

**URBAN
TRANSPORTATION
ALTERNATIVES:
Evolution
of
Federal Policy**

Special Report 177

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URBAN TRANSPORTATION ALTERNATIVES: Evolution of Federal Policy

Report of conferences held February 23-26, 1975, at Airlie House, Virginia, and March 29-April 1, 1976, at Hunt Valley, Maryland, and sponsored by the Urban Mass Transportation Administration, U.S. Department of Transportation.

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Contents

PREFACE	
C. Kenneth Orski	1
INTRODUCTION	
Louis J. Gambaccini	2
1 ALTERNATIVE ANALYSIS, PRINCIPLES, AND LEVEL OF FUNDING	4
2 POLICY AND DRAFT ANNOTATIONS	9
3 PROPOSED DECISION CRITERIA	13
4 RELATED ISSUES	16
5 UMTA DOCUMENTS	18
Preliminary Guidelines and Background Analysis	18
Major Urban Mass Transportation Investments: Proposed Policy	22
Draft Annotations Pursuant to Policy on Major Urban Mass Transportation Investment	24
Major Urban Mass Transportation Investments: Statement of Policy	32
6 CONFERENCE PARTICIPANTS	35

Preface

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In November 1974 Congress passed the National Mass Transportation Assistance Act—a landmark legislation that provided some \$12 billion in federal assistance for urban mass transportation. For the first time, the federal government was able to aid urban areas to revitalize their badly neglected transit systems.

The availability of these new funds, however, raised some complex questions of equitable resource allocation. For example, in the division of the funds, how should the needs of the older, transit-dependent cities be balanced against the needs of the newer, automobile-oriented cities? How much weight should be given to modernizing existing transit systems already serving millions of riders and how much to building new rail systems to help highway-dominated cities achieve more orderly development patterns? What criteria should be used in deciding whether an urban area needs a fixed-rail system? Should the money allocated be used to complete a limited number of regionwide systems or to start a large number of initial rail segments that would be incrementally expanded into areawide networks?

Reaching answers to these and related questions was not a matter of making scientific deductions, but of developing a consensus on a series of compromise solutions that would best reconcile the competing demands of many different claimants.

Developing such a consensus required an open consultation with the various groups that might be potentially affected by the federal decisions. The Urban Mass Transportation Administration needed to explain its own thinking, to expose itself to the different points of view, and to involve its constituency to the fullest extent possible in the shaping of the policies that would guide future resource allocation decisions. Without the discipline of public disclosure and scrutiny, without a willingness to listen and to respond, no policy initiative of this significance could ever hope to survive.

This, then, was the guiding philosophy underlying the process that culminated in the two conferences at Airlie House and Hunt Valley. Their record should be viewed not only as an important building block in the continuing evolution of transportation planning philosophy but also as a case study in participatory policy development.

Introduction

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The following quotation from the Urban Mass Transportation Administration (UMTA) Statement of Policy on Major Urban Mass Transportation Investments succinctly provides the backdrop for the unique evolutionary process of federal rule-making that involved two highly successful conferences.

At the outset of the urban mass transportation assistance program in 1964, the \$75 million annual budget was directed toward the preservation of urban transit service in selected cities through the conversion of failing private transit companies to public ownership. A decade later UMTA's annual capital assistance budget exceeds \$1 billion, and is primarily devoted to modernizing existing transit properties and constructing new transit facilities. Not only has the magnitude and duration of Federal transit investments increased and changed significantly but the number of potential recipients has grown. The pressure of these competing demands requires the Department of Transportation to ensure that the available Federal resources are utilized in the most prudent and effective manner.

UMTA certainly was not alone in feeling the pressure of "competing demands." During the last decade, many cities and transportation districts struggled with similar problems of funding and modal choice. In addition, concerns about a variety of noneconomic factors such as land use, environment, energy, and social equity increased dramatically. Accordingly, any major expenditure of public funds necessarily dictated the development of appropriate strategies and methodologies in the allocation of these funds.

Perceiving these pressures at the local level, being aware of its own concerns, and responding to recently passed legislation and policy directives, UMTA began in late 1974 a careful reevaluation of the urban transportation planning and programming process with the objective of preparing guidelines to help determine eligibility for federal funding support. Key to this process was to be the evaluation of local transportation alternatives that would lead to the advancement of the most effective alternative for major investment.

UMTA recognized, however, that in promulgating a policy of such significance it must first survey and learn from its constituency. Thus, the Transportation Research Board was requested to convene a conference that would review and revise draft UMTA guidelines on major investments and the alternative-analysis process. A committee was constituted within TRB to develop the framework for the conference and prepare the final report.

The Conference on Evaluation of Urban Transportation Alternatives was held at Airlie House in Warrenton, Virginia, on February 23-26, 1975. The conference attracted a varied group of participants from several federal agencies, transit agencies, state departments of transportation, major city governments, regional planning agencies, transportation consulting firms, and academic institutions. The participants were given copies of Preliminary Guidelines and Background Analysis before the meeting and were then assigned to workshops to discuss the issues raised.

In reviewing the outcome of the Airlie House Conference, one is struck by the consensus achieved by so many from varied positions of responsibility and with such different stages in the outcome of the discussions. The conferees generally came to agreement on five of the principles in the Preliminary Guidelines and Background Analysis; these dealt with regional multimodal strategy, incremental planning, management of the existing system, framework for evaluation, and public involvement. Conferees also reached an understanding on such related transportation concepts as cost effectiveness and usable segments. And in addition, the conferees took the opportunity to raise with UMTA a number of concerns they had with the overall functioning of the UMTA program. Among these concerns were lack of an overall national transportation policy, lack of modal coordination within the transportation department itself, fear of overloading the planning and evaluation process with resultant "paralysis by analysis," and need for UMTA to pursue a transit advocacy role.

But the Airlie House Conference ended on a positive note and with the thought that there would be a second conference to discuss the implementation of this new UMTA policy. In the year intervening between the Airlie House and the second conference, the transit community was both encouraged and discouraged by various developments and thus approached the second conference with a certain wariness.

UMTA's notice of its Proposed Policy on Major Urban Mass Transportation Investments was published in August 1975; and, like all statements subject to review by widely divergent interests, it was a compromise. Some modifications, particularly on cost effectiveness and incremental development, reflected the input of the Airlie House Conference. Other aspects of the Proposed Policy, specifically those relating to the extent of federal commitment, the short time focus, and transportation sys-

tem management (TSM), did not.

The September 1975 Statement on National Transportation Policy was generally welcomed by the transit community, but subsequent speeches and policy directions by UMTA promoting paratransit and TSM, discouraging heavy rail transit, and invoking the "economy-of-scarcity" specter were viewed with some degree of skepticism. To many it seemed that a major thrust of UMTA was to allow capital development to be constrained by the budgetary process and particularly by the alternative-analysis planning requirement.

Nonetheless, the transit community welcomed again the opportunity to participate in the evolutionary process of UMTA policy development at the second Conference on Urban Transportation Alternative Analysis, which was held at Hunt Valley, Maryland, March 29-April 1, 1976. As before, TRB was the host and UMTA the sponsor. A second committee was established to plan the conference and prepare the final report. Although the original purpose of this conference was to review UMTA's description of the implementation of the Proposed Policy, which was contained in the Draft Annotations Pursuant to Policy on Major Urban Mass Transportation Investment, conferees were also given a second opportunity to review and comment on the revised Policy on Major Urban Mass Transportation Investment (with the new Part II, Procedures and Time Table) and the Proposed Decision Criteria that UMTA expected to use in evaluating and selecting projects for funding.

The conferees spent most of the time in the six workshop and plenary sessions on the revised Policy and the Proposed Decision Criteria; the latter probably garnered the most interest. Once again, the conference was notable in the consensus achieved by such a disparate group. The frustrations and concerns relating to the Policy that had built up during the preceding year were discussed in detail, and the Policy itself was modified in a variety of ways as the conferees sought balance and flexibility. The new part on procedures and timetable came under particular scrutiny, for this addition placed the concept of alternative analysis in the real-world context for the first time. The conferees expressed great satisfaction at UMTA's sharing the Proposed Decision Criteria with them and seeking input from its constituency. Although they agreed with significant portions, the conferees felt nearly unanimous that the criteria should not be officially promulgated and should be retitled guidelines for or factors to be considered in funding transit projects.

As at the Airlie House Conference, underlying all the discussions at Hunt Valley were a number of related issues that the conferees felt to be of critical importance to urban mass transportation. Participants raised questions about UMTA's advocacy role, the adequacy of funding levels, and new procedural requirements that seem to reflect an attempt by UMTA to reduce the quantity and cost of project applications rather than to encourage sound planning and ensure effective investments of federal funds. Participants were also critical of UMTA's practice of articulating policy incrementally through speeches and letters to applicants rather than promulgating official policy, supported by measurable goals and objectives, and standing by this policy for some reasonable period of time. Directly related to these concerns were the real needs of transit planners to be bound to federal requirements and decisions that enhance rather

than detract from the credibility of local planning and decision processes. Other discussion centered around issues such as the feasibility of a united surface transportation fund, formula versus discretionary funding of capital improvements, and the need for greater consistency between planning requirements of UMTA and the Federal Highway Administration (FHWA).

Yet, notwithstanding the controversy and continuing discussions concerning the Policy, the Draft Annotations, and the Proposed Decision Criteria, the two conferences were indeed highly successful. Through UMTA's deliberate and innovative policy-making process, the central theme of alternative analysis withstood the scrutiny of public review and comment. This concept has been accepted by all segments of the transit community as a valuable tool in both improving local decision making and ensuring cost-effective expenditure of limited resources.

This Special Report contains the findings of both the Airlie House Conference and the Hunt Valley Conference. The following documents were prepared by UMTA for discussion at the conferences or for publication afterward.

1. Preliminary Guidelines and Background Analysis. Feb. 1975.
This document was prepared for the Airlie House Conference and is referred to in this report as Preliminary Guidelines. It is discussed in section 1; the full text is given in section 5.
2. Major Urban Mass Transportation Investments: Notice of Proposed Policy. Federal Register, Vol. 40, No. 149, pp. 32546-32547, Aug. 1, 1975.
This document is referred to in this report as Proposed Policy. The full text is given in section 5.
3. Policy on Major Urban Mass Transportation Investments (with Part II: Procedures and Time Table). March 1976.
This document was prepared for the Hunt Valley Conference and is referred to in this report as Policy. The full text and discussion of it are given in section 2.
4. Draft Annotations Pursuant to Policy on Major Urban Mass Transportation Investment. March 1976.
This document was prepared for the Hunt Valley Conference and is referred to in this report as Draft Annotations. It is discussed in section 2; the full text is given in section 5.
5. Proposed Decision Criteria Governing UMTA Commitments to Construction Financing of Major Mass Transportation Projects. March 1976.
This document was prepared for the Hunt Valley Conference and is referred to in this report as Proposed Decision Criteria. The full text and discussion of it are given in section 3.
6. Major Urban Mass Transportation Investments: Statement of Policy. Federal Register, Vol. 41, No. 185, pp. 41512-41514, Sept. 22, 1976.
This document is referred to in this report as Statement of Policy. The full text is given in section 5.

1 Alternative Analysis, Principles, and Level of Funding

This section contains a discussion of the Preliminary Guidelines and Background Analysis, which was prepared by the Urban Mass Transportation Administration for discussion at the Airlie House Conference. The full text is given in section 5. In the paragraphs below, the appropriate material from the Preliminary Guidelines is given first in a light sans serif type. Deletions proposed by the conferees are indicated by dashes through the words (~~and~~) and the proposed additions by italics (*and*).

ALTERNATIVE ANALYSIS REQUIREMENT

The growing requirements for improved public transit have increased the demand for federal and local investment, which has continually outpaced the availability of funding at every level of government. At the same time, the increasing variety and complexity of local transit programs have made it increasingly difficult for federal officials to maintain an equitable and rational process for reviewing the results of the planning process and making funding decisions.

At the local level, the same problem has arisen. Urban areas have developed public transit components of regional transportation plans that meet local and regional goals but that are often beyond available local and federal funding capacities.

The result of this is the need to increase the rationality on which transit investment decisions are based and to evaluate alternative improvement and investment strategies for developing improved transit services and systems throughout the country. The analyses of these alternatives must give local decision makers the ability to evaluate the effectiveness of various levels of investment in meeting the transit objectives of the region. They must be developed so that they can be tested against UMTA's requirements to ensure that federal decisions regarding project eligibility are equitable and rational.

The conference discussions reflected a general acceptance of the concept of alternative analyses. At the same time, the conferees raised a number of questions regarding specific applicability.

One frequent question related to the requirement in the Preliminary Guidelines that "all pertinent alternatives" be evaluated as a condition to federal assistance. To determine the alternatives to be analyzed, the following considerations should be taken into account.

1. Pertinent alternatives must be mutually defined. All pertinent alternatives, if defined unilaterally by the federal agency, might include alternatives that are not at all pertinent to the local community. Too many or too few alternatives might make the investment overly cumbersome or immaterial or might exclude an alternative that is the locally supported alternative.

2. Some projects have no alternatives or have alter-

natives that are clearly not pertinent. These might include rehabilitation and replacement projects for facilities or rolling stock. Alternative analysis in these cases would be counterproductive.

3. Some projects are so small that an alternative evaluation would be less desirable than some other rationally based evaluation. Several threshold minimum cost levels for projects were suggested.

A second question related to the point in the planning and project development process at which an alternative analysis should be made. The consensus of the conference was that the evaluation should be introduced as a part of the planning process before the development of individual projects. Conferees noted that the alternative analysis is related to some extent to virtually every stage in the planning and project development process. The analysis should be introduced at the early stages of the planning process and applied progressively but with diminishing intensity as planning becomes more specific and reaches project development. The alternative analysis should, therefore, be made a part of the planning process and should allow for a review of alternatives at each stage as appropriate to ensure a logical sequence in the development of transit plans. The product of the analysis in the final stages before implementation should be adequate to meet the needs for justification of the implementation of the projects that are the recommended alternatives.

A third question related to the application of alternative analysis to all urban transportation planning regardless of mode. The application of the process to highways was viewed by some to be out of date because of the advanced stages of the implementation of the urban sections of the Interstate highway system and other highway improvements that might have had a reasonable transit alternative. Others felt that it was not a valid concept for highway planning procedure because of the unique funding of highway improvements.

A final question related to the application of a new procedural requirement. The conferees were in agreement that the introduction of a new procedural requirement should be carefully applied so that it does not unnecessarily and adversely affect the many significant transit projects that are now in various stages of development. In general, the notion of exempting projects from the new process would apply to projects that have been adequately developed to meet current capital grant requirements. Such projects should not be subject to new planning requirements simply because of new procedural guidelines.

PRINCIPLES OF ANALYSIS AND PLANNING

Regional Multimodal Strategy

Areawide transportation improvement plans should be conceived as integrated multimodal strategies that involve elements tailored to the service requirements and travel volumes of the particular corridors and communities they serve. As an example, a comprehensive strategy may involve the construction of a rail rapid transit line in a corridor of heavy demand, supplemented by a light rail network or busways on a lower density portion of the metropolitan area, and assisted by fleets of flexibly routed paratransit vehicles acting as suburban feeders to the high capacity line-haul systems. Explicit recognition should be given to community level transit services which improve mobility within neighborhoods, as well as to express line-haul connections which foster region-wide accessibility.

