	P	10-15		1	NCTF
Germantown Bypass (Phila., Pa.)	m	R	H	4-8	S	N	N	P	10	5-7		
Skybus (Pittsburgh, Pa.)	M	Inter	T	2-4	U/S	Y	N	G	10-15	8-10	3-4	
N.J. Turnpike Extension	M	Inter	H	NA	S/R	Y	N	G			4	D
Baltimore Expressways (Md.)	M	Varies	H	2	U/S	Y	Y	G	31	20±	5	D
Outer Wilmington Beltway (Del.)	M	C	H	.5	R	N	N	P	10	2-3		
12th St. Connector (Wilmington, Del.)	m	R	H	.5	U/S	N	N	P			2	D
I-95 (Prince George's County, Md.)	M	R	M	2-4	S	Y	Y	G	20+	7-10	2	NCTF
I-66 (Virginia)	M	R	M	2-4	S	Y	Y	G	20±	17	2-3	D
Three Sisters Bridge (D.C.)	M	SP	H	2-4	U	Y	N				2	D
I-40 (Memphis, Tenn.)	M	R	H	.5-1	U	Y	Y(T)	G	8-20	14	6/2	D/NCTF
St. Louis Rapid Transit System	M	Inter	T	2-4	U/S	N				5-7	2	NCTF
Stone Mountain Tollway (Atlanta, Ga.)	M	R	H	1-2	U/S	N	Y(T)	G	30	5-6	3	NCTF
I-485 (Atlanta, Ga.)	M	L	H	1-2	U/S	Y	Y	G	11	7-10	2-3	NCTF
Riverfront Expressway (New Orleans, La.)	M	L	H	1-2	U	N	N	G	30+	10-12	6	NCTF
I-410 (New Orleans, La.)	M	C	H	1-2	S	Y	Y	G			1-2	NCTF
New Mississippi Bridge (La.)	M	SP	H	1-2	S	Understudy				4-5		

TABLE B-1—(CONTINUED)

	FACILITY DESCRIPTION			AREA DESCRIPT'N		DOCUMENTATION			DECISION SEQUENCE (YEARS ELAPSED)			
	SCALE	TYPE	MODE	SMSA SIZE	TYPE	EIS	NCTF ANALYSIS	OVERALL DOCUMENTATION	ORIGINAL PROPOSAL	DETAILED ENGINEERING STUDIES	NCTF OR DELAY DECISION	STATUS
Crosstown Expressway (Chicago, Ill.)	M	C	H	4-8	U	Y	Y	G	30+	12	3-4	D
Cross Basin Connector Cincinnati, Ohio)	M	C	H	1-2	U	N	N	P	5-6			D
Cincinnati Subway (Ohio)	M	R	T	1-2	U/S	N	N	P			30+	NCTF
U.S. 191 Spur (Montana, "Big Sky")	M	RES	H	NA	W	Y	Y	[illegible]	5+	4-5	2	
I-470 (Denver, Colo.)	M	C	H	1-2	S	Y	Y	G		7	2-3	D
I-10 (Phoenix, Ariz.)	M	L	H	1-2	U	Y				8-10	1	NCTF
I-90 (Seattle, Wash.)	M	R	H	1-2	U	Y	Y	G	20+	13	2-3	D
Mt. Hood Freeway (Portland, Ore.)	M	R	H	1-2	U	Y	Y	G		10	2-3	NCTF
I-205 (Portland, Ore.)	M	R	H	1-2	U	Y	Y	G		10-15	1	D
I-505 Spur (Portland, Ore.)	M	L	H	1-2	U	Y	Y	G	12	11		D
Southern Bay Bridge (San Francisco, Cal.)	M	SP	H	2-4		N	N	G	20-30	20+	3	NCTF
Embarcadero Freeway (Cal.)	M	L	H	2-4	U	N	Y		20-25	15	7	NCTF
Foothill Freeway (Cal.)	M	R	H	2-4	S/R	Y					4	NCTF
I-105 (L.A., Cal.)	M	R	H	4-8	U/S	Y	Y	G	15-20	10	3	D
H-3 Expressway (Hawaii)	M	Inter	H	NA	R	Y					3	D
Auburn-Bothell Corridor	M	C	H	1-2	S	N	Y	G	10	6	4	NCTF

TABLE B-1—(CONTINUED)

Key:

Facility Description	Facility Scale	M	Major (new facility)
		m	minor (upgrade)
	Facility Type	R	Radial
		C	Circumferential
		L	Loop (downtown)
		SP	Bridge or Tunnel
		RES	Resource Access Facility
		INTER	Inter-Regional
	Mode	H	Highway
		T	Transit
		M	Multi-Modal
Area Description	SMSA Size	NA	Not Applicable (outside SMSA)
		0-.5	0- 0.5 million
		.5-1	0.5-1.0 million
		1-2	1.0-2.0 million
		2-4	2.0-4.0 million
		4-8	4.0-8.0 million
		8+	over 8.0 million
	Area Type	U	Urban
		S	Suburban
		R	Rural
		W	Wilderness
Documentation	EIS Availability	Y	Yes
		N	No
	Status of Available Documentation	G	Good
		F	Fair
		P	Poor
Decision Sequence	Years Elapsed		(Self-Explanatory)
	Decision Status	NCTF	Not to Construct Transportation Facility
		D	Delay

and their comparative advantages and disadvantages are summarized as follows:

1. *Approach 1—Similar Facility Types.* This would have focused on similar types of facilities (e.g., radials) in order to achieve comparability across project type under different contextual conditions. The advantage was ease of comparison between cases; the disadvantage was the potential loss of breadth and regional balance. A sub-option of this approach was to select two facility types for study, to both expand the range of geographic choices and provide an opportunity for economies where one city includes both types (e.g., Boston's Inner Belt and I-95N).

2. *Approach 2—One or Two Cities.* This approach would have been limited to only one or two geographic areas in an attempt to study several different types of facilities in a common context. The main disadvantage was the narrowness of geographic coverage, because few cities have had a large number of NCTF decisions.

3. *Approach 3—Cities of Similar Size.* This approach would have maintained SMSA size constant, while varying

both the type of facility and geographic region. In practice, based on the reduced list of candidate cases, the appropriate SMSA size ranges were from 1 million to 1.5 million and from 2.5 million to 3 million. Practically speaking, the SMSA size criterion provided little advantage in terms of comparability, since so many other variables established more meaningful differences among urban regions. Additionally, given the range of candidate cases, this approach overlapped substantially with others already mentioned.

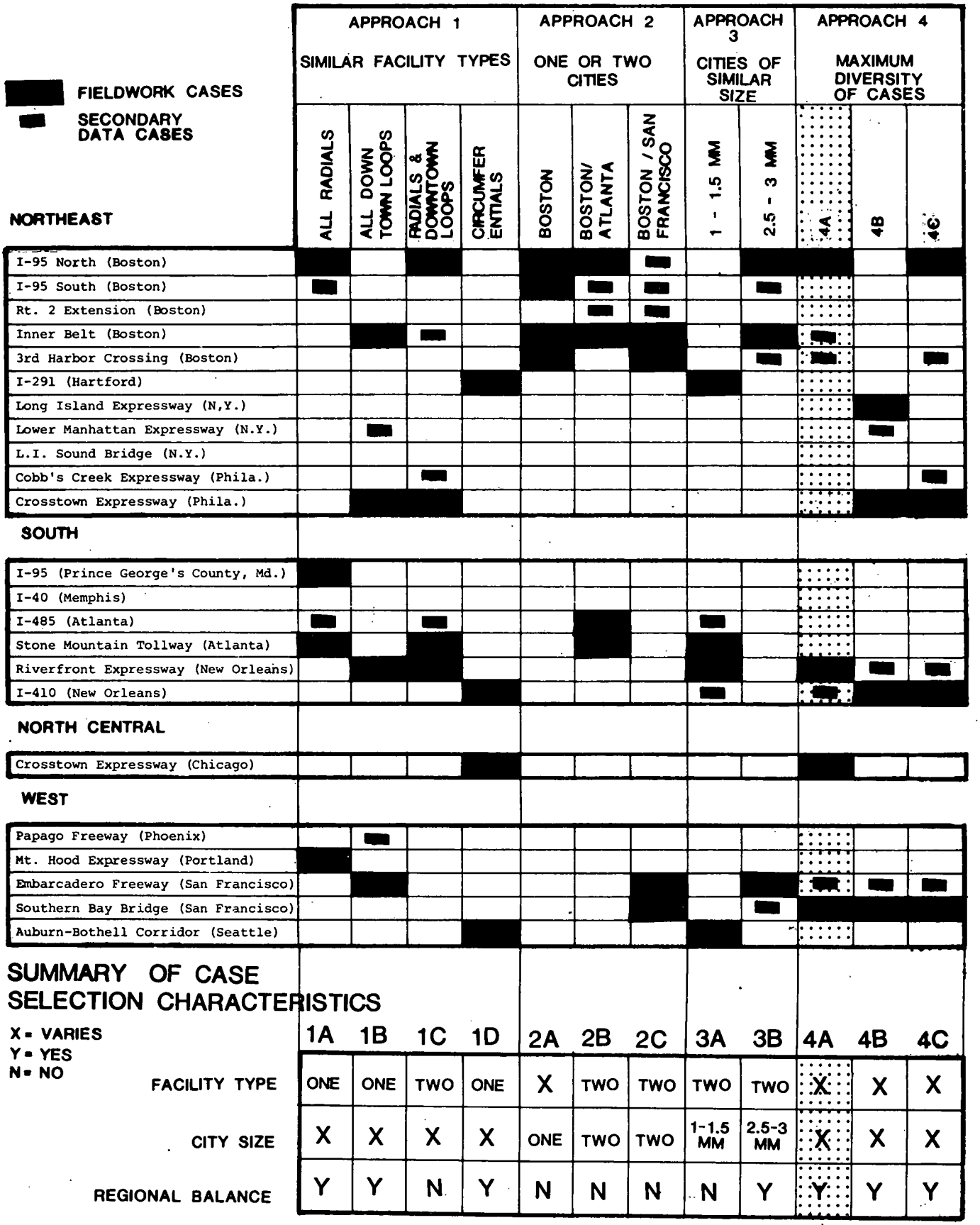
4. *Approach 4—Maximum Diversity of Cases.* This approach was derived because of the large number of variables, the relatively limited geographic coverage of the cases, and the Panel's desire for maximum diversity in case types. It provided examples of all facility types, all geographic regions (as defined by the U.S. Census), and cities of varying SMSA size. The effort for the case study phase focused on the individual characteristics of each case and minimized efforts at comparative study of cases.

Figure B-4 illustrates the potential case selection options for each of the foregoing analytical approaches. A total of 12 options (labeled 1A, 1B, etc.) is presented. In each

TYPE OF FACILITY

SMSA SIZE (000,000)	Radial	Circumferential	Downtown or Special Loop	Bridges, Tunnels Other Special Facility
8 and above	Long Island Expressway (NY)	Crosstown Expressway (Chicago)	Lower Manhattan Expressway (NY)	
4 - 8	Cobb's Creek Expressway (Phila)		Crosstown Expressway (Phila)	
2 - 4	I-95 (Prince George's Cty, Md) I-95N (Boston) I-95S (Boston) Route 2 Extension (Boston)		Inner Belt (Boston) Embarcadero Freeway (San Francisco)	3rd Harbor Crossing (Boston S. Bay Bridge (San Francisco)
2 or below	Stone Mountain Tollway (Atlanta) Mt. Hood Expressway (Portland) I-40 (Memphis)	I-410 (New Orleans) Auburn-Bothell Corridor (Seattle) I-291 (Hartford)	Riverfront Expressway (New Orleans) Papago Expressway (Phoenix) I-485 (Atlanta)	

Figure B-3. Facility type related to SMSA size for candidate cases.



SUMMARY OF CASE SELECTION CHARACTERISTICS

X = VARIES
Y = YES
N = NO

	1A	1B	1C	1D	2A	2B	2C	3A	3B	4A	4B	4C
FACILITY TYPE	ONE	ONE	TWO	ONE	X	TWO	TWO	TWO	TWO	X	X	X
CITY SIZE	X	X	X	X	ONE	TWO	TWO	1-1.5 MM	2.5-3 MM	X	X	X
REGIONAL BALANCE	Y	Y	N	Y	N	N	N	N	Y	Y	Y	Y

Figure B-4. Case selection approaches.

case a distinction was made between field work cases, where trips would be made and interviews conducted with key participants and secondary data cases, where analysis would be confined to available documentation. Several principles were used to identify appropriate cases.

Regional balance was maintained, where possible. Secondary data cases were selected in the same cities where field work cases were located in order to maximize economies of data collection. A bias was exercised toward cases with any or all of the following characteristics: (1) where substantial time had elapsed since the NCTF decision, (2) where an NCTF alternative had been defined and evaluated; and (3) where before/after data were judged likely to be available. Depending on the suboption to be analyzed, this influenced the selection of individual cases.

The two most promising approaches for the Phase I investigation were defined as 1C and 4A. These two options were submitted to NCHRP along with supplementary data for review and comment. Following the receipt of the NCHRP comments, option 4A was selected.

Field Work and Survey Procedures

For each case study location, an extended visit was made by an interdisciplinary team of three senior professionals. The site visits included personal interviews with approximately 25 key individuals who were involved with the project, with interviews balanced so as to represent the various official and unofficial points of view important in the project development and NCTF decision process. As the study effort progressed, it became apparent that, determining even approximately, actual and predicted effects of the NCTF decision was a herculean task requiring substantially more data and analysis time than possible under the constraints of the project. Therefore, a decision was made to focus all energy on the field work cases (Fig. B-1).

For each project, an extensive review was made of published project documents, agency clipping files, and, where available, hearing testimony. Determination of predicted effects of NCTF was complicated by the fact that inadequate study often had been given to the NCTF option, particularly in pre-NEPA technical studies. Actual effects of NCTF were based principally on available agency data and publications, plus primary data from the personal interviews and survey.

Case Study Survey

Survey forms (see Fig. B-5) were distributed to key participants in the Boston, New Orleans, and Chicago case studies. The survey design was intended to complement the analysis method as described in the previous section. The forms were distributed to 25 to 40 people (representing a wide spectrum of disciplines) involved in the project. As an example, in New Orleans the survey was mailed to the following types of people:

- City Streets Department, director
- Greater New Orleans Chamber of Commerce (present director, Central Area Committee; director, Growth Management Program; board member)
- New Orleans businessmen
- City Planning Commission, director
- Special assistants to the Mayor for development
- Advocate attorneys opposed to Riverfront Expressway
- Major waterfront developers
- Vieux Carre Commission members
- Vieux Carre architects
- Tulane School of Architecture faculty
- Local academics and researchers
- Local planners
- Dock Board Staff
- Citizen opponents of Riverfront Expressway
- Louisiana Department of Highways

Early responses in Chicago indicated that the project covered such an extensive area that it was impossible to get knowledgeable feedback on localized impacts. This was verified on receipt of all responses from the Chicago survey. On the basis of this information a decision was made not to distribute surveys in San Francisco.

Response profiles for each case are given in Table B-2. Boston responses were stratified by corridor and non-corridor residents, which was not practical in the other cases. Response rates varied from 44 percent in Chicago to 55 percent in New Orleans. As a control on interpretations, a question was asked to determine the position, if any, of the respondent: in favor of or against the proposed project. While responses in Boston were relatively evenly distributed between proponents and opponents, responses in New Orleans were slightly tipped towards opponents, and responses in Chicago were overwhelmingly (95 percent) from project proponents.

The questionnaires were mailed to key figures (e.g., state public works directors, planning officials, advocate lawyers, business groups, municipal officials, etc.) who were considered to hold representative points of view vis-à-vis various pertinent interest groups. Thus, the responses should not be viewed as a "sample survey," but rather as a structured guide to informed opinions of individuals close to the project.

SUMMARY OF THE FOUR CASE STUDIES

Full reports of the four case studies are in the Interim Report (*2*). This section summarizes key data and findings.

Case Characteristics

Table B-3 summarizes comparative characteristics of the four cases. The projects were located in different regions and in cities of varying size, and were different facility types. Cost estimates varied from $150 million to $1.6 billion. All of the projects have had a relatively long history, dating back 20 or more years, although the most recent studies and the actual NCTF decisions were made two to six years prior to the case studies.

Environmental Impact Statements were prepared for three of the four cases. Only one had a particularly well-detailed NCTF alternative and evaluation. The issues covered in the four cases include social, economic, en-

TABLE B-2

RESPONSE PROFILE FOR CASE STUDY QUESTIONNAIRES

CASES STUDIED	QUESTIONNAIRE RESPONSE RATE: QUESTIONNAIRES MAILED NO.	QUESTIONNAIRE RESPONSE RATE: QUESTIONNAIRES RETURNED NO. (%)	OPINIONS OF RESPONDANTS: SHOULD HAVE BEEN BUILT NO. (% OF RETURNS)	OPINIONS OF RESPONDANTS: SHOULD NOT HAVE BEEN BUILT NO. (% OF RETURNS)	OPINIONS OF RESPONDANTS: NO OPINION NO. (% OF RETURNS)
Boston Case					
Corridor residents					
Lynn	10	6 (60)	4 (21)	2 (10)	0 (0)
Lynnfield	3	2 (67)	1 (5)	1 (5)	0 (0)
Saugus	8	5 (63)	3 (16)	2 (10)	0 (0)
Others	18	6 (33)	3 (16)	3 (16)	0 (0)
Total	39	19 (49)	11 (49)	8 (42)	0 (0)
New Orleans Case	29	16 (55)	5 (31)	9 (56)	2 (12)
Chicago Case	48	21 (44)	20 (95)	0 (0)	1 (5)
Total, all cases	116	56 (48)	36 (64)	17 (30)	3 (5)

vironmental and transportation impacts, with varying emphasis in each case.

The actual NCTF decisions were made by governors (in Boston and Chicago), the U.S. Secretary of Transportation (in New Orleans), and a voter referendum (in San Francisco).

Case Synopses

Boston—I-95 North was a segment of a larger radial expressway evaluated as part of a regional transportation restudy, the Boston Transportation Planning Review (BTPR). This case included a detailed NCTF alternative.

TABLE B-3

CASE STUDY CHARACTERISTICS

	I-95 N BOSTON	I-310 RIVERFRONT EXPRESSWAY NEW ORLEANS	I-494 CROSSTOWN EXPRESSWAY CHICAGO	SOUTHERN BAY CROSSING SAN FRANCISCO
Geographic region	Northeast	South	Midwest	West
1972 SMSA size	2,899,000	1,077,000	7,085,000	3,132,000
Type of facility	Radial	Downtown loop	Circumferential	Bridge
Estimated cost	$150 million		$1,600 million	$500 million
Length	8 miles		20 miles	
Initially proposed	1948	1946	1958	1941
EIS prepared (date)	Yes (1972)	No	Yes (1971)	Yes (1971)
NCTF alternative studied	Yes	No	Yes	No
Description of NCTF alternative	Arterial upgrade, subregional improvements to transit and arterials	NA	Do nothing and arterial improvements	Ferry system
Level of detail of description/ analysis of NCTF	Highly detailed	NA	Little detail	Little detail
Major issues in NCTF decision	• 4(f) impact • system completion • business impact • regional economic growth	• historic/ aesthetic impact • downtown access • system completion • economic growth of downtown	• corridor redevelopment • relief to local streets • system relief to existing expressway and loop • displacement of housing and business • neighborhood impacts	• relief to existing bridge • transit impacts • land use growth/impact • need for additional connecting expressways
Decision made by	Governor Francis Sargent	Secretary of Transportation John Volpe	Governor Daniel Walker	Voter Referendum
Date of decision	1972	1969	1973	1972
Present status	Interstate funds transferred; "demapped"	Elevated boulevard under study; interstate dropped	Legal validity of decision currently being challenged by city	Dead, unless voter/ legislative mandates reversed

An interesting aspect was that the NCTF alternative included specific improvements that would accompany an NCTF decision on I-95N for both corridor and subregional scales. At the time of the case study, improvements noted as part of the NCTF alternative were being carried forward into detailed planning and engineering. Additionally, the BTPR project was the only one of the cases where an "alternative futures" framework was used to test the

impacts of a variety of regional policy assumptions on the project. Because of the short time elapsed between the NCTF decision (1972) and the case study (1975), comparison of actual and predicted effects was speculative.