The general principle that there should be a regionwide strategy for transit investment, which includes a continual upgrading of existing local, subregional, and regional level feeders and line-haul systems, was accepted as axiomatic by the conferees. The fact that local and neighborhood service improvements are now more implicit than explicit in regional transit development programs does not mean that they are not present. The lack of explicitness usually occurs because planners and public policy makers have less interest in neighborhood improvements than in more dramatic, higher capital projects. In general, conferees felt that such local and neighborhood service improvements should not be viewed as a substitute for the line-haul, long-range, regional systems in areas where both are part of a regional strategy. They are equally essential portions of an overall multimodal strategy.

The multimodality of such a strategy was generally accepted as desirable. To accomplish the objective of such a strategy will, however, require the cooperative efforts of all agencies that have responsibilities for urban transportation. Many highway-related projects are usually not under the jurisdiction of transit planners or operators and in fact are often under the jurisdiction of other transportation agencies that may have plans of their own and therefore may resist the use of highway facilities or funds to accomplish a more effective transit system. Conferees felt that the accomplishment of true multimodality depended on a significant strengthening of resolve by the U.S. Department of Transportation that both highway and transit projects have a common level of project justification to ensure the "multimodality" of investment strategies for both modes. The comprehensive nature of such a multimodal strategy also clearly implies that the planning for such a strategy should be long range and comprehensive and not short range, incremental, and single purpose. The use of various transit modes in a regional system plan is a valid concept as long as each one is the most effective means of public transportation.

Travel volume is only one of the factors on which service requirements are determined and therefore need not be emphasized. Conferees propose that it be deleted from the principle.

Incremental Planning and Implementation

Major transportation investment projects should be planned and implemented in stages with initial segments of fixed guideway systems constructed in corridors and areas having priority needs. The level of service should be raised incrementally as the demand develops, reflecting a balanced concern for the near-term and the long-term. Where there are plans to construct an areawide rapid transit system, such plans should be blended with the program of immediate low-cost actions to revitalize or upgrade service within the existing transportation system. The aim should be to avoid premature investment in costly fixed facilities in order to preserve maximum flexibility in response to future unknowns.

The concept of implementing in stages was generally accepted as a reasonable and realistic concept (in fact, the concept is normally applied in virtually every system in the country). Conferees felt that the stages must be usable segments but need not be the smallest usable segment nor necessarily a core element. The implementation of a regional transit plan can be carried out in increments that range in size from a full region to multiple or single corridors. The extent of the increment to be implemented depends on a number of factors including financial resources, local immediate needs, and ability to implement.

Conferees expressed substantial concern, however, about the notion that systems should be planned in stages and whether this conflicted with the first principle and with the sound, long-standing policy objectives of UMTA that transportation planning be comprehensive, regional, and multimodal. Long-range system planning tends to create a regional system plan that is too formidable in many respects to be implemented. Fixed regional plans are regarded as inviolate by their advocates in the way that many urban Interstate highway segments were regarded by some highway planners and officials. Furthermore, many system plans are often based on long-range assumptions that become irrelevant or false as conditions, values, policies, technology, and financing capabilities change.

The conferees thought that an iterative relation is essential among the comprehensive regional multimodal system plan, shorter range objectives, and individual elements of the plans as they are implemented. More emphasis in regional transportation planning programs should be placed on developing short-range improvement programs.

Each element—say, a rail transit corridor project—could be implemented incrementally and designed and built in stages as long as the individual element was a usable segment. No planning for an increment should be done outside the context of the regional transportation plan.

Whether planning is long range or incremental should not be a question: Long-range and short-range elements of the planning process should have an iterative relation. The planning process should consider the impact of implemented increments of the plan, immediate system improvements, and changing public policies and other land use, economic, and social phenomena. The focus for this is currently the regional unified work programs and the transit development plan.

Incremental Service Increase

Three interpretations of staged implementation evolved in the conference discussions:

1. Upgrading capacity within a single corridor or right-of-way over time by installing sequentially higher capacity transit technology as usage and demand increase,
2. Incrementally upgrading and extending an existing system within a given technology while improving over time the state of the art as appropriate at each new project implementation stage of that technology, and
3. Staging implementation of new systems in usable segments of that technology and using at each stage the latest effective version of such technology.

The first interpretation had the most opposition because conferees thought it was impractical and had potential diseconomies, operational complications, and counterproductive investment.

To serve short-term demand with buses in corridors where line-haul transit might be the long-term solution

is not unreasonable. Bus service can be incrementally upgraded in frequency, capacity, quality, line speed, and street- and highway-operation improvements. It can then be completely or partially replaced in time by line-haul service.

There is a capacity continuum from occasional bus service to maximum frequency, line-haul, exclusive right-of-way technologies. There is a threshold, however, in the evolutionary process of corridor transit development at which exclusive, grade-separated guideways are required and possibly changes in vehicle systems, wayside power, and signal and control systems. This phenomenon has the effect of producing two categories of transit technologies: transit vehicles operating in mixed traffic on streets and operating on exclusive rights-of-way. In terms of technology, this makes implementation basically a two-stage process. The continuum is accomplished not by technology but by operating practices.

Incrementalism is a term that can be reasonably applied to the implementation process if local circumstances permit. It is possible, however, that the regional strategy set in accordance with the principle on regional multimodal strategy may mean that regional support for a system depends on balanced progress in each subregion and corridor.

The concept of a usable segment was generally accepted as reasonable although several efforts to define it met with limited success. The basis for a definition is suggested by the following characteristics that a usable segment should have:

1. Fully self-sustaining logistically,
2. Capable of operating independently and indefinitely,
3. Compatible with regional system plan, and
4. Justifiably cost effective.

Some negative aspects of a minimal usable segment include

1. Erosion of regional political support;
2. Proportionally higher front-end costs for facilities such as shops, yards, and power;
3. Higher unit costs for rolling stock because of size of order; and
4. Redistributive effects on land use favoring early corridor.

In addition, the development of various usable segments over time may result in the creation of a series of diseconomies and geometric distortion of overall operating and capital costs resulting from lack of any economies of scale. Some advantages of the usable segment concept as an essential element of the incremental implementation of regional plans include

1. Improved prospects for local and federal funding for small projects,
2. Chance of becoming cost effective by leading to investments for a demand that can reasonably be expected,
3. Greater compatibility with ability to construct and operate,
4. Better learning curve for the development of new systems, and
5. Allocation of federal funding over a larger number of metropolitan areas.

The conferees were generally in accord on the following considerations relating to the concept of a usable segment:

1. A usable segment does not necessarily mean the smallest usable segment,
2. A usable segment may be a core element of a regional system or a corridor line, and
3. The concept of a usable segment should not be viewed as a means to reduce the demand for federal assistance within any metropolitan area or nationwide.

Short-Term, Lost-Cost Improvements

There was strong agreement with the third major element of this principle: Long-range, capital-intensive plans should be blended carefully in the existing transportation system with short-term, low-cost improvements. Virtually every metropolitan area that has plans for major capital-intensive systems already has an ongoing low-cost improvement program well under way. Some of the cities that have more controversial capital-intensive proposals have some of the best short-term bus improvement programs that are yielding substantial increases in ridership.

Premature Investments

The fourth element of this principle was perhaps one of the most difficult precepts to deal with. The minutes of each workshop indicate that conferees took substantial exception to the implication that currently proposed regional system plans, developed within the existing regional transportation and land use planning programs, should or could be considered premature or costly. In addition, they questioned whether the delay of the implementation of the regional plans, or the staged implementation of those plans, will reduce the cost of the plans, make them more "mature," or "preserve maximum flexibility in response to future unknowns." Future unknowns will always be a problem. Reasonable predictions can be made now, and the credibility of those predictions depends on the quality of the work and the good faith of the creators and interpreters of the predictions.

The basic conclusion seemed to be that the aim of incremental implementation should be not to avoid anything but to develop the best investment decisions in a rational and timely fashion. Delay for the sake of delay or for the sake of reducing demand for funds or for the sake of awaiting some vaguely anticipated technological breakthrough were all considered to be improper aims of incrementalism.

Managing the Existing Transportation System

Improvements in transportation service should be sought through effective management and operation of the existing transportation systems as well as through the construction of new facilities. Measures such as preferential treatment of buses on freeways and city streets, reserved lanes and transit-ways, parking management, peak-hour tolls to discourage automobiles from entering central areas, changes in fare structure to stimulate off-peak travel, traffic flow improvements, paratransit services, staggered work hours and other actions designed to make more efficient use of existing transportation facilities—all of these should be considered as possible alternatives or supplements to the construction of new capital facilities: *part of the planning process for implementation by the appropriate agencies.*

There was clearly no disagreement among the conferees that effective management and operation of existing transportation systems are important means of improving transportation services. They viewed efficient management and operation as key elements to the improvement of any system and thought that these elements should be carefully and vigorously developed as supplements, but not as alternatives, to major capital improvements. The

planning for management and operation improvements should be made an integral part of the planning process for implementation by the appropriate agencies.

The conferees recognized that many of the examples of management and operation improvements described in the text of the principle are not under the control of most agencies that have the responsibility for the management, operation, and capital improvement of transit systems. For example, most of the street management improvements are under the control of municipal or state traffic and highway departments, and restricting automobile use and introducing staggered workhours are clearly the province of a host of government agencies, regulatory bodies, and private establishments. The realization of a total program to accomplish increased operating results for transit through devices such as those mentioned here depends on the determined support of public policy makers, highway officials, private business groups, and a complex of other public and private groups, including the federal government.

The conferees noted the need to coordinate a variety of federal policies more productively and more positively if the full potential of this principle is going to be realized. Among the policies mentioned in this context are those relating to energy, air quality, highway investment, metropolitan development, and environmental improvement.

Tactics to improve transit management and operation effectiveness should be defined in the short-term plans of a system. Conferees also thought that major highway improvements should meet similar, prior definitions.

Framework for Evaluation

The analysis of alternatives should include a determination of which alternative is the most economical and effective way of achieving the metropolitan area's social, *economic*, environmental and transportation goals. Such analysis should also assess *include* the impact of each alternative on local and regional accessibility, air quality, energy consumption, neighborhood environment, community and regional development patterns, and other factors considered important by the area's residents.

This principle attracted a great deal of interest and discussion in every workshop and, along with the related questions of cost effectiveness, provided some of the most intense debates. The discussion of the principle generally included several key points.

1. Would this process be an additional requirement to those now in effect, or would it be integrated into the existing process for program and project approval?
2. At what stage in the development of a project would such an analysis be made?
3. Can the process be designed to ensure that quantitative measures will not overwhelm qualitative measures of effectiveness?
4. Can "factors considered important by the area's residents" be systematically analyzed at a level comparable with that at which more traditional measures of effectiveness and factors important to the funding agency at the federal level are analyzed?
5. How will projects already under way be treated?

The discussion was closely related to the discussion of three questions posed by UMTA in its Preliminary Guidelines provided to the conferees. Paraphrased, these questions are as follows:

1. What should the measures of effectiveness be, and who should define them?
2. Is cost effectiveness an appropriate tool for evaluation of transit investments?
3. Should there be a uniform methodology in evaluating transit projects?

The analysis of alternatives is an exercise that is related to the planning process stage of the development of transit planning. The analysis should be an integral part of the planning program and should not be motivated to support the implementation of any particular alternative. Properly integrated into the planning process, however, the alternative analysis should produce adequate information for a valid basis for proceeding to implementation. The guidelines are for the planning process and should be applied well before the project justification or grant application stage. The consensus of the conferees indicated substantial agreement on several points.

1. Projects already under way should be exempted unless there is some compelling reason that can be demonstrated to slow down the project for this kind of reconsideration.

2. Quantitative measures by themselves are not adequate for determining cost effectiveness. Quantitative factors should not be allowed to overwhelm reasonable qualitative and public policy considerations. Cost effectiveness should not be limited to transportation-related factors.

3. Local policy and neighborhood area interests should be an important factor in assessing alternatives. The function of the regional transportation planning process is to produce a rational and feasible program with local support and involvement. Projects should be considered in the context of the process that has produced them. By and large, this is a local and regional process carried out in the manner prescribed by federal policy. Projects produced by such a process should not be rejected simply because they are capital-intensive and produce a demand beyond the present level of federal funding.

4. No single measure of cost effectiveness is adequate by itself. Evaluation factors should not be enumerated by the federal government but should be developed by the participants in the project planning at the outset of the project. The rules for and scope of the evaluation should be agreed to by federal and nonfederal participants at some early stage in the process. Agreed-to rules and scope should not be revised or added to. The nature and intensiveness of the evaluation should be appropriate to the size, scale, and type of the alternatives under evaluation.

5. Cost of any such analyses should be supported by UMTA funds as a part of the uniform work program.

6. The analyses should be presented as a part of the project justification in the application for capital grant assistance.

7. The procedures should be uniform throughout the country to the extent possible so that the UMTA analysis of projects is on a common basis. Uniform methodology and procedures should not be prescribed at the national level, however, and clear provisions for local circumstances and special need should be provided.

8. The primary measure for alternatives analyzed should be regional factors and needs. The validity of a project should not be constrained by the limitations of federal funding.

9. Only a few evaluation measures can be standardized. These include escalation, amortization and discount rates, and life cycle of project elements. Some measures prescribed by other agencies, such as the U.S. Environmental Protection Agency and the Federal Energy Office, might also be standardized. A basic, minimum inventory of factors to be evaluated might also be possible as long as allowances are adequately made for regional policy assumptions and additional local considerations.

The suggested revision of this principle is simple but significant; its thrust is to take the cost-effectiveness

element out of a special status and place it on equal footing with social, environmental, and transportation factors. This gives the economic aspects no special weight in project evaluation.

Public Involvement

There should be full opportunity for timely public involvement in the planning and evaluation process, so that the public which may be potentially affected by the project has full access to all relevant information and has an opportunity to influence the process in timely and constructive fashion. Interested parties, including local governments and metropolitan, regional, state and Federal agencies, as well as the public, must have adequate opportunities to express their views throughout the study process. This involvement must begin early enough to influence the course of planning decisions, particularly on the alternatives to be considered, the effects to be studied, actions to be taken to minimize or avoid adverse effects, priorities for implementation, and the time-schedule of program and project development activities.

Conferees had no strong objection to the principle of timely public involvement in the planning process. Several particular issues were raised in the workshops: When is involvement timely? Does the principle mean, as the second sentence implies, that the government officials and the general public have the same involvement and access to the process? What relation does the present public hearing process have to public involvement?

In general, the discussions assumed that the public involvement contemplated in this principle is beyond and in addition to the participation in the existing land use and transportation planning process. The public that is to be involved was assumed to be the general public other than and in addition to the official community. Unaffiliated individuals with a special or general interest, civic associations, and special interest groups all might come within this general involvement principle.

Timely public involvement was one of the most elusive concepts to the conferees. The draft principle attempts to define the term in the sentence, "This involvement must begin early enough to influence the course of planning decisions." Conferees were left, however, with many questions and, therefore, proposed that this sentence be deleted, leaving the concept of timeliness undefined.

Also important to the acceptance of this principle is the definition of public as being that "public that may be potentially affected by the project." The term project also implies that the involvement should take place at a stage in which the project is reasonably well defined and well beyond the system planning stage.

The existence of controversy relating to a project should not be viewed as a detriment, and public statements by public participants should be considered as a part of the overall public policy commitment and public support for the project.

LEVEL OF FEDERAL FUNDING

It is proposed that the level of Federal funding for a major mass transportation investment project be based on the alternative which most economically and effectively achieves the locality's objectives. Local choice will be preserved by permitting the area to use the Federal funds to support any of the alternatives evaluated, provided that the locality is willing and able to secure the additional funding required for a more costly alternative. The level of federal funding shall be the statutory percentage of the costs of that alternative, which, considering both economic and noneconomic factors, most effectively achieves regionally determined local objectives.

Three interpretations of the meaning of the term "level of federal funding" developed in the discussions of the workshops: (a) the percentage of total project cost, (b)

the order of magnitude of the total cost of the project to which the evaluation process would apply (similar to the question of applicability), and (c) the type of UMTA capital assistance that would require the use of the suggested techniques.

Percentage of Project Costs

Conferees felt strongly that UMTA should neither reduce the current 80 percent of eligible project costs nor reduce the definition of eligibility as a means for selecting approved projects and allocating funds in the presence of a demand for funds that might outstrip the current supply. There should be no question of the percentage of UMTA participation in total project costs. UMTA should participate at the 80 percent level as specified by federal law. If appropriations are not adequate to meet the cumulative justifiable demand, then proposals for increased funding should be dealt with on the merits by the legislative process. The transit community should work for a continuing level of congressional authorizations and appropriations and for approvals by the Office of Management and Budget to ensure a continuing adequate availability of federal funding.

Project Size

Several workshops dealt in detail with the question of the size of projects that might be subjected to alternative analysis. Several thresholds were suggested. With reasonable flexibility, a \$100 million minimum level seemed appropriate. They could not agree, however, on any threshold cost below which projects might be exempt from alternative analysis. They thought that the analysis should apply only to major new construction and extensions and not to reconstruction, rehabilitation, and replacement in kind of rolling stocks and other equipment.

Other UMTA Fund Sources

The conferees noted that UMTA now administers four programs through which major regional transit investments can be funded: section 3 capital grant discretionary program, section 5 program, funds transferred from canceled Interstate highway projects, and funds transferred from the federal-aid urban system. UMTA has reasonably and efficiently minimized the complexity of its administrative apparatus during the year. Applicants have been able to follow a single, well-defined procedure. This well-organized system should not be complicated unnecessarily by providing different requirements for project development, analysis, and justification depending on which funding source UMTA eventually—and perhaps at the last minute—decides to use for that project.

The process by which a unified work program leads to a transit improvement program, an annual program of projects, and individual capital grant application is reasonable and orderly. To require a different course of action depending on funding source would be unnecessarily cumbersome. The minimally different administrative and decision-making procedures recently developed are fully adequate to meet the requirements of the statute.

Conferees thought that the entire paragraph on level of funding should, therefore, be deleted; they drafted a new paragraph to be used instead. The key revision is intended to ensure that, for projects developed in accordance with the earlier principles, the costs that result from accommodating the social, economic, and environmental concerns and the special needs of a community are not arbitrarily found by UMTA to be uneconomic.

2 Policy and Draft Annotations

Two related documents, the Policy on Major Urban Mass Transportation and the Draft Annotations Pursuant to Policy on Major Urban Mass Transportation Investment, are discussed together in this section although they were reviewed separately at the conference. The specific recommended changes in the Policy are applicable to the Draft Annotations although they were not formally incorporated in the Draft Annotations by conference consensus.

This combined discussion is necessitated by the uneven attention given to the Draft Annotations by the conference workshops. The extensive amount of time devoted to debating and revising the Policy precluded review of the Draft Annotations. Although it was intended that this report to UMTA contain recommendations that are supported by conference consensus and therefore are fairly representative views of the transit constituency, the thoughtful and detailed workshop comments on the Draft Annotations should not be ignored because they do not constitute a consensus. Such comments, therefore, are presented in this report but are distinguished from consensus recommendations of the conference.

The Policy is given in full below in a light sans serif type. Proposed deletions are indicated by dashes through the words (*word*), and proposed additions are indicated by italics (*word*). Conference recommendations are discussed after each section of the Policy. (The Draft Annotations are given in section 5 of this report.)

POLICY ON MAJOR URBAN MASS TRANSPORTATION INVESTMENTS

INTRODUCTION

The purpose of this notice is to promulgate UMTA's policy and the procedures which will guide future Federal decisions in determining an area's eligibility for Federal assistance for major mass transportation investments of the fixed guideway type. This policy will be applicable to all funds administered for these purposes by UMTA—Discretionary Grant funds (Section 3); Formula Grant funds (Section 5); Interstate Transfer funds; and Urban System funds.

Since the beginning of this decade, the Federal Government has provided an increasing share of the Nation's capital investment in urban mass transportation. In the years ahead, as more and more communities seek Federal financial aid to improve and expand their mass transportation systems, it is more essential than ever that Federal funds be effectively and efficiently utilized.

The Policy was first issued for public comment on August 1, 1975. Sixty-eight responses were received from local, State and Federal agencies, transit authorities, metropolitan planning organizations, and other interested parties. UMTA has taken careful account of these comments in modifying and clarifying the Policy.

The revised Policy contains one major new element: a statement of procedures and timetable for the alternatives analysis process. It is UMTA's belief that a Federal agency has an obligation to spell out clearly the process by which it makes major decisions, and to suggest a schedule which it would normally expect to follow in arriving at these decisions.

The procedures establish the steps that lead to a fully funded construction commitment. These steps include: completion of an alternatives analysis; technical review by UMTA; decision whether or not to autho-

rize preliminary engineering; completion and circulation of an Environmental Impact Statement; and decision to make fully funded construction commitment.

The section entitled "Extent of Federal Commitment" which appeared in the original text has been deleted. The proposition that the Federal Government might provide funding for alternatives which the local analysis had determined as not cost-effective is deemed to be inconsistent with the Federal obligation to ensure prudent and effective use of the taxpayer's money. The Department's policy of confining the Federal commitment to cost-effective alternatives remains unchanged.

Review of the comments received also indicated the desirability of removing certain ambiguities and making certain clarifications to the Policy Statement. These changes are discussed below.

1. A number of respondents felt that no single overall measure of transportation cost-effectiveness could fully reflect all of the significant issues which must be considered in reaching responsible decisions. A single measure was not the intent of the policy. The statement now makes it clear that multiple measures of cost-effectiveness should be considered, and that effectiveness is measured by the degree to which the proposed investment attains the social, economic, environmental, urban development, and transportation goals of the community.

2. Some comments interpreted the emphasis on a short planning horizon as a rejection of the concept of comprehensive metropolitan planning. The policy does not challenge the concept of long range planning, and UMTA recognized the need for such planning as a means of giving an overall direction to metropolitan development. However, UMTA believes that it is not prudent for either a locality or the Federal Government to make a massive commitment to a fixed course of action based solely on the necessarily speculative projections that must characterize plans which target 20 to 25 years in the future. Changing social priorities, demographic shifts, environmental concerns, accelerated inflation and other unanticipated developments can drastically alter even the most carefully conceived long range plans. It is desirable therefore to couple the long range plan with a shorter planning horizon which would serve as the basis for defining the fixed guideway increments of the plan. The section on "Incremental Development" has been revised in order to bring out more clearly these considerations.

3. A number of respondents felt that a 10-year basis for the shorter horizon was too close in the future to permit investments such as advanced acquisition of rights-of-way, that pay off only in the long run. These comments are well taken. Considering the long lead times that are required for most fixed guideway projects, a somewhat longer planning horizon is justified. The policy has now adopted a horizon of up to 15 years.

4. Several comments expressed doubt about the feasibility of the incremental approach to transit system implementation because of the need to offer benefits more or less simultaneously to the entire region. UMTA agrees that there must be some geographic equity in transit development. But the incremental approach is not inconsistent with an equitable distribution of transit benefits. An "increment" of the plan may contain a package of projects designed to benefit an entire metropolitan area. For example, the initial implementation plan may include express bus service in exclusive lanes, new fringe parking facilities, improved feeder services in suburban communities, as well as the first localized segment of a fixed guideway system.

5. A more precise definition of a "major mass transportation investment" was urged by several respondents. This point has been clarified by bringing under the coverage of the policy all projects involving the construction or extension of fixed guideway systems, except projects identified by UMTA as part of a demonstration program (such as the proposed "Shuttle Loop Transit" Demonstrations). Fixed facilities by nature of their permanence and irreversibility have potentially the greatest impact upon the urban area in terms of land use, financial burden, and urban growth. Decisions concerning fixed facilities, therefore, deserve particular care, regardless of their financial scope.

In accordance with a conference recommendation, the material originally presented as a preamble to the policy was recast as an introduction and the order of the material was changed. In the text above, only the revised form is shown. The conferees further recommended that the introductory language be expanded to reflect the relevance and benefits of this policy to the local and federal planning and decision-making processes.

There was considerable discussion regarding the planning horizon, specifically UMTA's explanatory remarks under change. The third and following sentences describe UMTA's views on the "speculative" nature of plans that cover 20 or 25-year periods and the desirability of coupling "the long range plan with a shorter planning horizon which would serve as the basis for defining the fixed guideway increments of the plan." Conferees expressed concern that these views imply a prohibition against public transit investment as a tool for implementing metropolitan development strategies. Conferees agreed that these sentences in the policies should be either deleted or substantially rewritten to eliminate the perceived implications.

PART I. GENERAL PRINCIPLES

Since each metropolitan area has differing characteristics, Federal mass transportation assistance programs cannot be based on standardized solutions. Rather, these Federal programs should be flexible, relying heavily on local ability to assess present and anticipated transportation needs, identify and evaluate alternative opportunities for improvement, and initiate needed actions.

The Federal Government does, however, have a strong interest in ensuring that Federal funds available for mass transportation assistance be used prudently and with maximum effectiveness. While there are no simple or standard procedures that will guarantee this outcome, a careful and systematic evaluation of the implications of alternative courses of action in advance of a Federal commitment should improve the quality of decisions. To this end an analysis of transportation alternatives will be required as a condition of eligibility for Federal assistance for any major mass transportation investment. Federal assistance will be confined to cost-effective alternatives. A major mass transportation investment for purposes of this Statement is any project which involves the construction or extension of a fixed guideway system (rail rapid, light rail, busway, automated guideway transit, *commuter rail*), except where such project is determined by the Administrator to be of importance as a demonstration of advanced technology. *Major mass transportation investment specifically excludes rehabilitation and modernization projects, regardless of cost.*

Conferees recommended that "major mass transportation investments of the fixed guideway type," to which the policy and procedures apply, specifically exclude rehabilitation and modernization projects regardless of cost. They also recommended that the listing fixed-guideway systems include commuter rail.

Conferees recommended that language regarding cost-effective alternatives be consistent throughout the Policy and related documents to ensure that UMTA's intent is clear with regard to federal funding commitments. They expressed concern that UMTA might intend to fund only one cost-effective alternative or "the most cost-effective alternative," neither of which necessarily would satisfy other important local goals and objectives. Since the process and the data used to determine cost-effectiveness can vary significantly from one metropolitan area to another, the conferees were against having any procedure or criterion that results in the selection of only one alternative to qualify for federal funding. The reference in the introduction to "cost-effective alternatives" was preferred and recommended for use throughout the Policy.

The conferees also noted that the statement "federal assistance will be confined to cost effective alternatives"

is contradicted in the Proposed Decision Criteria by a reference to additional factors, such as local overmatch of funds, that would be considered favorable at the time intercity project comparisons are made by UMTA. Conferees were against any exceptions to the congressional intent that qualified projects receive 80 percent federal assistance and recommended that Section III, Additional Favorable Factors, be deleted from the Proposed Decision Criteria.

The analysis of alternatives shall be carried out as part of a comprehensive transportation planning process in accordance with the following principles:

A. Long Range Plan

Major mass transportation investment decisions shall be consistent with an urban area's comprehensive long range plan which articulates the overall direction for metropolitan development and identifies major transportation corridors.

Such plan should reflect an awareness that different levels and types of transportation service may be needed in different portions of the metropolitan area. Each major corridor should be considered individually to determine the level and type of service that will best meet its projected requirements. *However, this does not preclude ridership forecasts from being based upon the assumption of a complete system.*

The plan should recognize the need for local community-level transit service as well as for express line-haul connections that foster regionwide accessibility. As an example, a comprehensive transportation plan may call for the construction of a rail rapid transit line in a corridor of heavy demand, a light rail network or busway in lower density portions of the metropolitan area, and fleets of fixed route buses and flexibly routed paratransit vehicles acting as feeders to the higher capacity line-haul systems and providing internal circulation service in the local communities within the metropolitan region. The long range plan should be reassessed and revised periodically as part of a continuing transportation planning process to reflect changes in local goals, priorities and long range forecasts; to respond to new land development and travel patterns; to adapt to new technologies as they are developed; and to adjust to the impact of previously implemented actions. (The policy regarding the long-range plan is further discussed in sections II and III of the draft annotations.)

A number of major recommendations were made on this first principle. Statements in the Policy and the planning process in the Draft Annotations assume and strongly emphasize the development of local goals and objectives and the use of these objectives as the basis for evaluating effectiveness of alternatives. Conferees urged that UMTA be equally systematic in developing national goals and objectives and particularly in developing UMTA policy regarding funding of urban mass transportation projects. The participants were critical of UMTA's practice of articulating policy in an incremental manner through speeches and letters to individual applicants and recommended (a) that measurable national goals and objectives be developed for purposes of evaluating the effectiveness of alternative investments of federal funds and (b) that such goals, objectives, and policies be set forth in officially promulgated documents or specifically referenced statements.

The policy regarding a long-range plan also recognizes the changeability of local goals, priorities, and long-range forecasts. The conferees noted that national goals, priorities, and policies also change and urged that UMTA use administrative discretion whenever possible to exempt projects already under way from new policies and regulations, especially when the already lengthy planning and development process required for fixed-guideway systems would be extended.

Section III of the Draft Annotations, Comprehensive Identification of Alternatives, describes the long- and short-range planning processes through which alternatives should be developed and stresses the importance

of systematically developing "a reasonable number of distinctly different service element alternatives and system combinations which 'sample' the range of possibilities (for improving transit)..." Conferees accepted and supported the concept of developing a wide range of alternatives but repeatedly expressed concern that, instead of iteratively narrowing the number of alternatives, the process can become a cyclical one in which UMTA requests the study of additional new alternatives and consequently delays the decision process. Conferees recommended that, as part of the iterative process, UMTA meet with applicants and agree on the ineffective or infeasible alternatives that are to be dropped and, at the conclusion of the process of alternative development, provide applicants with explicit acceptance of the alternatives for which detailed study will be expected. These recommendations are referred to later in the discussion of the procedures and timetable.

The conferees also recommended that the statement in the Policy, "Each major corridor should be considered individually to determine the level and type of service that will best meet its projected requirements," be amended or qualified to note that this requirement does not preclude the basing of ridership forecasts for individual corridors on assumptions of a completed transit system for the metropolitan area.

Three further comments were made by the workshop that reviewed section III of the Draft Annotations.

1. The measures of service provided to prospective users should be more clearly defined. For example, what is meant by monetary costs or overall service image?

2. The three search methods for developing system and service variations are difficult to understand, are loaded with jargon, and should be rewritten.

3. A more precise definition is needed of the required null alternative or baseline condition. Does this condition mean that nothing is done, a trend projection is made of existing conditions, transportation system management is applied, or some combination of these? The question arises because of the apparent distinction between the null alternative and TSM as starting points for justifying more capital-intensive improvements.