New Orleans—Riverfront Expressway (I-310) was a segment of a downtown loop adjacent to the historic Vieux Carre and was intended to serve both through and CBD-destined traffic. This case was characterized by the lack of an NCTF alternative and related evaluation. Since six years had elapsed between the decision and the case study, several effects were observed and were compared with previous predictions. First, the major negative effects of an NCTF decision on the central business district and Riverfront district, which were forecast by many proponents, were not observed because of, at least partially, an aggressive downtown planning effort by the New Orleans Chamber of Commerce. Second, pedestrian and transit improvements were being planned in the Vieux Carre, although proponents had claimed that they would only be possible if traffic reductions could be achieved by expressway construction. Third, the dropping of the facility spurred a larger scale reexamination of planning assumptions and objectives for both the regional transportation system and the downtown. This may result in substantially different public and private investment patterns from those assumed at the time of the decision. The need for improved surface transportation along the Riverfront to service proposed development was still under debate.

Chicago—Crosstown Expressway (I-494) was a circumferential 8 to 10 miles from the loop, planned by a major design team effort in conjunction with numerous joint development proposals. This project was still in dispute at the time of the case study. The governor had decided not to build it and refused to approve use of state funds; the City of Chicago supported construction and offered to finance the local share of construction costs. This difference of opinion, which had reached the stage of legal proceedings, left the facility in a delayed status. The delay had an apparent detrimental impact on the immediate corridor and a negative effect on the commitment of public funds to projects in the area. The strong, joint development/community planning effort which characterized the Crosstown Design Team effort, and the inextricable link between the highway and related improvement proposals, had the adverse effect of replacing, or preempting, ongoing community planning in the corridor. Through most of the Crosstown planning process, which was pre-NEPA, the technical work emphasized selection of the best location and design for the highway and related uses and excluded NCTF or suboptimal alternatives. This lack of noninterstate alternatives was partially rectified by inclusion of an NCTF and other options in the subsequent draft Environmental Impact Statement. Alternate proposals for reduced scale options were made by the state at the time of the case study. For a facility of regional significance, the only circumferential in an otherwise radial system, relatively little effort was given to regional land-use impacts of an NCTF decision.

San Francisco—Southern Bay Crossing was to be a major, east-west bridge across San Francisco Bay, supplementing the existing Bay Bridge and linking to proposed and existing highways on either side of the bay. The project had prospective impacts on both sides of the bay, where redevelopment projects were being coordinated with the approach roads. It also had potentially significant effects on regional land development patterns and the success of the new regional transit system, BART. The project was to be financed with toll revenues and was, therefore, the subject of substantial local and state concern over its feasibility. Several relationships of the project to BART were predicted and observed, and a recent series of studies to test the impact of BART investigated the possibility that if BART had *not* been built, the Southern Bay Crossing might have been constructed.

The case studies of these projects illustrated that major projects die hard: the Riverfront in New Orleans was being studied for a boulevard project instead of an expressway; the City of Chicago and State of Illinois were engaged in an epic battle in the summer of 1975 to determine whether the city could pay the local share and build the Crosstown Expressway over the state's veto; and the Southern Bay Crossing was taken off official plans but could be reinstated on a vote of the legislature.

Case Study Findings

The following sections summarize general and specific observations from the case studies.

Definition and Role of NCTF Alternatives

In the four cases, the use of NCTF alternatives was limited. The regular flow of highway funds in the past, and the technical and political skills of the agencies, had produced an enviable record of satisfactory project implementation. It was not until the late 1960's that transportation agencies were fully confronted with the realization that NCTF options might be necessary or even realistic alternatives.

The only project that included a fully detailed and evaluated NCTF alternative was the I-95 North project, which was explicitly required as part of the Boston Transportation Planning Review (BTPR). (This project also was studied under NEPA guidelines.) The strong push to rigorously evaluate the NCTF option came from the community liaison effort within the $3.5 million BTPR, and from the citizen transit-advocates who were closely monitoring the alternatives-definition process. The political demand for an NCTF alternative, which was a scenario for what would happen in the event of an NCTF decision, was motivated by the governor's need for a real decision option in the event the highways were judged to be unnecessary or too disruptive.

In the cases of New Orleans, Chicago, and San Francisco, the impetus to include an NCTF alternative did not come until late in the planning process, by which time proponents and opponents were too polarized to attempt the redefinition and restudy of alternatives.

The NCTF option was evaluated with varying degrees of seriousness in the cases. In the BTPR, the NCTF alternative was defined to include the arterial upgrade of an

existing highway, plus a series of transit and arterial improvements to the North Shore subregion. The package of improvements was tested against the "alternative futures" used for traffic assignment analysis. Results of the NCTF assessment were displayed in comparable units of measure for impact categories and for comparable incident populations. At the conclusion of Phase I, the governor decided that the originally proposed interstate alignment through a major public park would be prohibited by Section 4(f) because feasible and prudent alternatives appeared to be available. It was explicitly recognized, at that time, that the option of not constructing the facility was potentially a feasible and prudent alternative. Thus, the realistic specification of the NCTF alternative became very important.

In contrast, the evaluation of NCTF alternatives to the Southern Bay Crossing was perfunctory; a ferry system was examined and found inadequate. Although alternatives to major bridge construction are limited, a clearer evaluation of the traffic and land-use implications of a no-action policy would appear to have been warranted.

In New Orleans, where an NCTF alternative was never considered, policies being pursued since the decision include fringe parking to serve the downtown, arterial improvements to parallel streets, and potential boulevard construction along the Riverfront to substitute partially for the Riverfront Expressway. Clearly, some of these considerations would have been appropriate when the original studies were done and might have revealed comparative strong and weak points in the expressway proposal.

The need to define clearly the parameters of an NCTF option is particularly important when the facilities have a regional significance; several of the facilities examined in the case studies appear to warrant such detailed evaluation. Such facilities might include the following:

- *Facilities that cause major functional alternation to the regional transportation system or that may induce future need for additional links.* Examples include the Riverfront Expressway, which would close the intended downtown loop; the Southern Bay Crossing, which was linked to north-south freeways on both sides of the Bay; or the construction of a complete circumferential such as the Chicago Crosstown, which would provide greatly improved linkages among existing radial elements of the highway system.
- *Facilities that may dramatically alter or affect modal choice.* Examples include the Southern Bay Crossing, which might have affected BART patronage across the Bay Bridge; or the full I-95 completion in Boston, which as originally designed might have competed with radial transit to the core.
- *Facilities that could induce major land-use changes beyond the immediate corridor.* Examples might include the Southern Bay Crossing, opposed because it might cause land-use trends that would dilute the subregional nodalization which was expected from BART, or new highway or transit service to a previously unserved area.

Ironically, the project for which elaborate corridor, subregional, and regional analysis was performed, the BTPR I-95 North, was shown in the end not to have had major, regional, land-use or mode-choice impact. The analysis revealed that the project would serve local corridor needs and would cause only local benefits and impacts. The initial analysis had featured an alternative futures framework for employment and population at the regional level and a subregional needs-analysis for the North Shore area. Although the analysis probably involved much more detail than warranted, the result—under the NCTF option—was a relatively carefully tailored package of improvements for the North Shore subregion. The case implies that a subregional analysis framework for the NCTF option may be appropriate.

The utilization of the NCTF alternative can be a positive element in informed decision-making, depending on when it is introduced and the level at which it is defined and evaluated. The development of an NCTF alternative at an early point in the BTPR process had a substantial effect on both the evaluation and decision-making process. The technical evaluation was structured to reveal differences among the options, and the NCTF alternatives were presented equally with "build" options throughout the process. In fact, when the decision was made not to construct I-95 North, some of the advisors to the governor used the NCTF definition and analysis to argue that the decision would be detrimental. Aspects of the NCTF analysis were used by project opponents and proponents.

In general, the absence of an NCTF alternative throughout the technical process appears to "set up" other options for criticism. In the case of the Riverfront Expressway, for example, the absence of an NCTF alternative attracted critiques of the "build" options as presented, and encouraged development of "underground" alternatives developed by citizen advocates. At least three alternate plans, each of which involved not building the Riverfront Expressway, were developed by opponents and then used as arguments against the project.

In Chicago, an NCTF alternative for the Crosstown Expressway was developed very early in the project history (1961) and very late as part of the EIS evaluation (1971). However, in the intervening period, the efforts were concentrated on achieving the best design and location for the build alternatives. The absence of an NCTF option or other suboptimal alternatives had the effect of undercutting public confidence in the technical planning process rather than focusing attention on the pros and cons of a broad range of alternatives.

Where an NCTF alternative is undertaken, project evaluations should strive for comprehensiveness and comparability of impact prediction and measurement for both "build" and NCTF options; the simple definition of an NCTF option does not suffice. The Riverfront Expressway analysis, for example, was pre-NEPA, and, therefore, not required to conform to environmental impact guidelines. The technical assessment of project impacts was done as part of a demonstration study for the Vieux Carre and focused largely on the potential negative effect of the proposal on that historic area. Although the work was competent and reflected the best state of the art at the time, equal levels of analysis were not applied to all aspects of the project; different impacts were studied from one area

to another, and the various areas affected by the expressway were not comparably analyzed. For example, while the Vieux Carre received extensive attention, the positive and negative effects of the project on the downtown were not really addressed. The inclusion of a broader framework of analysis for the facility and an NCTF alternative might have revealed the presence or absence of significant relationships between the project and the downtown/port economic development and might have contributed to a more informed decision earlier in the process.

In contrast to the Riverfront Expressway, the BTPR developed a set of 50 evaluation criteria which were applied equally to all alternatives for projects under study. The list did not assure a consistent level of quality in the analysis, but it did provide some measure of accountability and comparability among alternatives.

Decision-Making Context for the NCTF Alternative

Who makes the decision is a factor in determining how the NCTF alternative will be used. In the case studies reviewed, the large scale of the projects and the size and uneven distribution of supposed or real negative impacts implied that any given decision to implement an alternative involved a trade-off among positive and negative costs, benefits, and impacts. The controversy surrounding such trade-offs guaranteed that such decisions would become open political issues, which recognized the need for pluralistic value judgments about impact distribution.