As noted elsewhere, conferees expressed their support for the TSM program, but were critical of what they considered to be its overemphasis in the Policy and supporting documents. Since TSM is an element of a separate program that must be revised annually, conferees recommended against its inclusion as a separate element of a policy on major urban mass transportation investment.

B. Incremental Development

Where an area's comprehensive transportation plan calls for the creation of a fixed guideway system, the system should be proposed for implementation incrementally. Initial segments of the system should be proposed in corridors where travel demand projected to arise within the next 15 years justifies the need for high-capacity fixed guideway transit service. *Alternative analysis is required for corridor planning at the time of determining the first usable segment but not subsequent segments.* Each segment should be capable of justification on its own merits, and should not be dependent on future extensions for efficient operations. *Increments should not be reshaped based on funding limitations.*

Corridors whose projects 15-year travel demands cannot justify high capacity fixed guideway transit service should be provided with levels and types of service appropriate to their near term requirements, with the service being progressively upgraded as demand develops.

Incremental development aims to ensure that high priority corridors receive initial attention; that appropriate balance is maintained between the requirements of the entire region and those of local communities

within the region, and between long range and short range needs; that maximum flexibility is preserved to respond to changing technology, land use patterns and growth objectives; and that the fiscal burden is spread over a longer period of time. (The policy regarding incremental development is further elaborated in section IV of the annotations.)

There was considerable discussion of the statement that incremental segments of a system should not be dependent on future extensions for efficient operation. A major point is that the cost of a minimum usable segment may exceed current available funding for the project. In addition, conferees were concerned about defining "efficient operation" since this would vary as segments are added to a system, and the efficiency that might result from construction of two or three segments could not necessarily be expected of only the first increment. The first opened segment of the Washington, D.C., Metro system was suggested as one that might not have met the criterion of efficient operations, and the proposed Chicago Loop Subway and Distributor System was identified as a project in which the initial usable segment exceeds available funding. The problem of funding limitations and UMTA's role in advocating increased funding for mass transportation underlies these issues and is reported separately. At least one workshop, however, made a specific recommendation that "staged funding should be developed for minimum usable segments whose costs exceed current resource availability."

Conference recommendations were that the phrase "and should not be dependent on future extension for efficient operations" be deleted from the Policy and that a new sentence, "Increments should not be reshaped based upon funding limitations," be added to reflect the concern that otherwise sound planning for incremental segments might be undermined or negated if unavailability of funds for such segments became a primary, exogenous constraint on the development of increments.

A second conference concern was the applicability of alternative analysis within the framework of incremental development. Conferees fully supported the concept of alternative analysis, but strongly urged that it not be applied to the segments subsequent to the initial increment. The following clarification was recommended: "Alternative analysis is required for corridor planning at the time of determining the first usable segment but not subsequent segments."

A third area of debate was over the length of the planning horizon for fixed-guideway systems. The conference did not reach consensus on this point. Two recommendations were made: (a) the planning horizon be 10 years from the date of opening the initial segment and (b) there be two planning horizons—1 or 2 years after opening and 15 years after opening. The first recommendation was intended to be compatible with UMTA's policy of a 15-year horizon and assumed 5 years for planning and design. The second recommendation for two horizons was more specifically oriented to two separate factors: the need to justify initial segments on their own merits and the contention that a longer time period is required to realize the payoffs of a system. Although the conferees did not arrive at consensus on this point, the wording of the two recommendations suggests that the planning horizon adopted by UMTA needs to be specifically tied to some point in time such as "opening of the first segment."

A final recommendation was that "maximum" be deleted from the description of flexibility that is to be preserved through incremental development.

C. Evaluation of Alternatives

For the purpose of assisting the locality in decision making, any metropolitan area which intends to apply for Federal assistance for a major mass transportation investment must undertake an analysis of alternatives with regard to any corridors in which fixed guideway facilities have been proposed for implementation. Alternatives to be considered shall include low-capital improvements.

This analysis should estimate each alternative's capital and operating costs; ridership attraction; capital and operating efficiency and productivity; effects on modal choice, level of automobile use, air quality, and energy consumption; impact on land use and development patterns; extent of neighborhood disruption and displacement; job creation impact; and such other factors as are considered important by the local community.

The analysis should also compare the relative cost-effectiveness of each alternative, where effectiveness is measured by the degree to which the alternative meets the locality's transportation requirements and attains its social, economic, environmental and urban preservation goals. *Effectiveness also is measured by the extent to which a proposed investment meets measurable national goals and objectives that are stated in officially promulgated documents or specifically referenced statements.* (The policy regarding evaluation of alternatives is further elaborated in section V of the draft annotations.)

To emphasize the function of alternative analysis as a tool for local decision making, the phrase, "for the purpose of assisting the locality in decision making," was added to the first sentence of this section. Considerable discussion and controversy surrounded the inclusion of transportation system management as a separate following section in the Policy. As noted earlier, conferees expressed their support for TSM but felt that as an existing program requirement it received too much emphasis in this policy on major mass transportation investments. Conferees recommended that the section on TSM be deleted from the Policy and that the section on evaluation of alternatives include an additional sentence noting that alternatives to be considered shall include low-capital improvements.

D.—Transportation System Management

~~Improvements in transportation service should be sought through effective management and operation of the existing transportation system as well as through construction of new facilities. Actions such as provision of reserved lanes and other forms of preferential treatment for transit and other high occupancy vehicles, parking management, pricing and regulatory measures to reduce the use of automobiles in congested areas, reduced fares to stimulate off-peak travel, incentives for ridership, more flexible and responsive routing, scheduling and dispatching of transit vehicles, staggered work hours and other actions designed to make a more efficient and productive use of existing transportation resources, should be considered as alternatives and supplements to the construction of new capital facilities. (The policy regarding TSM is further elaborated in section VI of the draft annotations.)~~

As noted in the preceding section, conferees recommended that this section be deleted and that a sentence be added under the preceding section to indicate that the range of alternatives to be studied must include low-capital improvements.

E. Public Involvement

There should be full opportunity for the timely involvement of the public, local elected officials and all levels of government in the alternatives analysis process. This involvement should be initiated early, so that all affected groups have an opportunity to influence the process in a timely and constructive fashion, particularly as to the alternatives to be considered, measures of effectiveness to be used, actions to be taken to minimize or avoid adverse effects and priority actions for implementation. (The policy regarding public involvement is further elaborated in section VII of the draft annotations.)

The conferees accepted this section without changes; however, several comments were made.

1. The section should be strengthened to emphasize the need for involvement of both elected and appointed public officials.
2. Any public involvement process should be finite and should specifically not require an applicant to repeat workshops, public meetings, and hearings.
3. It should be made clear that at the outset of planning the public serves in an advisory role and that only elected officials are empowered to make decisions regarding a project.

PART II. PROCEDURES AND TIMETABLE

This section promulgates the procedures and timetable for the review of the alternatives analysis and the Federal decision on participation in locally recommended mass transportation projects.

1. Early and frequent communication with UMTA during the analysis processes is suggested especially to consult on the range of alternatives to be analyzed and evaluation methodology to be employed. Upon completion of the alternatives analysis, the applicant should submit the final analysis to UMTA's Office of Transportation Planning together with a recommendation on a cost-effective alternative chosen for implementation and the rationale for that choice. Any such recommendation for a fixed guideway system should clearly state its corridor location, technology, horizontal and vertical alignment, amount of grade separation, station locations, and length of initial segment.

As noted earlier, conferees supported this concept of early and frequent communication and urged that UMTA explicitly agree to the elimination of interim alternatives and to the specific alternatives for which formal analysis is required.

2. Upon receipt of the report and recommendation, UMTA will undertake a technical review of the applicant's alternatives analysis in order to ensure that the analysis has been carried out in conformance with UMTA policy as spelled out in this document and any guidelines issued pursuant thereto. UMTA will provide the applicant with a response within 90 days from receipt of the report.

Conferees were enthusiastic about the proposed 90-d response period and supported the adding of any UMTA staff that may be required to permit expeditious handling of applications within this time period.

3. The response shall be in the form of one of the following:

—a notification that the alternatives analysis has been found complete and consistent with the principles outlined in this statement, and that the applicant is eligible to be considered for a grant for preliminary engineering;

—a notification that the alternatives analysis has been found deficient in certain respects, and that these deficiencies must be corrected before the analysis can be considered complete. A detailed work program addressing the deficiencies will be jointly agreed to by the applicant and UMTA. UMTA will work closely with the applicant during this re-analysis; or

—a notification that the alternatives analysis has been found deficient in certain respects and *may or may not have been sufficient but* that, on the basis of work done to that point, UMTA finds insufficient justification for Federal participation in a fixed guideway project.

The change in procedure 3 is intended to remove emphasis from the sufficiency of analysis and to stress instead that the work completed to date is sufficient to indicate that the proposed project is not justified.

4. As soon as possible after notification that the analysis has been found to be complete and consistent with the principles outlined in this statement, UMTA will inform the applicant whether or not it intends to award a preliminary engineering grant on a cost-effective alternative. In making a decision with respect to a preliminary engineering grant, UMTA will be willing to finance projects the combined cost of which may exceed available Federal contract authority. This would be done in anticipation of any of several possibilities: the withdrawal of projects as a result of a loss of interest by the local sponsors based on preliminary engineering results; a local decision to use non-Federal resources to finance more than 20 percent of project costs; changing conditions which might lead to an increase in UMTA contract authority; or a later decision based on detailed cost estimates that a particular project cannot be Federally financed.

The award of a preliminary engineering grant may or may not be accompanied by a commitment in principle by UMTA to fund project construction. If made, a commitment in principle would be based upon a preliminary comparison among projects then pending, and on an initially favorable judgment based on that comparison.

No specific recommendations were made regarding this procedure; however, the definition of commitment in principle was unclear and a source of confusion and concern to the conferees. Procedure 4 notes that a preliminary engineering grant may be awarded by UMTA with or without a commitment in principle to fund project construction. This wording, as well as the UMTA decision to grant preliminary engineering funds to Dade County, suggested to many conferees that projects that receive a commitment in principle would be removed from competition with projects proposed by other cities and would receive construction funding contingent only on availability of federal funds. Procedure 4 further states, however, that "a commitment in principle would be based upon a preliminary comparison among projects then pending, and on an initially favorable judgment based on that comparison." This statement and a statement in procedure 6 that a definite funding commitment will be made only after review of the detailed cost estimates emerging from preliminary engineering are contradictory. As a result, conferees were unable to distinguish between the status of projects that do and those that do not receive a commitment in principle.

5. During the execution of preliminary engineering, the applicant will be asked to complete an Environmental Impact Analysis (EIA) on the basis of which UMTA can circulate the Environmental Impact Statement (EIS). Such a circulation is a precondition for any project approvals beyond preliminary engineering. During such time, and as part of the preparation of a capital grant application for final design, land acquisition, and initial construction, the applicant will also be expected to complete other steps which must precede the full Federal commitment. These steps include achievement of a State and/or local consensus regarding the financing of operating deficits, and planning for and financial commitment to necessary supportive actions to promote access to and effective utilization of the proposed fixed guideway system.

The conferees spent considerable time discussing the timetable for transit planning, particularly the sequential timing of the alternative analysis and the environmental impact statement. Conferees attempted with some difficulty to draw a parallel between the UMTA and FHWA planning processes. One of the problems in achieving this is the apparent limitation that has been placed on uses of section 3 and section 9 funds. Another problem is the inherent difference between the FHWA program, which is totally formula allocated, and the UMTA program, which is partially discretionary. In addition, there is some uncertainty about the precise definition of preliminary engineering in UMTA and FHWA. The conferees stopped short of recommending that the alternative analysis and environmental impact statement processes be completed at the same time, but were unanimous in urging that the two processes be carried out simultaneously to the extent possible.

6. A definite funding commitment by UMTA for construction in a specific dollar amount will only be made upon review of the detailed cost estimates emerging from the preliminary engineering and such a comparison among those projects then pending. Such a commitment shall include both the total ceiling level of Federal support for the project and a projected multi-year obligation schedule.

This procedure was accepted without change. Comments are included under the discussion of procedure 4.

3 Proposed Decision Criteria

Review at the Hunt Valley Conference of the Proposed Decision Criteria Governing UMTA Commitments to Construction Financing of Major Mass Transportation Projects was the first public review of these criteria. Whereas the Policy and Draft Annotations set forth federal requirements governing local planning for major mass transportation investments, the Proposed Decision Criteria are to be used by UMTA in comparing projects submitted by metropolitan areas and in deciding which ones to fund. The changes recommended reflect both general conference conclusions and conclusions by various workshops. In the paragraphs below,

the text of the Criteria is given in a light sans serif type; proposed deletions are indicated by a dash through the words (~~word~~), and proposed additions are indicated by italics (*word*).

Although the conferees expressed concern about the limited funds available for mass transportation improvements, they generally acknowledged that the costs of proposed projects will always exceed available funding and that some guidelines or criteria are needed to assist UMTA in selecting projects for funding. Conferees expressed their appreciation to UMTA for making the Proposed Decision Criteria available for comment and recommended that the criteria, incorporating the conferees'

recommended changes, be widely circulated while they are in draft form to obtain further comments from local governments and operators and to inform applicants of how projects are selected for funding. The conferees also recommended that the decision criteria not be officially promulgated and that they be called guidelines or factors.

**PROPOSED DECISION CRITERIA GUIDELINES/
FACTORS GOVERNING UMTA COMMITMENTS
TO CONSTRUCTION FINANCING OF MAJOR
MASS TRANSPORTATION PROJECTS**

The policy on major mass transportation investments states that a formal commitment by UMTA to fund fixed guideway construction shall be subject to certain conditions and shall be based upon "a comparison among projects then pending." The purpose of the comparison is to identify those locally recommended projects which merit priority Federal support. Given the wide disparity between the number of proposals for Federal assistance and the funds actually available, a selective approach to the funding of projects has become necessary. This does not imply a judgment on UMTA's part that only certain cities "deserve" fixed guideway transit. Rather it reflects the realities of the situation: faced with many more capital grant applications than it can fund, UMTA has an obligation to allocate its limited resources to the most meritorious projects.

This paper advances the ~~conditions and criteria~~ *guidelines* that UMTA will use in this selection process. These include:

- I. Formal requirements which must be met as a condition of a construction funding commitment; *and*
- II. ~~Criteria which will be used~~ *Major relevant considerations* to assess the relative worth of projects emerging as recommended choices from the local alternatives analysis process.
- III. ~~Additional factors which will count in a proposal's favor.~~

I. FORMAL REQUIREMENTS

A formal multi-year funding commitment to a project will be subject to the satisfaction of all legal requirements and to the following actions:

- A. Completion of a detailed cost estimate based on the preliminary engineering design of the project;
- B. Completion of an Environmental Impact Analysis and successful circulation by UMTA of an Environmental Impact Statement (EIS);
- C. ~~Completion of all necessary steps~~ *Demonstration by a local government that it has a financial plan and the legal authority* to ensure the availability of non-Federal (State and local) funds required to match the Federal grant which is being sought for construction and submission of appropriate evidence thereof;

D. Assessment of the projected operating ~~deficits~~ *costs* of the proposed project and submission of appropriate evidence of a local consensus on how any such *costs* will be met over at least the short term.

E. Commitment of funds for the necessary feeder bus and parking supports to the fixed guideway project. The success and viability of a fixed guideway system depends on its accessibility to potential users. ~~The system's accessibility will be greatly enhanced through two types of measures: (1) coordinated bus and paratransit feeder services that will effectively extend the reach of the fixed guideway system into the surrounding residential areas; and (2) ample parking facilities adjacent to stations (especially stations located in suburban areas) that will make the system attractive and convenient to automobile commuters from outlying areas.~~

~~Some sources of capital funding and operating support for these ancillary services should be specifically identified and committed at the same time as the funds to match the Federal contribution to the fixed guideway project itself.~~

Conferees suggested that item C language be changed to require proof of a local financial plan and legal authority and that "project deficits" in item D be changed to "project costs." In item E, the general statement that the project submission include commitments of accessibility to the fixed-guideway system was accepted, but conferees recommended deletion of the remainder of the item because it is too prescriptive.

**II. CRITERIA USED IN COMPARING PROJECTS MAJOR
RELEVANT CONSIDERATIONS**

**A. Need for High-Capacity Transit Service Fixed Guideway
Facility**

The need for high-capacity *fixed guideway* transit will be the single most important criterion used in evaluating the comparative worth of the projects. This need will be judged by a composite of the following measures:

- (1) Current and projected (15-year) population and population density ~~within the metropolitan area and within the corridor to be served by the proposed fixed guideway project (hereinafter called "the corridor"; project service area");~~
- (2) Current and projected level of employment ~~in the central business district trip attraction in the projected service area~~ and other employment centers to be served by the project;
- (3) Current and projected level of personal mobility as measured by the number of total daily trips, areawide and within the ~~corridor~~ *project service area* (all modes);
- (4) Current and projected intensity of transit utilization, as measured by ~~annual transit trips per capita modal split~~ (all transit modes), areawide and within the ~~corridor; project service area and on the proposed facility;~~
- (5) Degree of transit dependency as measured by the percentage of transit dependents living or working within the ~~corridor; project service area;~~
- (6) Ease of automobile access as measured by:
 - current and projected freeway network within the metropolitan area (~~miles of freeway per capita~~);
 - current and projected modal split, areawide and within the ~~corridor; project service area;~~
 - extent and level of traffic congestion as measured by average speed on freeways and major arterials within the ~~corridors; project service area;~~
- (7) Patronage on the proposed fixed guideway project projected to arise within the next 15 years, as measured by:
 - number of daily riders (one way)
 - number of peak-hour riders (one way);
- (8) Need for air quality control as evidenced by the presence of an EPA air quality control plan;
- (9) *Consistency with long-range plan.*

This section was criticized generally because it describes data that might be used to develop criteria but does not list the criteria themselves. Significant revision of this section was unanimously recommended. The specific revisions were not recommended by the conference as a whole; however, individual workshops examined this section at some length, and the combined changes of all workshops are included in the preceding marked-up version to indicate the concerns underlying the general request for substantial revisions.

**B. Economic Efficiency and Productivity of the Proposed
Fixed Guideway Project**

While cost measures will be only one among several criteria of choice and can, to some extent, be overcome by a show of superior responsiveness in other areas, relative economic efficiency will weigh heavily in the overall comparison, given UMTA's limited capital budget. This economic performance will be judged in terms of the following measures:

- (1) Capital cost/daily rider; operating cost/daily rider; combined capital and operating cost/daily rider (annualized over a 35 year project life); *peak hour costs*
- (2) Capital cost/passenger mile; operating cost/passenger mile; combined capital and operating cost/passenger mile (annualized over a 35 year project life)
- (3) Marginal capital cost/daily rider; e.g., as a result of new investment of \$100 million, total ridership in the corridor is projected to increase from 10,000 to 14,000 riders/day. The marginal capital cost of the investment will be \$25,000/daily rider (\$100 million/4,000). Marginal analysis will be particularly appropriate in the case of extensions to existing fixed guideway systems.
- (4) *Benefit-cost analysis.*

These proposed criteria were criticized as being related only to relative ranking of projects and having nothing to do with transportation user benefits related to costs. The conferees recommended that this section be reworked. Specific suggestions include the following:

1. Any criteria that use capital cost as a function of ridership should include peak-hour as well as daily costs;
2. The value of marginal capital cost analysis is overstated in item 3; and
3. Benefit/cost analysis should be added to introduce a substantially more significant set of criteria to the existing criteria, which are based solely on number of riders.

C. Non-Transportation Impact

Non-transportation benefits will be an important measure of the investment's effectiveness. In particular the proposals will be compared as to their:

- (1) Positive environmental and resource conservation impact, as measured by the extent to which the proposed project will result in:

- percentage reduction in air pollution emissions (CO, HC, NO_x)
- reduction in fuel consumption
- percentage reduction in downtown congestion (as measured by the decrease in the number of automobiles entering the CBD)

- (2) Positive socio-economic impact, as measured by the extent to which the proposed project will service transit-dependent elements of the population, especially low-income, elderly and handicapped persons.

- (3) Positive employment impact, as measured by the number of new jobs created by the project (planning, construction, operation) related to unemployment rate at the time a funding decision is made.

- (4) Positive land use and urban development impact, as measured by the extent to which the proposed transit project will support or reinforce adopted land use plans and development objectives.

~~UMTA does not seek to encourage any particular developmental patterns or to impose a national land use policy. However, cities that are prepared to exploit the developmental impact that a fixed guideway system can provide e.g. to densify selected corridors, create metropolitan growth centers, preserve the core city, or achieve other effects that strengthen the vitality of the metropolitan area and promote energy-efficient land use patterns, will get preference in UMTA funding.~~

Conferees stressed that decision criteria regarding non-transportation impact should focus on the extent to which proposed projects are supportive of local goals and objectives. UMTA should not develop highly specific national goals and objectives to be the basis for comparing nontransportation impacts of local projects. However, UMTA should accept an obligation similar to that imposed on local areas to define their own goals and objectives.

Item 3 suggests that "number of new jobs created by the project" is an inappropriate criterion. Instead, the criterion should be related to the unemployment rate in the area.

Item 4 was accepted as a criterion; however, the conference recommended that the entire second paragraph be deleted because it excessively elaborates on the first sentence and, notwithstanding the qualifying remarks, suggests that UMTA sets land use requirements rather than relying on local objectives.

D. Degree of Local Commitment to Promote Balanced Transportation and Support the Transit Project as a Viable and Cost-Effective Investment That Supports Adopted Land Use Policies

Cities *Local governments* that adopt positive policies aimed at the gen-

eration of high levels of transit ridership will receive preference in funding. These policies at local option may include:

- (1) Zoning changes, joint development and other land use ~~and development actions~~ *plans and proposals* that will permit high density commercial and residential development in the transit corridor, especially adjacent to transit stations. By the same token, efforts to maintain low densities in the transit corridor, to bar commercial and office development around transit stations, to down-zone along the rights-of-way, and other *actions plans and proposals* aimed at attenuating the developmental impact of the proposed transit project would be considered an indication of a lack of consistency between transit and land use policies and a lack of commitment to policies that would support a high level of ridership on the system.

- (2) ~~A moratorium on further freeway construction, especially~~ *Coordination of transportation improvements* in the corridors to be served by the proposed transit system;

- (3) Appropriate transportation system management actions. (e.g. downtown parking restrictions, peak-period automobile tolls, reserved transit lanes) to reduce unnecessary automobile use and promote transit habit, especially in the corridors to be served by the transit project.

The conferees accepted this criterion but disagreed with the extent and manner in which it is elaborated. The statement should focus more on intent rather than enumerate factors that should be taken into account. A local government should be required to demonstrate that a project includes consideration of such factors and that it reflects a local commitment. UMTA's statement should deemphasize the notion that transit is necessarily the driving force behind zoning, land use, and density and stress instead the interactive relations of transit improvements and local development patterns.

The conferees regarded as inappropriate UMTA's statement that local commitment to transit might be demonstrated by "a moratorium on further freeway construction, especially in corridors to be served by the proposed transit system." They recommend that instead the language emphasize the interactive and mutually supportive roles of different modes and stress the importance of coordinated transportation improvements in a corridor to be served by transit. In selecting projects to fund UMTA should be concerned with the effects of and the interaction between proposed transit improvements and other transportation projects including free-ways.

Conferees agreed that degree of local commitment is demonstrated by plans for or implementation of appropriate transportation system management actions, but recommended against enumeration of such possible actions. This comment is related to the general conference consensus that TSM, as a separate, existing requirement, receives too much emphasis in these documents governing major mass transportation investments.

E. Local Institutional Structure

~~UMTA will give preference to communities which have a governmental structure that can facilitate coordination of transit planning and local land use decisions; that has authority to manage the various elements of the local transportation system, including automobile traffic, public transit and taxis; that has a power to achieve and maintain a balanced transportation program; and that is in a position to exploit the urban preservation or developmental impact of a fixed guideway system.~~

The conferees recommended that this entire section be deleted because it is too prescriptive. One of the workshop reports indicated that this section described a governmental system that exists nowhere in the United States. One might seriously question whether the local governmental structure should have any bearing at all on the need for public transportation in a given urban area.

Local citizens would be puzzled at best if federal funding for a transit system were rejected because the bureaucratic structure in their area did not suit the federal government. However, if there must be such a criterion, it should perhaps refer to organization for funding but not give details.

III. ADDITIONAL FAVORABLE FACTORS

A. Willingness to overmatch the Federal capital contribution from local revenue sources, willingness to use Interstate transfer and Urban System funds;

B. Evidence of an agreement with local contractors and construction unions for peaceful resolutions without work stoppages, of any labor disputes which might arise during construction;

C. Use of value capture mechanism to recapture for transit financing purposes a portion of the real estate value increase generated as a result of the transit investment. UMTA believes that it is eminently reasonable that the cost of building and operating a transit system should be met in part out of the real estate value increases which the system itself generates around transit stations and along the corridor. As a matter of equity, those who benefit should help pay for the system.

The conferees recommended that this entire section be deleted because the factors are not appropriate for evaluation of projects among metropolitan areas. They felt that willingness to overmatch the federal contribution from local revenue sources is directly opposed to congressional intent that qualified projects receive 80 percent federal assistance. Furthermore, the opportunities to use funds transferred from Interstate highways and federal-aid urban systems not only vary from city to city but also cannot be assumed to be unilaterally desirable.

There was a consensus among participants that it is difficult to obtain advance agreement from local contractors and construction unions to peacefully resolve any labor disputes during construction without work stoppages.

Finally, conferees expressed strong reservations about consideration of value-capture mechanisms as additional favorable criteria. Recognizing that UMTA is emphasizing value capture to encourage local governments to examine opportunities for its application, the conferees nevertheless urged caution in the use of such mechanisms in local development and recommended against inclusion of this specific strategy among factors to be used in decisions on allocation of federal funds.

4 Related Issues

During both conferences participants discussed a number of other issues directly or indirectly related to the documents that were presented by UMTA for review. The conference as a whole did not make specific recommendations regarding these issues; therefore, the following comments are not in all instances supported by conference consensus. These issues can be divided into three broad categories: general comments, funding for mass transportation, and procedural requirements governing mass transportation planning. It is worth noting that the two conferences were concerned with some similar issues and expressed similar opinions on those issues.

GENERAL COMMENTS

The issue of the lack of a comprehensive national transportation policy was summarized in the following remarks by conference chairman Gambaccini: "It is with ill grace that the federal government seems to require more of a region in a way of definition of goals and objectives than the federal government is willing to articulate for itself." There is, however, a variety of national policies that influence federal priorities and lead to the increased involvement by the federal government. Policy areas include metropolitan development, air quality improvement, fuel conservation, personal mobility, resource conservation, environmental protection, and balanced transportation systems. But UMTA, working with all interested parties, should take the lead in ensur-

ing that the various diverse federal policies relating to the development of transit are brought together in a basic transit development policy that is part of a national transportation policy.

FUNDING FOR MASS TRANSPORTATION

Conferees expressed concern about the inadequate level of federal funding available for urban mass transportation. They rejected the notion that the alternative-analysis process should be used to finely screen proposed improvements in order to reduce the number and cost of project applications to a level that can be funded under UMTA's existing contract authority. The basis for comparability from one city to the next is simply not adequate as a rational basis for resource allocation. Instead, conferees argued that the planning process should emphasize the development of sound improvement plans that would represent national transit needs (to the extent that they cannot now be funded) and that would help to justify increased federal funding for mass transportation at some future date. In this regard, conferees urged that UMTA, and the Urban Mass Transportation Administrator in particular, be a strong advocate for mass transportation insofar as possible within the limits set by the President and the Office of Management and Budget. Further, the Airlie House conferees recommended that UMTA should be a partner with the local agencies responsible for transit development. (In this context, local

is intended to mean all nonfederal agencies, i.e., states, counties, cities, municipalities, and transit properties.)

The Airlie House conferees felt that UMTA should work within the U.S. Department of Transportation to ensure a departmentwide effort to realize the full potential for multimodality, particularly for the use of highway funds for transit-related improvements to streets and highway systems that improve the efficiency of transit service and thereby improve the return on UMTA's involvement in transit improvements. They also felt that every effort should be made to have a common evaluation process for capital projects regardless of whether they are eventually funded out of capital grant discretionary funds, section 5 allocated funds, Interstate highway transfer funds, or urban system transfer funds.

In general, conferees at Hunt Valley urged that no reduction be made in the 80 percent federal share for major mass transportation improvements until and unless such a reduction is justified by future events. Similarly, they urged that UMTA make no further attempts to abruptly reduce the availability of section 5 funds for operating subsidies. Participants were sympathetic to and concurred with the need for additional analysis of the implications of national policies and criteria that might relate operating subsidies to productivity or to some ratio between fare-box revenues and expenses.

Two of the six workshops at Hunt Valley spent considerable time discussing the desirability of discretionary funding of UMTA programs. Such discretionary funding was considered by these groups to be a major impediment to rational long-range planning for capital investments by local governments. Given the increasing emphasis on the function of transportation, on the movement of people and goods instead of on the transportation mode, and on institutional or technological issues, these workshops recommended that UMTA pursue a course of action leading to creation of a single transportation fund that would be appropriated on a multiyear basis. They recommended further that funds be allocated to state and local governments on a multiyear basis to facilitate long-range planning and that the allocation of funds be made by formula if one can be developed that is fair and equitable.

Finally, conference participants concurred in the recommendation of one workshop that UMTA periodically publish a cash-flow status report itemizing allocations, appropriations, obligations, and expenditures to highlight the extent to which large blocks of funds may be tied up or reserved for long periods of time without producing any tangible product.

PROCEDURAL REQUIREMENTS GOVERNING MASS TRANSPORTATION PLANNING

Airlie House conferees felt that, before any new evalua-

tion process is implemented at the local level, UMTA should review its current administrative requirements to make certain that proposed requirements do not duplicate present ones. Any new requirements should be carefully integrated into the existing planning guidelines. Each new requirement should replace an old requirement and not be an additional requirement. Every effort should be made not to increase the time and work involved in project development.

Participants in the Hunt Valley Conference discussed at length the various processes required in connection with planning mass transportation improvements, the lack of flexibility in use of funds to support these activities, and the disparities between UMTA and FHWA planning processes. One of the problems cited was that an environmental impact statement required information at an equal level of detail for all alternatives although, from a cost point of view, the number of alternatives for which preliminary engineering is required should be limited. Conferees were generally opposed to the alternative-analysis and environmental-impact-statement processes being totally separate and sequential steps. They urged that UMTA review these requirements and integrate the processes as much as possible.