For the BTPR, the governor was committed to an open planning process where the question of whether or not the facilities should be built would be considered. Substantial public and political pressure existed both to include an NCTF alternative and to define it as a realistic choice. In the case of the Southern Bay Crossing, the decision was debated by the legislature until a referendum was suggested. As one of the principal opponents noted, a referendum almost always guarantees the defeat of major public works proposals, as it is the citizenry's best chance to say "no" to the expenditure of public funds. For the Riverfront Expressway, the eventual decision to disapprove the proposal was made by the U.S. Secretary of Transportation. The mayor of Chicago and the governor of Illinois were still arguing in 1975 about who had the legal authority to make final decisions regarding the Crosstown.

In several of the cases, decisions were linked to other regional projects. For example, the Southern Bay Crossing was popularly linked with the north-south freeway on either side of Bay, although this was denied by project planners. Similarly, decisions on Boston's North Shore were linked to decisions for the remainder of the I-95 route through metropolitan Boston. In the latter case, the study procedure was broad enough to respond to this concern: while I-95 North was shown to be not functionally linked to I-95 South, the governor decided that the complete facility symbolized an "old" policy and could not be justified if the policy were to be redirected towards transit improvements. In the case of the Southern Bay Crossing, no definitive analysis was ever done to indicate whether the related highway facilities on the east and west bay would be built in the absence of a new bridge. An NCTF alternative can be useful in providing a framework for examining the strength of such linkages and determining whether they would be built in an NCTF future. Funding considerations are a strong influence on the attractiveness of an NCTF decision. In Boston, for example, the governor was relatively confident that transfer of allocated Interstate funds to other transit and highway projects could be accomplished and, therefore, could be confident that an NCTF decision would not result in a net loss of construction funds to the region. This contrasted sharply with earlier projects throughout the country, where the 90 percent federal Interstate funding was a compelling argument agaisnt an NCTF decision (or an NCTF alternative). In San Francisco the prospect that the new crossing might not generate sufficient revenues—in concert with the possibility that excess revenues from the Bay Bridge could be used to subsidize transit construction or operations—was a strong argument against the project.

Finally, it should be stressed that very few decisions are absolute and binding for all time. The Southern Bay Crossing, according to the referendum, could be resurrected by vote of the legislature. The governor's decision on the Chicago Crosstown set in motion a series of complex legal and political maneuvers to reassert the City of Chicago's jurisdiction over the project. And the Riverfront Expressway corridor was being considered for a boulevard and street relocation to partially serve the function for which the original facility was intended.

Actual Effects of the NCTF Decisions

Table B-4 summarizes the actual observed effects of the NCTF decisions for the four case studies. The "fall-out" or "unwinding effects" of a decision to abandon plans to construct a highway facility have real impacts and cause institutional confusion. Direct impacts include a widespread ripple effect on transportation and land-use planning in affected areas and a variety of locally felt, social, economic, environmental, and transport impacts.

The consequences of NCTF decisions are long term, and observed changes in the short range may only be suggestive of trends that may be either accentuated or reversed in the long term. Clearly, the uncertainty which surrounds impact prediction should be acknowledged in technical studies. Only the I-95 North study included an alternative futures framework as a device for recognizing future uncertainty and responding to potential long-term impacts of nontransportation trends.

NCTF decisions for major facilities can cause substantial delay when system plans and project priorities subsequently must be modified. Often substitute plans have been developed either to solve apparent problems or, less compellingly, to spend available funds. In the case of New Orleans, there was an effort being made to complete certification plans for the regional system and to locate a new Mississippi River Bridge that was controversial during the Riverfront project study and was dropped. Some of the current uncertainty over transport plans and priorities is traceable to the removal of the Riverfront Expressway from the system, which, in turn, caused many

TABLE B-4

MAJOR IMPACTS OF NCTF DECISIONS FOR CASE STUDIES

IMPACTS	I-95 BOSTON	I-310 RIVERFRONT EXPRESSWAY NEW ORLEANS	I-494 CROSSTOWN EXPRESSWAY CHICAGO	SOUTHERN BAY CROSSING SAN FRANCISCO
Substitute proposals or projects since NCTF decision	Arterial upgrade in corridor; subregional transit and arterial improvements	Boulevard to serve local development (early proposal stage only)	Truckway, arterial upgrade, and transit (proposed by state); special purpose expressway (proposed by special task force)	Carpool and bus preference lanes on Bay Bridge
Impact on regional/ local transportation planning	Redesignation of interstate; new priorities for arterial upgrade projects in subregion	Several years of uncertainty currently being resolved by concurrent studies	Intensified state-local conflict, accompanied by delay of safety, operations improvements in corridor	Allowed BART some "breathing" time to become operational; discouraged construction of bayside freeways of either end
Social impact	No change	No change	Uncertain, tending towards determinate	No change
Economic impact	Potential negative effect on Lynn	Positive effect in planning of CBD; uncertain if felt on values downtown; positive effect on riverfront property	No effect on Loop; shadow effect on industry in corridor	Negative impact on development plans in Alemeda and India Basin area of San Francisco
Environmental impact	No change	Positive effect on Vieux Carre and preservation	No change	No change
Transportation impact	Slight deterioration in regional and local accessibility	Increased congestion; execution of traffic limitations projects in Vieux Carre	Increased congestion in corridor	Continuing high level of congestion on Bay Bridge

other fundamental precepts on which the system design was based to be questioned.

In the case of the BTPR, where it was recognized that the purpose of the restudy was to reach final and binding decisions on whether the expressways should be built, the NCTF decision created disruption and delay for the transit and highway agencies. However, the inclusion of the NCTF option in the BTPR analysis may have eased the transition and reduced the consequent confusion and delay. In New Orleans, six years after the decision, major system decisions still were being bitterly debated; whereas in Boston, within two years after the decision, projects defined as part of the NCTF alternatives were being studied in detail.

Delay in decision-making appeared to have a negative impact on the study corridors. This is probably due to a combination of the psychological effects of uncertainty, exaggeration of anticipated negative effects, and property owner/occupant tendencies to defer maintenance and improvement expenditures when threatened with relocation. Effects of the continued dispute in the Crosstown Expressway corridor generally were viewed negatively with regards to both the fabric of the affected communities and the general business and investor climate. A more dramatic effect of delay was the increase in estimated construction costs from $1 billion in 1971 to $2 billion in 1974 (according to the State). In many cases, a distinct and final decision to build or not build a proposed project would have had less negative impact than continued delay and uncertainty.

Transportation Effects

Both opponents and proponents believed that congestion increased after the NCTF decisions in New Orleans and Boston. However, in the New Orleans case the traffic assessment of the Riverfront project asserted that pedestrian and transit improvements in the Vieux Carre would be enhanced and enabled by the expressway through traffic relief to local streets. Today, without highway construction, many such improvements have been implemented without catastrophic effect on either the Vieux Carre or the downtown.

Two examples of transit/highway interrelationships were noteworthy. Although the Southern Bay Crossing was asserted to have only a slightly negative effect on BART transbay ridership, the bridge opponents argued that it should not be built to "give BART a chance." As it turned out, the argument was probably valid for the wrong reasons. Because of the various technical and service problems which have cropped up in completion of the BART system, full transbay service was in operation later than originally planned. If the Southern Bay Crossing had been completed in 1975 as projected, it is entirely possible that the reduction of congestion on the existing Bay Bridge might have worked to the detriment of a partially operational BART system.

In the Boston case, pro-development advocates for Lynn, an older North Shore suburb, argued eagerly for I-95 completion. When the facility was dropped, they argued equally eagerly for extension of rapid transit to Lynn for economic development reasons, to substitute for improved access that I-95 would have brought. Ironically, the same group did not recognize the positive advantages of transit to Lynn while the highway option was still under consideration.

Economic Effects

NCTF decisions for major facilities appear to have retarded development plans that were felt to be physically dependent on improved access that would have been provided with the facility. This occurred in Boston and in San Francisco, where developments on either end of the bridge at Hunter's Point and Alameda were delayed or stopped because of the loss of improved access.

Secondary economic effects on development because of NCTF decisions are difficult to identify. In Boston, the lack of I-95 North construction as originally proposed through Lynn appeared to have had a slightly negative effect on development and business in central Lynn, although effects in neighboring Saugus, which is already served by a highway facility, tended to be slightly positive. The dropping of the Riverfront Expressway in New Orleans appeared to have prompted more aggressive planning and development activities by the business community to compensate for the perceived loss of access advantages. The Growth Management Program in downtown New Orleans appeared to have had a positive effect on the central area, although the long-term trend for the downtown was not yet discernible. The depressing effect of the uncertainties caused by delay and dispute over the Chicago Crosstown Expressway on economic development and local business climate has already been noted.

Social Effects

The major social impact of NCTF alternatives may, in the simplest terms, be the absence of impacts associated with build alternatives. Aside from some perceived positive effects from the absence of direct displacement impacts, it was too early to accurately assess other positive or negative social impacts of the NCTF decisions in the subject cases. No data were available on changes in neighborhood mobility.

Environmental Effects

Major environmental changes were not observed in San Francisco or Boston due to the NCTF decisions. In New Orleans, the major environmental effect noted was the indirect positive impetus to the local preservation movement given by the dropping of the Riverfront and the recognition of the regional value of the Vieux Carre.

Survey Forms

A typical survey form is shown in Figure B-5. Similar forms were used for the Chicago and New Orleans cases.

References

A complete list of references, appropriate to the full case studies, is included in the Interim Report (*2*).

a research study on
THE SOCIAL, ECONOMIC AND ENVIRONMENTAL CONSEQUENCES OF NOT CONSTRUCTING A TRANSPORTATION FACILITY

sponsor
NATIONAL ACADEMY OF SCIENCES - NATIONAL ACADEMY OF ENGINEERING
TRANSPORTATION RESEARCH BOARD
National Cooperative Highway Research Program Project 8-11

INTERSTATE ROUTE I-95 NORTH
LYNNFIELD, LYNN & SAUGUS, MASS.
CASE STUDY QUESTIONNAIRE

RESEARCH CONTRACTOR
and
PRINCIPAL INVESTIGATOR:

JONATHAN S. LANE
DAVID A. CRANE AND PARTNERS/DACP, INC.
334 BOYLSTON STREET
BOSTON, MASSACHUSETTS 02116
(617) 262-0953

This survey is being conducted by DAVID A. CRANE AND PARTNERS/DACP, INC. for the National Cooperative Highway Research Program under contract to the Transportation Research Board of the National Academy of Sciences and the National Academy of Engineering. YOUR RESPONSES TO THIS QUESTIONNAIRE WILL BE KEPT CONFIDENTIAL.

NAME: _____

CURRENT POSITION: _____

ORGANIZATION: _____

ADDRESS: _____

_____

TELEPHONE: (area code) _____ (number) _____

1 DURING WHAT YEARS WERE YOU INVOLVED WITH THE I-95 NORTH PROJECT?

2 WHAT POSITION(S) DID YOU HOLD AT THAT TIME? (e.g., REPRESENTATIVE-CITIZEN'S GROUP, STATE HIGHWAY ENGINEER)

3 IN YOUR OPINION, WHAT WERE THE MAIN REASONS FOR THE DECISION NOT TO CONSTRUCT I-95 NORTH? (Please explain briefly.)

(i)

(ii)

(iii)

Figure B-5. Case study questionnaire.

4 DO YOU FEEL THAT THE TECHNICAL STUDIES DONE FOR THE PROJECT ADEQUATELY PREDICTED THE CONSEQUENCES OF NOT CONSTRUCTING I-95 NORTH?

5 WHICH STUDIES HAD THE MOST INFLUENCE ON THE DECISION?

(over)

6 TODAY, THREE YEARS AFTER GOVERNOR SARGENT'S DECISION NOT TO CONSTRUCT I-95 NORTH, WHAT DO YOU PERCEIVE TO BE THE EFFECTS OF THAT DECISION? (FOR EACH OF THE FOLLOWING QUESTIONS, PLEASE CIRCLE THE ANSWER WHICH BEST CORRESPONDS TO YOUR OWN OPINION.)

6.1 CHANGES IN THE ACCESSIBILITY OF THE NORTH SHORE TO THE REMAINDER OF THE REGION

a. major improvement
b. minor improvement
c. no change
d. minor deterioration
e. major deterioration

6.2 USE OF EXISTING STREETS AND HIGHWAYS IN SAUGUS

a. major increase in congestion
b. minor increase in congestion
c. no change
d. minor decrease in congestion
e. major decrease in congestion
f. no opinion

6.3 USE OF EXISTING STREETS AND HIGHWAYS IN LYNN

a. major increase in congestion
b. minor increase in congestion
c. no change
d. minor decrease in congestion
e. major decrease in congestion
f. no opinion

6.4 IMPACT OF TRANSPORTATION CAPITAL EXPENDITURES ON REGIONAL EXPENDITURES AND EMPLOYMENT

a. major positive effect
b. minor positive effect
c. no change
d. minor negative effect
e. major negative effect
f. no opinion

6.5 IMPACT ON BUSINESS OPERATIONS IN LYNN

a. major increase in sales
b. minor increase in sales
c. no change
d. minor decrease in sales
e. major decrease in sales
f. no opinion

6.6 IMPACT ON BUSINESS OPERATIONS IN SAUGUS

a. major increase in sales
b. minor increase in sales
c. no change
d. minor decrease in sales
e. major decrease in sales
f. no opinion

6.7 CHANGES IN PROPERTY VALUES IN LYNN

a. major increase in values
b. minor increase in values
c. no change
d. minor decrease in values
e. major decrease in values
f. no opinion

6.8 CHANGES IN PROPERTY VALUES IN SAUGUS

a. major increase in values
b. minor increase in values
c. no change
d. minor decrease in values
e. major decrease in values
f. no opinion

Figure B-5—(Continued)

6.9 NEIGHBORHOOD AND COMMUNITY COHESION;QUALITY OF NEIGHBORHOOD LIFE IN LYNN

a. much better cohesion/ higher quality
b. somewhat better cohesion
c. no change
d. somewhat less cohesion
e. much less cohesion
f. no opinion

6.10 NIEGHBORHOOD AND COMMUNITY COHESION;QUALITY OF NEIGHBORHOOD LIFE IN SAUGUS

a. much better cohesion/ higher quality
b. somewhat better cohesion
c. no change
d. somewhat less cohesion
e. much less cohesion
f. no opinion

6.11 NEIGHBORHOOD AND COMMUNITY COHESION;QUALITY OF NEIGHBORHOOD LIFE IN LYNNFIELD

a. much better cohesion/ higher quality
b. somewhat better cohesion
c. no change
d. somewhat less cohesion
e. much less cohesion
f. no opinion

6.12 EFFECTS ON WETLAND AND AQUATIC LIFE ECOSYSTEMS

a. major improvement
b. minor improvement
c. no change
d. minor detrimental effect
e. major detrimental effect
f. no opinion

7 ARE THERE ANY OTHER EFFECTS OF THE DECISION (NOT TO CONSTRUCT I-95 NORTH) WHICH YOU FEEL ARE SIGNIFICANT? (Please describe briefly.)

8 HAVE ANY OF THE EFFECTS DESCRIBED IN QUESTIONS 6 AND 7 BEEN EITHER MORE OR LESS SIGNIFICANT THAN THE IMPACTS YOU EXPECTED AT THE TIME OF THE DECISION NOT TO CONSTRUCT I-95 NORTH IN 1972? (Please describe.)

(over)

9 AT THE TIME THE DECISION WAS MADE, WHAT WAS YOUR OPINION REGARDING THE MERITS OF THE PROPOSAL?

A. A major facility should have been built
B. Agreed with the decision not to build
C. No opinion

10 COMMENTS

Figure B-5—(Continued)

APPENDIX C

PILOT PROGRAM SUMMARY

OVERVIEW

The purpose of the research was to produce guidelines for assessing the social, economic, and environmental consequences of not constructing a transportation facility. The research was monitored by an advisory panel of professionals from a wide variety of backgrounds who provided review and criticism at key intervals. A major concern of the panel was to ensure that the guidelines were highly responsive to the needs of prospective users. Therefore, two key interactions with prospective user groups (beyond the panel members) were incorporated into the research plan. The general process is shown in Figure C-1, and included the following:

1. Production of an Interim Research Report in December 1975(*2*). This two-volume report was a detailed description of all research activities. A first draft of the guidelines was included as an appendix to Part I of this Interim Report.
2. On the advice of the panel, initial review visits with three states represented on the panel—California, Maryland, and New York—were held in one-day work sessions. This resulted in significant revisions to the guidelines.
3. Revised guidelines were developed, based on the comments of the panel and the three reviewer states. These were issued in October 1976. Based on panel comments, they were modified in early 1977 and reprinted in sufficient quantity to support a broad pilot program exposing the guidelines to a range of prospective users for a field trial.
4. The pilot program, involving nine states with varying levels of interaction with the research team, took place over a one-year period. At the conclusion of this effort, comments were summarized and the guidelines were finalized.

INITIAL REVIEW VISITS

State Review Agencies

At the NCHRP advisory panel meeting in late January 1975, it was suggested that the Interim Report (*2*) and the guidelines be discussed with state transportation agency personnel in California, Maryland, and New York, the three states represented on the panel. Additionally, these field visits would provide immediate practitioner input to a first, early guideline revision.

The field meetings were well attended and informative. In New York, the research staff met with the directors of Planning and Research, Capital Programming, Environmental Analysis, Project Development, Systems Planning, team captains for the Albany and Buffalo areas, and the West Side Highway project engineer. In Maryland, the research staff met with the Director and Deputy Director for Planning and Preliminary Engineering, the assistant chief engineer, and supervisors for the Project Planning, Traffic Engineering, Environmental Analysis, and Urban and Regional Liaison sections. In California, research staff met with headquarters staff responsible for Design and Environmental Studies, as well as managers and specialist personnel in three districts.

In total, about 35 agency personnel were interviewed. There were four meetings held at each agency: a 3-hour session in the morning including administrative and supervisory personnel, and three 1-hour meetings in the afternoon—on programming issues, project development issues, and environmental issues, respectively. The afternoon meetings often involved technical staff in addition to the supervisors. The format for the meetings was determined after telephone discussions with panel members from each state, who took the lead responsibilities of contacting agency personnel, scheduling, and coordinating the meetings.

Discussions focused on four areas of concern: a critique of the Interim Report and the guidelines; an examination of the agencies' planning processes, looking at procedures and constraints for the use of NCTF; and an attempt to gauge the type of projects that the agencies would be undertaking in the next 3 to 5 years. (NCTF is an acronym for *N*ot *C*onstructing *T*ransportation *F*acilities. Since the acronym was used in the research at the time of the state agencies' reviews, it has been used in this section of the appendix.)