Hunt Valley conferees also found the differences between UMTA and FHWA planning processes to be confusing and undesirable particularly with respect to interpretations of what is required by the National Environmental Policy Act. The highway program requires the environmental assessment to be done earlier in project development and to examine a number of alternatives, while the UMTA program requires the environmental impact to be determined later in project development when a single, more finely designed course of action may have been selected. By delaying preparation of the environmental impact statement, the UMTA process tends to divorce the alternative analysis from the environmental analysis. Conferees disagreed strongly with such a procedural objective and noted further that the disparity between the environmental processes of UMTA and FHWA has been a major hurdle in the planning of joint highway-transit projects. Recognizing that differences in the funding and technologies of the two modes may prevent the use of identical procedures, conferees urged that the policies and procedures of the two administrations be reviewed and coordinated as much as possible.

Hunt Valley conferees noted that the alternative-analysis process may require efforts on the part of a local government that are beyond the scope of section 9 funds. For example, different degrees of engineering detail may be required for different projects or different alternatives in order to provide necessary cost estimates whether this engineering work is called alternative analysis or preliminary engineering. Therefore, they recommended that section 3 funds be made available, as necessary, to augment section 9 funds.

5 UMTA Documents

PRELIMINARY GUIDELINES AND BACKGROUND ANALYSIS

INTRODUCTION

Since the beginning of this decade, the Federal government has provided an increasing share of the Nation's investment in urban mass transportation. In the years ahead, as more and more communities work to improve and expand their mass transportation systems, it is essential that Federal financial support be effectively and productively utilized. The following is a proposed statement of the policies that will guide future decisions regarding Federal assistance in the funding of major mass transportation investment projects.

ALTERNATIVES ANALYSIS REQUIREMENT

Since each metropolitan area has differing characteristics, Federal mass transportation assistance programs cannot be based on standardized solutions. Rather, Federal programs must respond flexibly, relying heavily on local ability to assess present and anticipated requirements, to identify and evaluate opportunities for improvement, and to initiate needed action.

The Federal government does, however, have a strong interest in ensuring that Federal funds available for mass transportation assistance be used prudently and with maximum effectiveness. While there are no standard prescriptions that will guarantee this outcome, a careful and systematic weighing of the implications of various courses of action in advance of major funding commitments should improve the quality of decisions. To this end an evaluation of all pertinent alternatives will be required as a condition of eligibility for Federal assistance for any major mass transportation project.

PRINCIPLES OF ANALYSIS AND PLANNING

The analysis of alternatives shall be performed as an integral part of a transportation planning process based on the following general principles:

1. Areawide transportation improvement plans should be conceived as integrated multi-modal strategies that involve elements tailored to the service requirements and travel volumes of the particular corridors and communities they serve. As an example, a comprehensive strategy may involve the construction of a rail rapid transit line in a corridor of heavy demand, supplemented by a light rail network or busway in lower density portions of the metropolitan area, and assisted by fleets of flexibly routed paratransit vehicles acting as suburban feeders to the higher capacity line haul systems. Explicit recognition should be given to community level transit services which improve mobility within local neighborhoods, as well as to express line haul connections which foster region-wide accessibility.

2. Major mass transportation investment projects should be planned and implemented in stages, with initial segments of fixed guideway systems constructed in corridors and areas having priority needs. The level of service should be raised incrementally as the demand develops, reflecting a balanced concern for the near term and the long term. Where there are plans to construct an areawide rapid transit system, such plans should be blended with a program of immediate low-cost actions to revitalize or upgrade service within the existing transportation system. The aim should be to avoid premature investment in costly fixed facilities in order to preserve maximum flexibility to respond to future unknowns.

3. Improvements in transportation service should be sought through effective management and operation of the existing transportation system as well as through the construction of new facilities. Measures such as preferential treatment of buses on freeways and city streets, reserved lanes and transitways, parking management, peak-hour tolls to discourage automobiles from entering central areas, changes in fare structure to stimulate off-peak travel, traffic flow improvements, paratransit services, staggered work hours and other actions designed to make more

efficient use of existing transportation facilities—all of these should be considered as possible alternatives or supplements to the construction of new capital facilities.

4. The analysis of alternatives should include a determination of which alternative is the most economical and effective way of achieving the metropolitan area's social, environmental and transportation goals. Such analysis should also assess the impact of each alternative on local and regional accessibility, air quality, energy consumption, neighborhood environment, community and regional development patterns, and other factors considered important by the area's residents.

5. There should be full opportunity for timely public involvement in the planning and evaluation process, so that the public which may be potentially affected by the project has full access to all relevant information and has an opportunity to influence the process in timely and constructive fashion. Interested parties, including local government and metropolitan, regional, State and Federal agencies, as well as the public, must have adequate opportunities to express their views throughout the study process. This involvement must begin early enough to influence the course of planning decisions, particularly on the alternatives to be considered, the effects to be studied, actions to be taken to minimize or avoid adverse effects, priorities for implementation, and the time schedule of program and project development activities.

LEVEL OF FEDERAL FUNDING

It is proposed that the level of Federal funding for a major mass transportation investment project be based on the alternative which most economically and effectively achieves the locality's objectives. Local choice will be preserved by permitting the area to use the Federal funds to support any of the alternatives evaluated, provided that the locality is willing and able to secure the additional funding required for a more costly alternative.

MAJOR ISSUES FOR DISCUSSION

The principles outlined in the above statement have been formulated with the objective of building a more orderly foundation on which to base decisions that lead to implementation of major mass transportation investments. In enunciating these principles it is not UMTA's intention to dictate how a metropolitan area should solve its transportation problems or meet its transit needs. However, when there are competing demands for scarce Federal resources, the Federal government must ensure that investment decisions premised on Federal assistance are made only after full consideration of all feasible alternatives and with complete knowledge of the consequences.

The principles have been formulated after mature reflection and a careful survey of current thought in the field of transportation analysis and planning. However, they, and the accompanying background analysis, do not purport to be a final statement of policy. Rather the principles are being advanced in the spirit of an open consultation. One of the principal aims in calling this conference has been UMTA's desire to expose its thinking to a critical review by a wide cross section of interests and disciplines.

To highlight the major issues involved, and as an aid in focusing attention of the conference on the principal areas of uncertainty, a number of questions are raised below. While these questions are not exhaustive of the subject matter of the conference, they may be helpful in serving as a springboard for discussion.

CONCEPT OF "USABLE SEGMENT"

The proposed guidelines view the construction of a region-wide rapid transit system as a continuous, long-range process. A transit line or a core element is begun in one or more corridors or areas where high capacity transit service is more urgently needed. The initial network

is then extended incrementally, year after year, until full areawide coverage is achieved. Service in individual corridors is progressively upgraded from transit operations in mixed traffic, to operations on partly reserved rights-of-way, to operations on dedicated rights-of-way, to keep pace with rising traffic volumes, ridership densities and demand for higher service quality.

Question: What operational criteria and measures should be devised to help identify the "usable segments" or "core elements" of new rapid transit systems? What are the criteria for deciding when a corridor shall obtain fully exclusive right-of-way service, partially exclusive right-of-way service or no exclusive right-of-way?

MEASURES OF EFFECTIVENESS

The background paper lists 18 proposed measures of transit effectiveness, reflecting both local and Federal concerns. Existing professional literature abounds with many other formulations.

Question: Is it possible to arrive at an agreed-upon list of effectiveness measures (perhaps broken down by "required" and "optional") which would guide the evaluation of all Federally assisted major mass transportation investment projects?

THE CONCEPT OF COST-EFFECTIVENESS AS A TOOL FOR EVALUATION

A simplistic view of the application of the concept of cost-effectiveness would operate in this way: (1) all alternatives would be designed to a single, common standard of effectiveness (presumably selected by the locality); (2) the alternatives would be evaluated in terms of a single measure of cost; (3) the alternative with the lowest cost would be declared as "the most cost-effective" (although not necessarily as "the most desirable"). While the logic of this approach is appealing because of its simplicity many analysts feel that this technique may not be practicable because no single overall measure of effectiveness can fully reflect all of the issues which must be considered in making transportation decisions. Even the term "level of service" cannot at present be defined in terms of a single indicator or parameter since it includes such disparate concepts as accessibility, availability, capacity, and convenience.

Question: How can the concept of cost-effectiveness be applied to serve as a practical tool of transportation analysis?

UNIFORM EVALUATION METHODOLOGY

Should UMTA ensure comparability of analysis from various localities? If so, should common values and uniform procedures be established to this end for travel demand forecasting, modal split estimation, air quality impact prediction, travel time, discount rate and amortization period, treatment of future costs and inflation, treatment of lane value appreciation due to transportation improvements, and other evaluation parameters?

LONG RANGE VERSUS INCREMENTAL PLANNING

The issue of long-range versus incremental planning is far from resolved. While the paper discusses incremental planning, it does not clarify how the staged approach should be integrated with long-range planning, nor what is the "level-of-effort" or "scale" of activity appropriate to one or the other. Certainly, the same level of detail, with all the variations of levels-of-service, technology operation, etc., would not be required to determine the proposed or alternative long-range futures, as would be required to determine the program to be initiated in the first increment. However, what level of detail is adequate to justify the elimination of certain alternatives? How can these planning concepts best be blended together?

FEDERAL ALLOCATION DECISIONS

While the application of the principles outlined in this paper should ease the present dilemma of bridging the gap between the demand for an availability of Federal funds, it may not necessarily produce a perfect match. Ways must be found to allocate available Federal funds equitably among competing applications especially in the event the funds are insufficient to meet all the demands.

There are a number of ways in which this could be done. For example, eligible projects could form a "pool" out of which candidate projects would be selected on a first-in first-out basis. Another mechanism to establish priorities would be the concept of least-cost-to-achieve-a-specified-level-of-effectiveness. In the latter case questions arise as to the proper measures of effectiveness and the method of weighing them. The issue of the bases for decision on Federal share is another important topic for discussion by the conference.

BACKGROUND ANALYSIS

CONSIDERATIONS IN DEVELOPING ALTERNATIVES

A wide range of alternatives should be developed and analyzed to provide a sound base of information for local decision-making and for Federal review of the selected major mass transportation investment project. These alternatives should represent transportation systems with a range of variation in technologies, network configuration, operating policies, feeder services and pricing policies. The purpose of this section is to outline the considerations which should be kept in mind while developing transport alternatives.

Baseline Alternatives

Among the alternatives to be considered should be some which do not involve the construction of new facilities or other major expenditures of funds, in order to provide a basis for comparisons with other, more capital-intensive future alternatives. A baseline for comparison is usually an alternative which assumes the existing level and type of service as applied to the horizon period and the forecasted demands.

Trade-Offs Among Objectives and User Groups

Priority should be placed on developing alternatives which bring out the tradeoffs achievable among varying levels-of-service, environmental, development, social, and fiscal objectives. There is no such thing as an "optimum" level of service or of environmental quality for a region. There are instead multiple and competing objectives which can be achieved by alternative strategies. It is essential therefore that the alternatives bring out the tradeoffs among the numerous groups and interests that will be affected by a regional transportation strategy. The following are examples of possible tradeoffs in objectives that might be considered in a particular region:

- increased level of service (frequency, speed, amenities) vs. lower fares;
- in-vehicle travel time improvements vs. access time improvements;
- increased market capture (i.e., higher transit mode split) through increased capital investment in a more extensive network vs. lower investment and lower ridership;
- increased guideway mileage to increase market capture, together with increased problems of community acceptability vs. lower mileage, lower ridership and less community opposition;
- lower investment cost via elevated guideway vs. guideway depressed below ground to gain greater community acceptability but at greater investment cost;
- initial investment in capital facilities (guideway and other fixed plant) to gain greater reductions in life-cycle costs vs. lower initial investment and greater future operating costs (e.g., automated vs. labor-intensive systems);
- commitment now to a system technology vs. deferral of a decision to reduce uncertainties and to utilize later-generation technologies.

Emphasis should be placed on developing alternatives which achieve both different levels of service and different distributions of service improvements among possible beneficiaries. For example:

- priority to low-income (auto-deprived) travelers vs. priority to higher-income (auto-owning) travelers;
- priority to home-work trips vs. priority to social-recreational and other off-peak trips;
- priority to long-distance trips vs. priority to local trips;
- priority to CBD-oriented trips vs. priority to suburb-to-suburb trips;
- priority to elderly and handicapped vs. priority to commuters;
- priority to service improvements in one subarea vs. priority to improvements in another subarea.

Mixes of Service Level Objectives

Transportation alternatives should be defined initially in terms of service objectives; transport technology is a means, not an end. The primary issue in any proposed alternative is the service it provides to prospective users as reflected in such service attributes as travel time, punctuality, service frequency, number of transfers, distance to the nearest transit stop or station, out-of-pocket costs, perceived security, reliability, privacy, overall service image, etc. Throughout most of the phases of planning studies and project development, alternative technologies should be described primarily in terms of service levels they provide to users, rather than by their specific technical and engineering characteristics. The nature of the propulsion, control, suspension, and other sub-

systems (e.g., steel or rubber wheels) is of secondary interest from a user perspective though important in determining costs, environmental consequences, and other non-user impacts.

Access and Line-Haul Service

In developing alternatives attention should be given to the total trip—not merely to its line-haul portion. Many studies in the past have focused only, or primarily, on the line-haul mode of technology. Yet, evidence indicates that the “access time” portion of the trip (walk, wait, transfer, times, etc.) affects traveler choice of mode at least as much as the “in-vehicle” portion of the trip. Thus, when appraising alternative technologies, the extent of network coverage, the frequency of service, the nature of access services, should receive the same attention as the “speed” and “capacity” of the line-haul technology. Particular emphasis should be placed on alternative ways of providing access to services. The total trip must be considered, door-to-door.

Furthermore, an analysis restricted to a single linear “corridor” may produce biased results, since some technologies—such as dial-a-ride or shared right-of-way bus systems—may be effective when providing “area” coverage but less effective in the line-haul portions. Fixed guideway technologies, on the other hand will be effective in the line-haul portions but provide poorer circulation and access service. Thus the full areawide pattern of service must be considered, not only one portion.

In summary, the analysis cannot look exclusively at areawide systems providing a single level of service in all corridors. The alternatives must consider the needs of the entire area, but examine different mixes of service levels in different corridors and sub-areas to meet both line haul and local demand. Extensive areawide line haul systems that neglect the provisions of service at the community level will never be a complete solution to a region’s transportation needs.

Range of Variations Within Systems Technology

A range of variations in the variables defining a system should be analyzed. To simply specify the technology as a rail rapid transit system or a bus rapid transit system is not sufficient to provide a basis for evaluating alternative system concepts. Within each such family of technologies there is a variety of different alternatives, each with distinct levels of service, costs and environmental consequences.

For example, for a light rail system available options include: vehicle size, standees allowed, minimum headways, cruise speeds (which may differ in “expressway,” “arterial,” and CBD links), system operating policies, nature of transfer provided, pricing policy, fare collection procedures, mixture of on-line and off-line stations, network coverage of area (dense, sparse), network geometry, station locations and size; urban design integration; etc.

Furthermore, the variations of service and cost levels within a technology overlap significantly the service and cost characteristics of other technologies. For example, a light rail system with intermediate-size vehicles (25-60 passengers) operating on exclusive right-of-way, is, from a service perspective, more like an express bus operating on separate right-of-way than like a streetcar operating on a street in mixed traffic.

Because of the wide variation in costs, performance, ridership, attraction, and environmental effects achievable by each technology, development and analysis of alternative combinations of networks, operating policies, rights-of-way, and access modes are essential in order to have an understanding of the potential tradeoffs achievable.

Selecting Specific Alternatives to Be Examined

The extensive range of possible alternatives to be examined in the preceding section might suggest that a very large number of possible combinations must be examined. This is neither necessary nor feasible within realistic time and budget constraints. What is necessary is that there be a careful effort to develop systematically a reasonable number of alternatives which “sample” the possible combinations, so that the local community can be aware of the choices available.

It is both difficult and undesirable to prescribe a “checklist” of standard typology of specific transportation alternatives to be developed. What is needed is a climate conducive to a creative development of options. The process of selecting alternatives should be completely open with positive efforts to encourage extensive public involvement in a timely and constructive fashion throughout the process.

Responsibility to introduce this style of planning lies with the responsible local officials. Formal Federal oversight of the process will occur at key review points, such as review of the work program for the alternative analysis study, and review of interim results periodically throughout the analysis. To the extent practical, informal consultations will also be maintained.

Search Strategies

The purpose of this section is to discuss possible search strategies which might be used in the development of alternative transportation systems. These strategies do not lead to the “automatic” development of specific alternatives, but can serve as stimuli to such development. Any one, or some combination, of the following search strategies may be used, although it should be stressed that local planning agencies are free to develop their own approaches, not limiting themselves to the strategies described here.

1. Urban land use and development plans. This strategy assumes a basic set of development objectives providing only minimum variations from the central theme of the development pattern. The basic objective of this search strategy is to concentrate on developing transportation network alternatives which realistically encourage the type of growth which is anticipated and consciously planned by localities.

2. Level of investment alternatives. In many cases, urban transportation improvements are strictly constrained by the level of local and/or Federal investment which can be made available. Perhaps several levels of investment are feasible, depending on the passage of a future local bond issue. This search strategy considers transport system alternatives which meet specified levels of investment.

3. Mix of service improvements for different “market segments.” An explicit consideration of the goals and transportation system objectives for different “market segments” (user groups) poses another strategy by which to develop transport alternatives. Different interest groups within an urban area will likely desire a wide range of unique transportation service improvements. For example, the urban poor and elderly will probably seek increased inner city circulation and accessibility, while suburban residents will call for improved line-haul commuter services and demand-responsive access to these facilities. The recognition of these differing objectives will naturally lead to the development of a wide range of alternatives.

4. Shifting modal split. One measure of the effectiveness of a public transit system is its ability to attract automobile users. An attempt to generate different levels of the market share for public transportation will result in the development of a range of alternatives. This could be done in varying modal split values and evaluating the tradeoffs between increased market capture and necessary investment costs. This strategy requires the development of at least rough demand models prior to the development of alternatives in order to predict quickly the estimated market share for each transit alternative.

5. Level of service alternatives. The choice of alternatives can be oriented around one or more level-of-service objectives. For example, a community may explicitly decide to improve transportation availability and coverage, and fix an objective of a given percentage of the metropolitan population living within walking distance of a transit stop or the goal may be to improve trip time and service frequency and to impose a maximum door-to-door travel time. Alternatives involving different technologies and service policies may then be developed to meet the specified levels of service.

INCREMENTAL PLANNING

Major mass transportation investment projects should be planned and implemented incrementally. Incremental planning does not reject the concept of a long-range plan. But it does recognize that there is a great deal of uncertainty in long-range projections, and it attempts to build into the process a sequence of decisions ensuring the maximum future flexibility to respond to future unknowns.

Usable Segment

The product of planning should thus be a staged program identifying improvements in specific corridors for immediate implementation, and improvements planned for future years. If the improvement is in the form of a fixed guideway, the segment in place at completion of the first stage should perform a productive role even if no further components of the system are built in the future. Each subsequent increment should be appraised in a similar manner.

The product of incremental planning may also take the form of a progressive upgrading of the level of transportation service within individual corridors. For example, there may be a significant uncertainty about whether the market response to a rail transit line in a given corridor would be sufficiently great to justify it over bus service on a separate right-of-way. To test response and reduce uncertainty, the first stage of implementation might involve the construction of a busway in the median strip of a freeway with explicit provision for upgrading to rail transit if ridership develops. Thus, busways or even reserved bus lanes can form part of a staged strategy to eventually provide the region with a rapid transit system.

The program should be reviewed and revised periodically as implementation proceeds, to reflect changes in goals, policies and priorities; the availability of new technologies; observed impacts of completed actions (e.g., actual ridership relative to predicted, actual costs relative to estimated); changes in funding availability; and unanticipated developments that have modified the original planning assumptions, as for example a drastic increase in the price of fuel or reduced population growth.

Since there will be opportunity to review and revise the program at each successive stage, any decision as to the latter-stage options should be considered as tentative. This style of planning is continuous, adaptive and open ended, and stands in contrast to the traditional transportation planning process whose product is a specific target-year master plan. As mentioned earlier, this does not mean that there can be no long-range directions to metropolitan development, but rather that such directions should result from a time-phased sequence of decisions and responses to those decisions over time, not from the existence of an "adopted" comprehensive regional transportation plan.

MANAGING THE EXISTING TRANSPORTATION SYSTEM

Transportation improvements should be sought not only through construction of new transit facilities but also through more efficient operation and management of existing transportation facilities. For example, significant increases in capacity and in the quality and reliability of service could be achieved through the provision of dedicated rights-of-way for buses and trolleys and through preferential treatment of transit vehicles in mixed traffic on freeways and city streets. Parking controls and peak hour tolls on bridges and at other convenient barriers could be introduced to reduce and control access of private vehicles to congested downtown areas and foster conditions necessary for the efficient operation of buses. Staggered work hours could be used to spread the peak period demand for road space. Finally, transit fares could be structured in ways that would stimulate off-peak travel.

These are some of the actions that urban areas, capitalizing on the enormous investment already made in the existing street and highways networks, could use to improve public transportation service rapidly and at modest cost. However, the use of non-capital intensive approaches represents more than just an attempt to reduce the magnitude of Federal financial commitments. For those communities which are too small to justify a fixed guideway investment, traffic management offers the best hope of achieving significant improvements in the quality of public transportation service. Even those cities now contemplating the construction of fixed guideway transit will need to take forceful steps to improve service in the interim. This will mean first and foremost better management of the existing street and highway system, with greater attention accorded to the operating needs of transit.

FRAMEWORK FOR EVALUATION

The evaluation process should be designed to provide meaningful information about the outcome or consequences of the alternatives. These are of two kinds: costs and measures of effectiveness. Costs are defined in terms of all the resources necessary for the design, property acquisition, relocation, construction, operation and maintenance of the system during its useful life. Effectiveness is the degree to which an alternative achieves stated objectives. Such objectives may be of national or local concern.

Measuring effectiveness and cost, each in one dimension, is sometimes possible when very simple transportation elements are being considered. In general, however, the issues which should be considered in reaching decisions on transportation alternatives are sufficiently complex to probably require the use of multiple measures of cost and multiple measures of effectiveness. A basic set of measures is proposed below. Urban areas are encouraged to develop and use any additional measures that reflect local needs, goals and concerns deemed significant by the locality. One constructive role for the public involvement process is to assist in developing a relevant and practicable set of measures by which to evaluate the alternatives.

A minimum set of measures should be established to assess the effectiveness with which each alternative meets the objectives of the region which it is designed to serve. Measures identifying the transportation effectiveness should be clearly indicated in the analysis. Other measures in the set should bring out the potentially beneficial and adverse social, economic and environmental effects of the alternatives, identification of which is required by the Clean Air Act and section 5(h)(2) of the UMT Act of 1964, as amended. Some measures should address the equity and distributional consequences of proposed projects by bringing out the incidence of beneficial and adverse impacts on particular groups and interests. It is likely that some measures will be expressible only in qualitative terms; however, this in itself should not exclude them from the evaluation process.

Generally, costs should be held separate from effectiveness throughout

the analysis. It then becomes the responsibility of the decision-making bodies to examine the two sets of descriptors of the alternatives and to relate them in the choice process. Where weights or other procedures are used to combine several effectiveness measures or impacts into one measure, the bases for developing such weights should be documented and alternative assumptions about weights should be included in the sensitivity analyses.

Analysis should include a comparison of transportation effects and non-transportation effects. In certain cases the best alternative from a transportation effectiveness standpoint may prove to be poor from a community perspective. The impact of community objectives on the alternatives should also be indicated.

Sensitivity Analyses

Estimates of the possible effects of each alternative should include an assessment of the range of uncertainty in those estimates. Particular emphasis should be placed on identifying uncertainties due to system cost and performance assumptions and those due to demand assumptions. Where formal impact prediction procedures are used (such as computer or mathematical models) appropriate sensitivity analyses should be done to identify the effects of key assumptions, especially about parameter values. Where the range of uncertainty in an estimate is significant in its relevance to decision-making, the reasons for this range of uncertainty should be described together with steps which might reduce this uncertainty (e.g., demonstration projects to reduce uncertainty about consumer response to new service). The staging of alternatives should be informed by, and reflect, considerations of major areas of uncertainty.

Measures of Costs and Effectiveness

Listed below are measures for the evaluation of major transportation projects. The measures are divided into five sets:

- Transportation cost measures
- System usage measures
- Service quality measures
- Measures reflecting national objectives
- Measures reflecting local objectives

Transportation Cost Measures

1. Total project cost: the total capital and operating costs for the project brought to a net present value through appropriate assumptions as to useful life, salvage value, interest rates and relative rates of inflation (in general, information will also be provided in the components of the total cost: design, right-of-way acquisition, relocation, construction, rolling stock, operating).
2. Federal project cost: that portion of the total capital and operating costs of the project which are not covered by anticipated local revenues (city, state, special district).

System Usage Measures

3. Expected volumes of travelers for the project and for the total system by mode. The breakdown of ridership should be consistent with the detail available from travel forecasting procedures. At a minimum the level of detail should include disaggregation of ridership by work/non-work trip purposes; low income groups; elderly and handicapped; auto owners/auto deprived; and CBD/non-CBD trips.

Service Quality Measures

4. Trip time: door-to-door, including in-vehicle and out-of-vehicle (access, waiting, transfer) times.
5. Out-of-pocket costs: fares paid and any other direct monetary costs to users.
6. Rider convenience: number of transfers and other attributes of service comfort, especially weather protection.
7. Transit availability: residential population and employment within walking distance of transit stations and transit stops.
8. Transit coverage: access to CBD and to major regional activity centers (including health care, education, shopping and recreational centers).

Measures Reflecting National Objectives

9. Consistency with Federal air quality standards: extent to which project will contribute to the attainment and maintenance of the Federal standards.
10. System accessibility to the elderly, handicapped, and others dependent on transit: qualitative appraisal of the significance of any barriers to use.

11. Viability: qualitative assessment of the extent to which the project would be viable and useful if no future increment were to be built.

12. Energy consumption: energy consumed and saved by source and mode.

Measures Reflecting Community Objectives

13. Consistency with community and regional development objectives: the extent to which the project would reinforce or inhibit adopted land use plans and help mold the future development and growth patterns of the region in ways consistent with the desires of the area's residents.

14. Neighborhood disruption: noise, visual intrusion, encroachment on open spaces and any other adverse effects during construction or operation of the project that are considered important by the locality.

15. Residential and business displacement: number of dwellings to be displaced and people and establishments to be relocated, disaggregated by income, neighborhood and type of dwelling.

16. Effect on auto usage and traffic congestion: in CBD and on commuter arteries.

17. Employment benefits: increases in local and regional employment due to system construction and operation.

18. Options foreclosed and options left open: assessment of any specific options foreclosed (e.g., use of advanced technology) and of the range of options preserved.

The Selection Process

The preceding discussion has made it clear that there are multiple measures of cost and effectiveness which are relevant to local decision-making. It is probably unrealistic to attempt to construct a single overall measure of effectiveness which fully reflects all of the significant issues which must be considered in reaching an effective decision. The only valid and practical procedure for the selection of the most effective alternative would seem to be an explicit judgmental determination, based upon an appraisal of the relative merits and liabilities of the various alternatives.

PUBLIC INVOLVEMENT

There must be full opportunity for timely public involvement in the development and evaluation of alternatives so that every group or sector of the public which may be potentially affected by the proposed project has full access to all relevant information and has full opportunity to influence the process in timely and constructive fashion. Interested parties, including local governments and metropolitan, regional, state and federal agencies, and the public, should have adequate opportunities to express their views throughout the study process.

Public involvement should begin early enough to influence the course of planning studies, as well as major decisions during the studies, particularly decisions on what alternatives should be considered, on the effects to be studied, on actions to be considered to minimize or avoid adverse effects, and decisions on priorities and on the time-schedule of planning and project development activities.

The Work Program for an analysis should indicate the procedures to be followed to integrate public involvement activities constructively with the technical analysis. Procedures should be established to ensure that information is made available to other agencies and the public throughout the duration of project studies. Such information should be as clear and comprehensible as practicable concerning:

1. The alternatives being considered;
2. The effects of alternatives, both beneficial and adverse, and the manner and extent to which specific groups are affected;
3. The proposed time schedule of planning studies and project development activities, including major points of public interest;
4. Major milestones at which key decisions will be made about alternatives to be eliminated from further consideration, and about alternatives to be given priority attention in further stages of studies or project development.

The procedures established should ensure that interested parties, including local governments and metropolitan, regional, state, and federal agencies, and the public have adequate opportunities to participate in an open exchange of views throughout the studies and to influence the decisions taken at major decision points.

The widespread and timely dissemination to all interested parties of study documents can be a useful catalyst to constructive and timely public involvement. Procedures should be established to ensure that appropriate documentation is prepared in language comprehensible to laymen and is disseminated widely in draft and final form.

INTEGRATION OF THE ALTERNATIVE ANALYSIS WITH THE PLANNING PROCESS

The analysis of alternatives shall be performed as an integral part of the established planning process. Typically this will involve the following sequence of events:

1. Tasks to initiate the development of alternatives and their evaluation should be included in the Unified Work Program.
2. UMTA will periodically review an on-going alternatives analysis. Specifically, UMTA will review and approve the range of alternatives to be evaluated; and review the process to ensure that it is being carried out in conformance with the policy and principles established in UMTA guidelines.
3. If the proposed project requires development of new sources of local financing, steps may be taken to establish an appropriate mechanism.
4. As a first step towards Federal funding of the chosen alternative, projects should be included in the Annual Element of the TIP for the year in which project implementation is to begin. Approval of the Annual Element will make the projects eligible for UMTA capital assistance under section 3 of the UMT Act of 1964, as amended.
5. The local applicant submits a capital grant application for Federal assistance under section 3 of the UMT Act of 1964, as amended. UMTA will review the application for consistency with other grant requirements as a basis for Federal approval and determination of Federal share.

MAJOR URBAN MASS TRANSPORTATION INVESTMENTS: NOTICE OF PROPOSED POLICY

Federal Register, Volume 40, No. 149, August 1, 1975, pp. 32546-32547.

The purpose of this Notice is to issue for review and comment a statement of Federal policy with respect to decisions on major urban mass transportation investments assisted under the Urban Mass Transportation Act of 1964 as amended. The need for such clarification has resulted from the shifting nature and complexity of the UMTA capital program and the increasing demands for available funds.