The general conclusion from these initial meetings was that guidelines on NCTF analysis would be germane to the agencies' needs. Fiscal constraints and changing priorities were placing pressure on state highway agencies and transportation departments to develop cost-effective transportation programs, requiring exploration of a wide range of alternatives. There was a definite desire on the part of the transportation agencies to structure this search process, and the agencies interviewed felt that guidelines would be useful. However, the agencies had several comments on the Interim Report and its contents:

1. Concerning the form of the Interim Report—there was a consensus that the Interim Report was useful, but that the two large volumes were overwhelming. All agencies expressed a desire for clear and concise guidelines with clear cross-referencing and indexing.
2. Concerning the definition of NCTF alternatives—agency personnel felt that NCTF alternatives had not been sufficiently detailed in the past. Since the use of a "maintenance only" alternative as the NCTF option was normal practice, the terminologies "no-build" and "NCTF" were

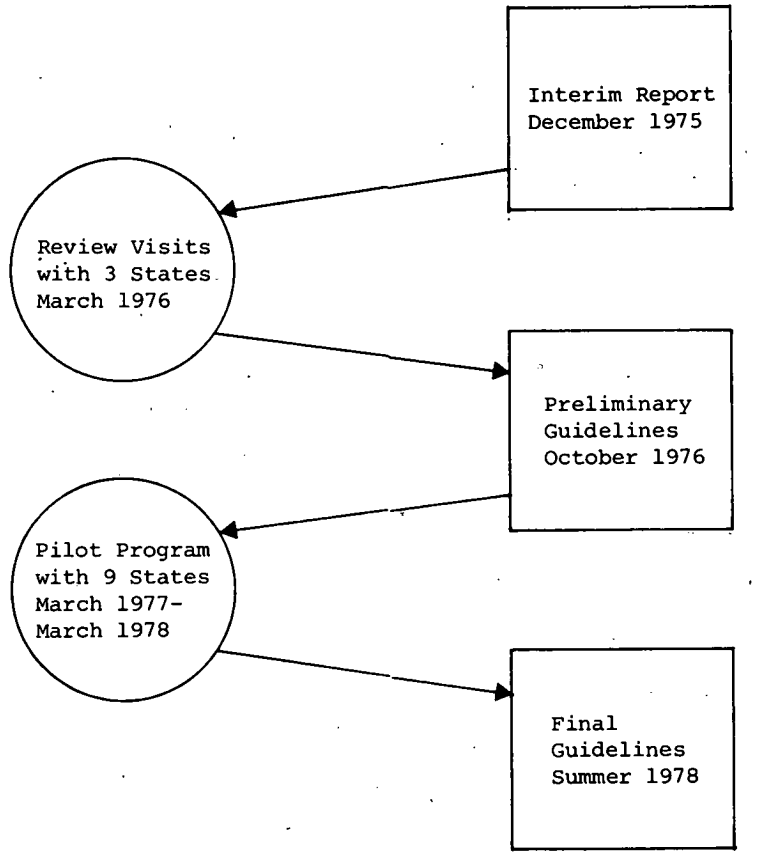


Figure C-1. Pilot program process.

both considered misleading. A new term should be developed, one which implied investment or improvement levels rather than the presence or lack of construction. The participants agreed that low capital-intensive alternatives should be carried further through the environmental assessment phases.

3. Concerning NCTF impact—it was generally felt that the social and economic impact categories identified as "methodologically deficient" in the Phase I Report were appropriate for priority research. Personnel wished guidance on appropriate levels of effort for different project types, in each category of impact.

4. Concerning the number of impact categories—agency reviewers noted that a number of groups—U.S. DOT, FHWA and several states—were developing environmental impact assessment guidelines and that each had a somewhat different list of impact categories. A standardized list would be preferred.

5. Concerning the prediction and analysis of NCTF impact—a significant problem for NCTF analysis was that minor actions (e.g., TOPICS-type improvements) were generally not analyzed in great detail even in comprehensive Environmental Impact Statements. One major reason for this was that the prediction and analysis of social, economic, and environmental impacts for the NCTF case depend on the ability of travel forecasts to predict marginal changes. In order to achieve this level of production, agencies felt that cost, time, and skill constraints would have to be removed.

6. Concerning organizational and procedural constraints on the use of NCTF—each agency had numerous organizational or jurisdictional constraints that influence the definition, analysis, and use of NCTF alternatives. However, the fundamental concept inherent (establishment of a benchmark for comparison of alternatives) was felt to be applicable and adaptable to a wide range of planning processes. Particular problems mentioned were the need to develop a better interface between systems and project planning and, within the programming and project development phases, to maintain continuity. Each agency's process was organized into several generic areas: systems planning, programming, project development, and traffic engineering/design/maintenance. The various stages of project analysis were handled by these functional groups, organizationally and often physically separated from one another. The resulting planning effort was seen as disjointed and the level of effort, particularly for the NCTF option, often produced incomplete decision-making information. For ex-

ample, where NCTF options involve traffic operations-type improvements, traffic engineering sections generally have not been involved in alternative development work at the location stage, and the NCTF has not been assessed at the same level of technical detail as other alternatives. The states viewed the guidelines as a potential means of increasing the speed and efficiency of the impact analysis process.

Guideline Revisions

After a review of the panel members' comments and the critiques gathered during the field trips, it was decided that the revised guidelines should exclude detailed procedures and formulae and be kept short. The revised document issued in October 1976—including text, illustration, impact assessment procedures and reference materials—was less than 140 pages, compared to the two-volume Interim Report of nearly 600 pages. To avoid excessive detail and repetition of material covered elsewhere, the guidelines were limited to recommending specific techniques, summarizing their approach, and providing references to more technical works for each category of impact assessment.

The guidelines were organized into five major sections, with several supporting appendixes. The content and purpose of each were as follows:

- *Section One—Introduction and Summary* offered an overview of the purpose, content, and conclusions of the guidelines.
- *Section Two—The Guideline Context* defined the legal requirements to assess the "no build" option, and related this to the typical agency project development and assessment process. Key decision points were located, and the need for information at each level of detail identified. This section clarified for the prospective user how the guidelines related to transportation planning process.
- *Section Three—Alternative Definition* presented three types of alternatives: (1) a "benchmark alternative," which assumes the physical maintenance of existing facilities, to be used as a measurement datum against which all other alternatives may be compared; (2) "minor action" alternatives, which represent realistic, though lower service level options; and (3) "major" action alternatives, which are the capital-intensive high impact facilities. This secton provided general and specific guidance to the user in the definition of these alternatives.
- *Section Four—Impact Assessment* presented general principles for impact assessment and recommended techniques for the assessment of the benchmark alternative. A list of 13 impact categories was developed from the original 26. The same categories are to be used in *Environmental Assessment Notebook Series for Highways* being developed by the U.S. Department of Transportation. The level of effort required for the techniques was indicated. Approaches to developing a future baseline forecast were proposed, along with suggestions for appropriate applications. Finally, discussions of each impact category were presented in tabular form, clearly identifying each step in the assessment process and specifying available techniques. The techniques named in this section were cross-referenced to Appendix A, which provided a summary description of the technical documents and examples of the output of each technique.
- *Section Five—Comparative Plan Evaluation* offered techniques for comparing the benchmark and other alternatives.
- *Appendix A—Techniques Dictionary* provided a description of the techniques cited in Section Four. Characteristics of each technique were briefly summarized and source references given. This section was intended to be used as the key instrument in technique selection by the analyst.
- *Appendix B—Glossary of Terms* defined key terms used in the guidelines.
- *Appendix C—Notes on the Impact Assessment Process* offered a conceptual model of the impact assessment process, providing a theoretical basis for the discussion of impact assessment in Chapter 4.
- *Appendix D—References* identified selected references useful in a project assessment but not identified in Appendix A.

Copies of the October 1976 version of the guidelines were distributed to panel members, NCHRP staff, and the state transportation agency personnel in California, New York, and Maryland. All had previously reviewed the Interim Report. The review comments indicated that the revised guidelines were well received and viewed as significantly better than the Interim Report version. Most reviewers found that the definition of the project development process, the central framework of impact prediction (magnitude, incidence, and significance) and the technique descriptions in Appendix A (the techniques dictionary) were clearly stated and much needed. Specific recommendations for clarifications and additions were made, and a number of these changes were incorporated into a second printing of the guidelines for the pilot program. The changes included a better reader's guide and clearer cross-references to the glossary; clarification of the distinction between major and minor alternatives; a rewrite of the introductory paragraphs; and better definition of the circumstances that warrant a negative declaration or an Environmental Impact Statement. These guidelines were then tested in a full-scale pilot program.

PILOT PROGRAM VISITS

The pilot program had four objectives:

1. To accomplish a broad policy review of the guidelines.
2. To apply the guidelines to a substantial number of projects of different types at different stages in their development.
3. In conjunction with the application of the guidelines, to accomplish a detailed review of the recommended alternative analysis policies and impact assessment techniques.
4. To evaluate the guidelines in a variety of agencies, over a significant period of time, both with and without research team involvement.

Several alternate ways to accomplish these objectives were developed by the research team. These were reviewed by NCHRP and a specific program was chosen. That program involved three stages—review/orientation, field testing, and evaluation—and interaction with three groups of state transportation agencies. The general structure of the program is shown in Figure C-2.

Contacts were made with state and regional transportation agencies interested in participating in the pilot program. Eight agencies were originally sought: four "primary" (Group I) agencies, and four "secondary" (Group II) agencies. The participating agencies were:

- *Group I agencies:* California, Colorado, Maryland, Michigan
- *Group II agencies:* New York State, Oregon

Additionally, single visits were held with state transportation agencies in New Jersey, State of Washington, and Kentucky to solicit comment and critique on the guidelines. These were states where a second "follow-up" visit was not judged necessary.

Review and Orientation

Review visits were held in all pilot program states. Each began with an introductory meeting with the chief administrators to explain the broad purpose of NCHRP Project 8-11 and the specific objectives of the pilot program. This was followed by a general session reviewing the guidelines, to which a wide spectrum of personnel were invited—project planners and engineers, environmental analysts, traffic and travel forecasting staff, management personnel, and policy staff. This was followed by project selection meetings with headquarters and district staff. A "guideline" evaluation questionnaire (see Fig. C-4) was distributed to all agency reviewers. The purpose of the questionnaire was to structure the receipt of comment from reviewers; no tabulation of responses was made.

The review of the guidelines resulted in the definition of

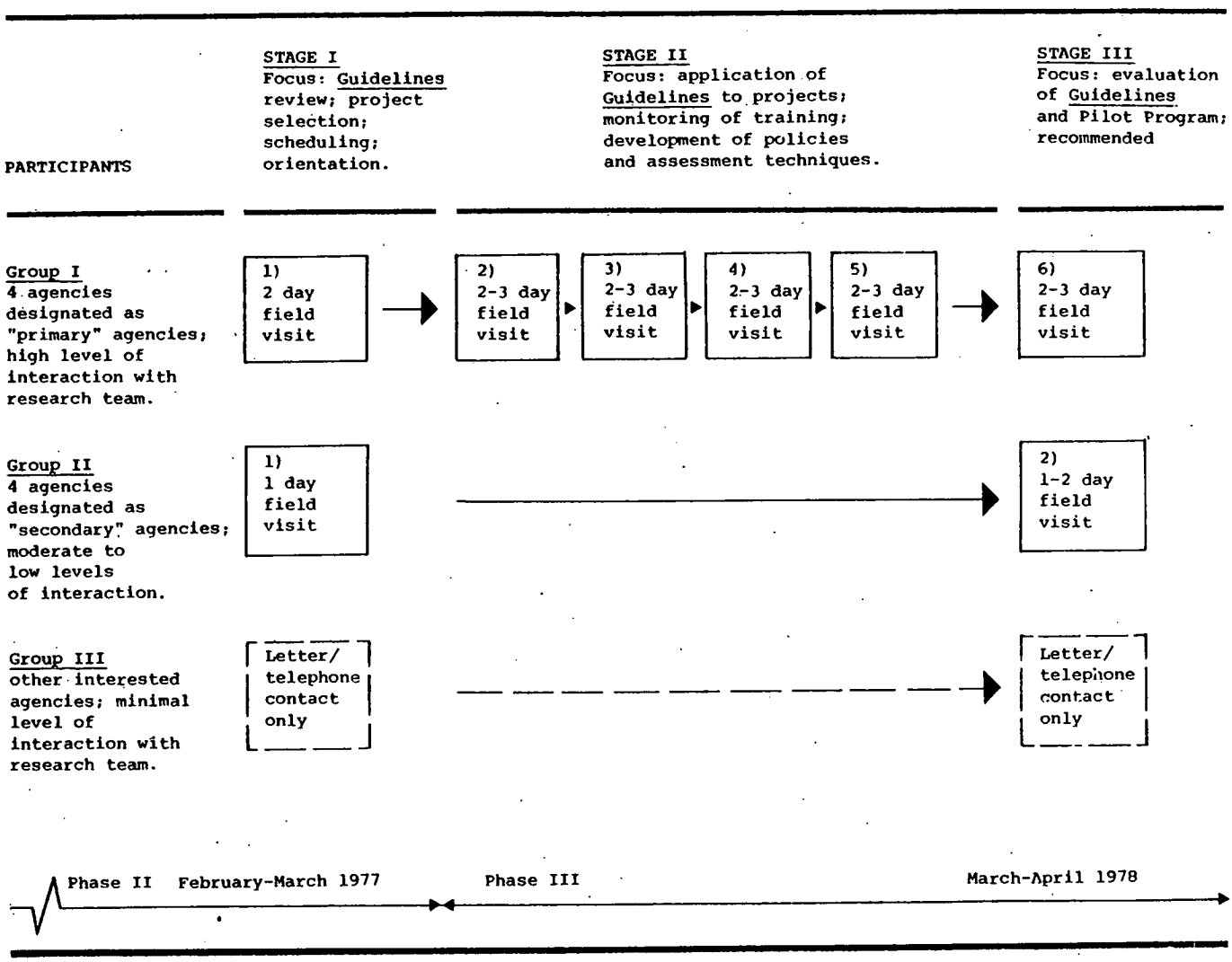


Figure C-2. Pilot program activities.

issues needing more detailed work; the more important of these are summarized in the following.

Use of the no-build alternative. The guidelines recommended the use of a benchmark (maintenance) alternative as a means of comparison among transportation alternatives. Most of the state agency reviewers accepted the logic of this recommendation but remained skeptical that it could be fully implemented. They believed that the no-build is often given perfunctory attention and that most project people, unless otherwise convinced, will only be interested in justifying build alternatives. To counter this, they recommended that some form of case example or discussion be presented in the guidelines to vividly illustrate the legal and logical reasons for using a benchmark alternative as a means of comparing alternatives.

Definition of the benchmark (maintenance) alternative. Each of the six states interviewed used a "maintenance" definition for the no-build alternative, but with substantial variation. More specific examples of what is or is not considered "maintenance" should be added to the guidelines.

More examples of minor alternatives. Several states had projects which were embroiled in no-growth debates and were under political pressure to carefully define and evaluate the development consequences of both maintenance and minor alternatives. These states were able to make immediate use of the guidelines but wanted to see more material on minor alternatives and their impacts. Case examples were suggested.

Transportation/land-use forecasting. This area seemed particularly troublesome to many agency personnel; almost all the reviewers indicated that they wanted more guidance concerning land-use forecasting for the benchmark and minor alternatives. Available techniques were considered unreliable and insensitive to marginal land-use shifts.

The project development process. The guidelines indicated that programming decisions were made before the Cycle I "broad brush" impact assessment. In practice, however, the reverse is becoming the more common pattern; a "broad brush" or preliminary assessment was frequently done prior to formal programming. The guidelines should be changed to reflect this.

Preliminary impact assessment techniques. Several reviewers commented that the recommended impact assessment techniques for the 13 categories of impact were too sophisticated for many projects, especially for the preliminary or "broad brush" impact assessment cycles, and recommended that simpler techniques be included.

Impact categories. It was recommended that one or more categories dealing with transportation impacts be added to the "yellow pages." The analysis of the traffic and other transportation impacts of a benchmark alternative was judged to be crucial for the assessment of its social, economic, and environmental impacts, but the discussion of this was not sufficiently prominent in Chapter 4, Section B. Also recommended was the addition of a category dealing with the "transportation disadvantaged"; this might be incorporated under "Accessibility to Facilities and Services."

Energy impacts. Better techniques to assess resource/energy impacts were needed in the guidelines.

Plan evaluation. Case example(s) should be added to the guidelines.

With these review comments in mind, the research team moved on to the field testing stage of the pilot program.

Field Testing the Guidelines

During the initial review visits with Group I, primary states, project selection meetings were held to identify agency projects that would be active over the next 8 to 10 months. In each state five to six projects were designated as potential "test" projects. Projects were screened to make sure that they were at a stage of development in which the guidelines could be applied; projects with social and/or economic impacts were favored in the selection process.

The range of projects reviewed and the issues associated with each are summarized in Table C-1 and Figure C-3, for the four Group I agencies. Table C-1 indicates the types of projects, their context, and their stage of development. Figure C-3 shows the major issues involved in the various projects. Over the course of the pilot program, the research team worked with agency personnel to apply the guidelines to these projects and monitor the results. Several of the projects originally in the early stages of alternative definition and preliminary assessment were dropped because of funding delays and priority changes. The test projects were representative of the types of projects the state transportation agencies believed they would be working on over the next several years, with some exceptions. Large interstate-type projects were not well represented and transit projects were underrepresented.

For each project, series of meetings were held with project personnel to receive feedback on the guidelines, and to assist in integrating guidelines concepts in the work. Additionally, the research team submitted written suggestions for modifications after each field visit. Following the sequence of field visits, the team assessed the comments and prepared a synopsis of recommended changes.

Evaluation and Guideline Revision

Many comments were received on the guidelines, and were taken into account in the final revision. The comments are summarized as follows:

- In the cover subtitle, "Project" should be changed to "Facilities." Several readers interpreted the guidelines as being applicable only for "project development" and questioned any mention of system or regional impacts. Although the guidelines focus primarily on corridor-level impacts, the assessment process must encompass the impacts caused by a project on the region and the system. Most of this analysis will normally be done in systems planning and the impact findings carried into the draft EIS, etc. However, many projects being undertaken by agencies today are not going through a full systems planning sequence either because of budget constraints or because they simply upgrade existing facilities. For these projects,

TABLE C-1

PILOT PROJECTS IN GROUP I AGENCIES

PROJECT CONTEXT	STAGE OF PROJECT DEVELOPMENT		
	ALTERNATIVES DEFINITION AND PRELIMINARY ASSESSMENT	IMPACT ANALYSIS	DEIS OR ND DOCUMENTATION AND PLAN EVALUATION
Regional		CA/West Coast Corridor Rail Study	
Urban Areas	* CA/CC 17--upgrade of major industrial highway CO/Powers Blvd.--reconstruction of arterial to airport * MI/Rte.51--widening residential street for major arterial CA/ED 50/89--widening for bus lane * CA/Ala. 84--local street widening and traffic control measures	* CA/Ala 17--HOVL and ramp metering of industrial highway	* CA/Marin 101 --HOVL* and ramp metering on radial highway into San Francisco CO/Through Alamosa--bypass to small city
Suburban Area	* MD/Rte. 2--new bridge and highway relocation MD/Rte. 108--new interchange and street widening * MD/Knecht Ave.--elimination of railroad grade crossing	* CO/Rte. 83--widening of radial road into Denver MD/US 50--(Cambridge)--bypass and new bridge for large town * CO/Quincy Ave.--street widening and intersection relocation	* MD/U.S. 50(Cabin Branch)--new interchange near industrial area
Rural Area	* MI/U.S. 31/10--bypass and corridor study * MI/U.S. 23--corridor study for upgrade or relocation MD/Rte. 220--relocation of 4 miles of existing highway	* MD/Rte 213--bypass of small town	* MD/U.S. 23--bypass of town
Wilderness Area	CO/S.H. 9--upgrade of existing road to recreation areas * CO/Wolf Creek--upgrade of existing road to recreation areas	* CO/Hotchkiss-Paonia--straightening of existing road to coal mining areas	CO/Rte. 82--upgrade of road in recreation areas

HOVL = high occupancy vehicle lane

PROJECTS		ISSUES/IMPACTS: Community Cohesion	Accessibility of Facilities and Services	Displacement of People	Employment, Income and Business Activity	Residential Activity	Effects on Property Taxes	Regional and Community Plans and Growth	Resources	Environmental Design, Aesthetics and Historic Values	Terrestrial Ecosystems	Aquatic Ecosystems	Air Quality	Noise
West Coast Corridor Rail Study					●				●				●	
CA/Contra Costa 17	upgrade of industrial highway through Richmond				●			●						
CO/Powers Blvd	reconstruction of arterial to Denver airport	●	●	●	●		●	●					●	●
MI/Rte. 51	widen residential street for new arterial in Niles	●	●	●	●		●						●	●
CA/ED 50 and 89	bus lane in Tahoe area; regional planning		●		●	●		●		●			●	●
CA/Alameda 84	local street widening			●			●							
CA/Alameda 17	HOVL on industrial freeway bordering San Francisco Bay				●			●					●	●
CA/Maine 101	HOVL and widening on radial highway from San Francisco to Petaluma area					●		●					●	
CO/Through Alamosa	bypass of small city	●	●	●	●		●						●	●
MD/Rte. 2	new bridge and upgrade of highway to Annapolis suburbs		●			●		●				●		
MD/Route 108	new interchange in suburban Baltimore			●										
MD/Knecht Ave	Amtrak railroad grade crossing elimination		●											
CO/Route 83	upgrade radial road from Denver to suburban growth county				●	●		●					●	
MD/U.S. 50	bypass to relieve summer tourist traffic in Cambridge, MD.	●	●	●	●		●				●	●	●	●
CO/Quincy Avenue	local street widening to relieve congestion in southwest Denver		●				●						●	●
MD/U.S. 50 (Cabin)	new interchange to industrial area in suburban Washington		●		●			●						
MI/U.S. 31 and 10	bypass of small rural town	●		●										
MI/U.S. 23 (corridor)	upgrade of highway corridor to upper Michigan recreation areas				●			●			●	●		
MD/Rte. 220	relocation of road north of Cumberland, MD			●	●		●	●			●			
MD/Rte. 213	bypass of small rural town			●	●		●	●				●		
MD/U.S. 23 (Standish)	bypass of town			●	●		●	●			●	●		
CO/S.H. 9 (Silverthorne)	upgrade road to ski/recreation area				●						●			
CO/Wolf Creek Pass	upgrade road to ski/recreation area				●						●			
CO/Hotchkiss Paonia	upgrade road to coal mining area				●			●	●		●	●		
CO/Rte. 82	upgrade road through ski/recreation areas (Aspen) major growth/no-growth debate				●			●		●	●			

Figure C-3. Major issues in pilot projects.

all impact assessment—regional, corridor, and local—is being done at what was once defined as the project development stage. For this reason, the guidelines must recognize assessment procedures and techniques dealing with regional impacts.

- Case examples illustrating the application of the recommended policies and procedures should be added, but the over-all length of the guidelines should not be significantly increased. Most reviewers thought that the length and accessibility of the guidelines were excellent, particularly the "yellow pages," which portrayed techniques for each impact category. The exceptions to this were individual impact assessment specialists who wanted detailed procedures for techniques within their field. The research

team found, however, that this would require duplicating material already available in other sources and would not particularly improve the treatment of the no-action alternative.

- Definitions of some of the terminology used in the guidelines should be included in the text, not just the Glossary. Terminology varies from state to state and many potential users work on narrowly focused specialties with little awareness of other aspects of the assessment process. There is a strong need for a commonly understood vocabulary.
- A loose leaf format was considered but was not recommended; the research team saw little indication that any guidelines are updated regularly except the Federal Highway Procedural Manual and did not anticipate revising the guidelines once they are published. Individual states expressed an interest in adopting material from the guidelines for their own manuals, but it is assumed that virtually all users will modify the contents and/or the format to fit their own needs.
- The original chapter structure was modified to have only two chapters. Chapter One deals with the function and definition of the no-action alternative and Chapter Two deals with its role in transportation planning and impact assessment.
- Discussions of "the problem" and need for the guidelines should be expanded and emphasized to make these more persuasive to readers who are not familiar with the problems of alternative analysis. The section should serve as an "appraisal and application of findings" section.
- In the chapter-by-chapter summaries, the role that a no-action alternative should play in plan evaluation and decision-making should be emphasized.
- After much discussion with agency personnel, a consensus was reached that the "no-action" terminology is preferable to "no build," "do nothing," etc. The use of "no action" will conform with NEPA and the language in the CEQ guidelines and will cover policy as well as construction actions.
- The project development process illustrated in the guidelines should be revised to show two (not three) assessment cycles: a preliminary assessment cycle prior to the programming budget decision point, and a main assessment cycle that leads to an environmental clearance. Preliminary assessment using "broad brush" analysis techniques or checklists have been tried by several of the pilot program agencies and found highly useful in making programming and budget allocation decisions. A single main assessment cycle was recommended because most projects are not complex enough to require two analysis cycles. Individual impact assessment techniques will continue to be rated in terms of level of effort required: low (quick, estimating techniques); moderate (standard analysis procedures); and high (very detailed or sophisticated techniques).
- The text in Chapter Two should be significantly expanded to describe in detail the type of work, level of effort, and decision-making points involved in each assessment cycle; and, where possible, reference should be made to task/decision sequences typically found in State Action Plans. This is a topic of concern to many agency administrators since most agencies do not adequately integrate the design, impact assessment and decision-making functions into one process.
- Case examples should be included that show how the no-action alternatives could be defined for different types of projects.
- Clearer guidance should be provided on defining the "regional context" of a project.
- The relationship between transportation/land-use forecasting and impact assessment should be shown more clearly. The guidelines provide a good framework for understanding how specific impact categories are analyzed, but the relationship of transportation/land-use forecasting to impact assessment and the rationale for projecting population, employment, and transportation factors is not worked out to the degree desired by many reviewers. This desire reflects, again, the need to integrate the transportation/land-use forecasting process with the impact assessment process.
- A new, more explicit section should be included to explain how the tables are to be used, emphasizing (1) that for each step in the analysis process, only one of the listed techniques need be selected and used; (2) that this choice is the project manager's or the analyst's responsibility and should be based on the level of effort required for actual project situation; (3) that the letters A, B, C indicate the approximate level of effort required; and (4) that the techniques are not mandatory.
- The discussions of no-action impacts should be expanded, and these should be illustrated with case examples in an appendix.
- Impact 8 should be changed to Resources and Energy; techniques and references for estimating future energy consumption patterns for different facilities should be included.
- Under Impact 4, Employment, Income, and Business Activity, the treatment of retail/commercial activity and manufacturing should be clarified.
- More of the less sophisticated analysis techniques that can be used on smaller projects should be included.
- An expanded discussion of the pros and cons of using the planning balance sheet method should be included.
- The discussion of evaluation should be tied to the description of the planning/assessment process.
- Case examples of the application of the planning balance sheet approach to actual projects, preferably to several projects of different scales, should be included.
- A new appendix should be added with examples of the definition of maintenance alternatives, the selection of impact assessment techniques, and the use of the planning balance sheet. The appendix would provide applied examples of the policies and approaches recommended in the main chapters of the guidelines.

SURVEY FORMS

A copy of the reviewers survey forms is shown in Figure C-4.

QUESTIONNAIRE
EVALUATION OF NCHRP PROJECT 8-11

IMPACT ASSESSMENT GUIDELINES:

THE ROLE OF THE NO-BUILD ALTERNATIVE IN THE EVALUATION OF TRANSPORTATION PROJECTS

DAVID A. CRANE AND PARTNERS HAVE BEEN CONDUCTING A STUDY FOR THE TRANSPORTATION RESEARCH BOARD; AN INTERIM PRODUCT OF THE STUDY HAS BEEN A SET OF GUIDELINES DEALING WITH TRANSPORTATION PLANNING AND IMPACT ASSESSMENT. THESE GUIDELINES, WHICH ARE APPLICABLE TO BOTH HIGHWAY AND TRANSIT PROJECTS, ARE INTENDED FOR USE BY STATE TRANSPORTATION AGENCY PERSONNEL IN PLANNING, PROJECT DEVELOPMENT, AND ENVIRONMENTAL ASSESSMENT. WE ARE, THEREFORE, ANXIOUS TO HAVE A NUMBER OF STATE TRANSPORTATION AGENCY PERSONNEL — AS WELL AS OTHER TRANSPORTATION PROFESSIONALS — REVIEW THE GUIDELINES PRIOR TO THEIR FINAL REVISION AND SUBMISSION TO THE TRANSPORTATION RESEARCH BOARD. IF YOU HAVE HAD AN OPPORTUNITY TO REVIEW THE GUIDELINES, WE WOULD APPRECIATE HEARING YOUR COMMENTS AND ANY SUGGESTED CHANGES. THE QUESTIONNAIRE SHOULD BE RETURNED TO:

DAVID A. CRANE AND PARTNERS/DACP, INC.
334 BOYLSTON STREET
BOSTON, MASSACHUSETTS 02116 TEL: (617) 262-0953

Name: _____

Position: _____

Organization: _____

Address: _____

_____

Telephone: (area code) _____ (number) _____

What type of work do you do? *(check one)*
○ project development ○ environmental assessment
○ other _____

Will the Guidelines be useful to you in your work? *(check one)*
○ highly useful as they are
○ useful with minor changes
○ useful with major changes
○ not useful

How carefully have you reviewed the Guidelines? *(check one)*
○ brief review
○ moderate review
○ detailed review

	Which chapter(s) did you find most useful? (check)	Are the concepts or materials presented in the chapter clear? (check)		Do you agree with the recommendation(s) in the chapter? (check)		Would you make changes in the content or format of the chapter? (check) if "yes," please explain below.	
		Yes	No	Yes	No	Yes	No
Chapter I - Introduction and Summary		○	○	○	○	○	○
Chapter II - Role of the No-Build Alternative		○	○	○	○	○	○
Chapter III - Definition of Alternatives		○	○	○	○	○	○
Chapter IV - Impact Assessment							
Section A - Impact Assessment Process		○	○	○	○	○	○
Section B - Projection Techniques		○	○	○	○	○	○
Section C - Assessment Methodologies (13 Tables)		○	○	○	○	○	○
Chapter V - Plan Evaluation		○	○	○	○	○	○
Appendix A - Techniques Dictionary		○	○	○	○	○	○
Appendix B - Glossary		○	○	○	○	○	○
Appendix C - Notes on the Impact Assessment Process		○	○	○	○	○	○
Appendix D - References		○	○	○	○	○	○

Comments:

Figure C-4. Guideline review survey.

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The National Academy of Sciences was established by a congressional act of incorporation signed by President Abraham Lincoln on March 3, 1863, to further science and its use for the general welfare by bringing together the most qualified individuals to deal with scientific and technological problems of broad significance. It is a private, honorary organization of more than 1,000 scientists elected on the basis of outstanding contributions to knowledge and is supported by private and public funds. Under the terms of its congressional charter, the Academy is called upon to act as an official—yet independent—advisor to the federal government in any matter of science and technology, although it is not a government agency and its activities are not limited to those on behalf of the government.

To share in the tasks of furthering science and engineering and of advising the federal government, the National Academy of Engineering was established on December 5, 1964, under the authority of the act of incorporation of the National Academy of Sciences. Its advisory activities are closely coordinated with those of the National Academy of Sciences, but it is independent and autonomous in its organization and election of members.

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