At the outset of the urban mass transportation assistance program in 1964, the \$75 million annual budget was directed toward the preservation of urban transit service in selected cities through the conversion of failing private transit companies to public ownership. A decade later, UMTA's annual capital assistance budget exceeds \$1 billion, and is primarily devoted to the rehabilitation and expansion of existing transit properties and to the construction of new transit systems. Not only has the magnitude of potential Federal investments increased significantly but the number of potential recipients for UMTA funds has

grown. The pressure of these competing demands requires the Department of Transportation to ensure that the available Federal resources are utilized in the most prudent and productive manner.

In the interest of making all urban areas aware of the issues which will be considered in the Federal decisions to assist in the implementation of major mass transportation investments, the Department of Transportation has decided to promulgate a statement of policy. This policy represents a process-oriented approach designed to allow each urban area to take into account its unique characteristics in the planning and implementation of transportation improvements. As a condition of eligibility for Federal assistance, the policy requires that alternative investments be evaluated to determine which investment best serves the area's transportation needs, taking into account the social, economic, environmental and urban development goals. The policy stresses the need to consider combinations of transit modes appropriate to the service re-

quirements of specific corridors, and improved management of the existing transportation resources as an alternative to the construction of new facilities. The policy also requires that major mass transportation investments be implemented in increments with priority given to the more immediate needs of the area.

The extent of the Federal commitment will be based on the cost of the initial increment of the plan which provides for the transportation needs of the community in a cost-effective manner.

The statement has been developed in concert with Federal, State, and local transportation and planning officials, transit properties, public interest groups, and other groups potentially affected by the proposed policy. Comments and suggestions from these diverse groups have been solicited by UMTA through individual solicitations as well as through a major UMTA-sponsored Transportation Research Board Conference (Airlie House Conference.) These comments have contributed substantially to the substance of this proposed statement.

The Department of Transportation invites further comments from all interested parties. Written comments should be directed to Urban Mass Transportation Administration, Office of Policy and Program Development, 400 7th Street, S.W., Room 9316, Washington, D.C. 20590. All comments received before October 1, 1975 will be considered in the preparation of the final policy statement.

Issued at Washington, D.C., July 25, 1975.

William T. Coleman,
Secretary.

FEDERAL POLICY ON ASSISTANCE FOR MAJOR MASS TRANSPORTATION INVESTMENTS

Since the beginning of this decade, the Federal government has provided an increasing share of the Nation's investment in urban mass transportation. In the years ahead, as more and more communities seek federal financial aid to improve and expand their mass transportation systems, it is more essential than ever that Federal funds be effectively and efficiently utilized. The following is a statement of the policy that will guide future federal decisions in determining eligibility for and the extent of federal commitment to the funding of major mass transportation investments. This policy will be applicable to all funds administered for these purposes by UMTA-Discretionary Grant funds (Section 3); Formula Grant funds (Section 5); Interstate Transfer funds; and Urban System funds.

ELIGIBILITY FOR FEDERAL ASSISTANCE

Since each metropolitan area has differing characteristics, federal mass transportation assistance programs cannot be based on standardized solutions. Rather, federal programs should be flexible, relying heavily on local ability to assess present and anticipated transportation needs, to identify and evaluate alternative opportunities for improvement, and to initiate needed actions.

The Federal government does, however, have a strong interest in ensuring that federal funds available for mass transportation assistance be used prudently and with maximum effectiveness. While there are no simple standard procedures that will guarantee this outcome, a careful and systematic evaluation of the implication of alternative courses of action in advance of a federal commitment to participate in a major mass transportation investment should improve the quality of decisions. To this end *an analysis of transportation alternatives will be required as a condition of eligibility for federal assistance* for any major mass transportation investment. Generally this would include investments which anticipate a federal participation of more than \$100 million in capital funds. However, circumstances may occasionally arise that make it desirable to require analysis of a smaller investment. For example, in smaller metropolitan areas a transit investment involving substantially less than \$100 million may be considered as a major mass transportation investment if it represents a significant portion of the area's total transportation program.

This analysis of alternatives shall be based on the following general principles and shall be performed as an integral part of a comprehensive transportation planning process.

A. Integration of Transit Services

Long-range transportation plans should reflect an awareness that different levels of transportation service may be needed in different portions of the metropolitan area. The plans should include specific transit elements tailored to the travel demands and service requirements of the specific corridors and neighborhoods they serve. Explicit recognition should be given to community-level transit services which address local circulation needs, as well as to express line-haul connections which fos-

ter regionwide accessibility. As an example, a comprehensive strategy plan may call for the construction of a rail rapid transit line in a corridor of heavy demand, supplemented by a light rail network or busways in lower density portions of the metropolitan area, and assisted by fleets of fixed route buses and flexibly routed paratransit vehicles acting as feeders to the higher capacity line haul systems.

B. Incremental Development

Major mass transportation investments should be implemented in increments based on an analysis of the projected 5-10 year transportation needs of the total area. The increments should be consistent with area-wide long-range transportation plans which should be reviewed and revised periodically to reflect changes in the long-range forecasts.

Where long-range plans call for the construction of an areawide fixed guideway system, the initial segments of the system should be implemented in corridors having priority needs. These initial segments of the fixed guideway system should be capable of efficient operation in themselves.

Corridors having less immediate needs should be provided with interim, lower level of service. This corridor service level should be upgraded progressively as the demand develops.

Incremental development will ensure that high priority corridors receive initial attention, will help to spread out the fiscal burden, and will preserve maximum flexibility to respond to changing urban conditions, technological change, and shifting land use and travel patterns.

C. Improved Management of Existing Transportation System

Improvements in transportation service should be sought through effective management and operation of the existing transportation system as well as through construction of new facilities. Actions such as preferential treatment of buses on freeways and city streets, reserved lanes and transitways, parking management, measures to reduce the use of automobiles in congested areas, changes in fare structure to stimulate off-peak travel, promotion of carpooling and of paratransit services, staggered work hours and other actions designed to make more efficient use of existing transportation facilities, should be considered as alternatives and supplements to the construction of new capital facilities.

D. Systems Evaluation

An analysis of alternatives should be undertaken in the development of the long-range plan and in the determination of the increment of the plan to be implemented. This analysis should include an assessment of the alternatives' impact on local and regional accessibility, air quality, energy consumption, neighborhood environment, community and regional development patterns, corridor traffic flows and modal choice, and other factors considered important by the area's residents. In defining the increment of the plan, the analysis of alternatives should indicate which alternative investment provides for the metropolitan area's transportation needs in a cost-effective manner, taking into account the social, economic, environmental and urban development goals of the community.

E. Public Involvement

There should be full opportunity for the timely involvement of the public local government and metropolitan, regional, State and Federal agencies in the alternative analysis process. This involvement should be initiated early, so that all groups have the opportunity to influence the process in a timely and constructive fashion, particularly as to the alternatives to be considered, the effects to be studied, actions to be taken to minimize or avoid adverse effects, priorities for implementation, and the phasing of program and project development activities.

EXTENT OF FEDERAL COMMITMENT

The extent of the Federal commitment for a major mass transportation investment will be determined by the cost of the increment of the long-range plan which provides for the metropolitan area's transportation needs in a cost-effective manner, taking into account the social, economic, environmental and urban development goals of the community. However, the locality may use the Federal funds available as a result of the Federal commitment to support any of the alternatives evaluated, provided that the transit coverage of the selected alternative is substantially the same as that of a cost-effective alternative, that the locality is willing and able to secure any additional funding which might be required, and that any project for which Federal assistance is sought meets the statutory requirements for approval.

FUTURE ACTION

Additional guidelines expanding the concepts outlined in this policy

statement are being developed. In the interim UMTA will continue to work with metropolitan areas on a case-by-case basis in developing procedures which will adequately fulfill these requirements.

DRAFT ANNOTATIONS PURSUANT TO POLICY ON MAJOR URBAN MASS TRANSPORTATION INVESTMENT

March 1976

INTRODUCTION

OVERVIEW

During the months following the release of UMTA's proposed policy on major urban mass transportation investments, a number of metropolitan areas have been engaged in alternatives analyses. UMTA has been working closely with these areas, providing guidance on the procedures and information required to satisfy the policy requirements. It has been a productive period, during which UMTA has learned a great deal about the difficulties encountered in policy interpretation, and the need for specific conceptual and technical guidelines. It has been our intention throughout to produce such guidelines, but our appreciation for what they should contain has been enhanced by the applied problems experienced in conducting these analyses. We hope the proposed guidelines adequately clarify the policy requirements, and welcome your suggestions and comments.

The guidelines are organized into six chapters:

1. Local Goals and Objectives. The existence of local goals and objectives is fundamental to the formulation and evaluation of alternative major mass transportation investments. Areas contemplating such investments must necessarily begin by determining what goals and objectives are being sought. This chapter outlines national transportation goals and objectives, and suggests a framework for articulating local goals and objectives. Where and how these goals and objectives are employed in an analysis of alternatives is discussed here, with reference to later chapters;

2. Comprehensive Identification of Alternatives. A number of fundamental questions are raised and answered in this chapter. What constitutes an alternative in alternatives analysis? How should such alternatives be conceived? What horizon years are these alternatives designed for, and how does the staging of these alternatives get incorporated in the analysis? The concept of incremental development—an analysis of alternatives designed to accommodate an area's anticipated needs within a 5-15 year time frame—and its relationship to the long range transportation planning effort is introduced here, and the reader is directed to the next chapter for a more detailed discussion;

3. Incremental Development. This chapter describes the planning analysis required for staging the implementation of major mass transportation investments. Such an analysis is designed to ascertain which, if any, of the major investment recommendations from the long range plan are required within the next 5-15 years;

4. Evaluation of Transportation Alternatives. The basic comparative information required for the evaluation is described here, and conceptual guidelines for accomplishing the evaluation are provided. The use of "cost-effectiveness" in the context of the previously formulated goals and objectives as a selection tool is described. The chapter concludes with a discussion of the required project cash flow analysis, which determines what the local, State, and Federal financial obligations would be to implement the recommended major investment(s) and, in so doing, assuring that these obligations can be met;

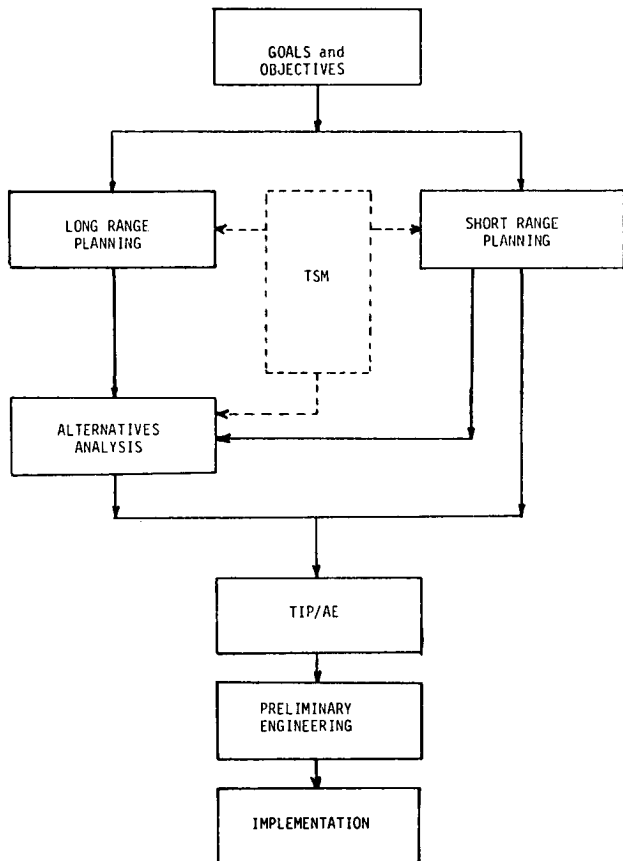
5. Transportation Systems Management (TSM). This chapter describes how TSM is incorporated into alternatives analysis, and refers to detailed discussions elsewhere. TSM is described as an option to a major capital investment alternative and as a complement to each of the major investment alternatives. Chapters 2 and 4 further discuss TSM in reference to the formulation and evaluation of alternatives; and

6. Public Involvement. Public involvement is an essential provision for ensuring the public interest and support. Where and how to involve the public in alternatives analysis is discussed.

THE TRANSPORTATION PLANNING PROCESS

Alternatives analysis can be better understood in the context of the transportation planning process illustrated with chart below. This representation of the process is reflective of the recently issued FHWA-UMTA regulations on urban transportation planning and the transportation improvement program that appeared in the September 17, 1975 Federal Register. The process begins with an identification of regional goals and objectives. These goals and objectives should be developed consistent with the area's urban development goals and objectives. The process then applies these goals and objectives to evaluating alternative transportation improvements for the area. To this end, the process consists of two continuous and concurrent planning efforts: (1) long-range planning (15-25 year timeframe); and (2) short-range planning (0-5 year timeframe). The applicability of transportation system management strategies is an essential consideration in both of these efforts; as the effective management and operation of the existing transportation system can substantially improve transportation service and possibly defer the need for new facilities.

The transportation planning process.



These planning efforts result in long-range and short-range plans. Projects resulting from the long- and short-range plans must now be merged into a transportation improvement program (TIP). The recommended projects resulting from the short-range plan are immediately ready for programming since the recommended improvements will likely be quite specific (e.g., the purchase of 50 buses or the implementation of a contra-flow lane for high-occupancy vehicles on a particular freeway). However, the long-range plan will not normally result in projects sufficiently defined for inclusion in a region's TIP. In general, the long-range plan will include an identification of corridors meriting new fixed-guideway facilities (e.g., freeways, rail rapid, busways, etc.) over the next 15-25 years tied in with appropriate TSM strategies requiring long lead times for implementation. The corridor recommendations will likely be rather general in regard to mode as well as alignment. The planning activity which provides the detailing of the corridor recommendations from the long-range plan is incremental development alternatives analysis. The guidelines in the succeeding chapters are keyed to this phase of the process.

Alternatives analysis defines the specific need for and nature of fixed guideway and related facilities required within 5-15 years time frame, cognizant of both the short and long range plans. Once completed the alternatives analysis is submitted to UMTA for review.

LOCAL GOALS AND OBJECTIVES

The urban transportation planning regulations issued jointly by the Urban Mass Transportation Administration and the Federal Highway Administration presuppose that each metropolitan area has developed a set of (transportation) system performance, environmental, energy conservation, social, urban development, and economic goals and objectives, and requires that the transportation plan be consistent with these. These goals will be the basis for evaluating the effectiveness of the various alternatives. Effectiveness will be measured by the degree to which each alternative meets the locality's transportation requirements and attains its social, economic, environmental, and urban preservation goals. For this reason it is necessary that local goals and objectives be clearly articulated. These goals should reflect a consensus of local opinion and should be stated in precise terms so as to allow a comparison of transportation alternatives.

General goals, may be relatively easy to develop but will not provide a basis for the evaluation process. It is important, therefore, to structure the goals and objectives in sufficient detail that the trade-offs among the alternatives in terms of goal attainment will be possible.

The determination of the goals should be independent of the specific transportation alternatives and should exclude biases toward a particular alternative. Transportation service objectives should be defined in terms of the desired service attributes (e.g., travel speed, cost, reliability of service, safety, security), not in terms of a requirement for a particular technology. While local goals and objectives should be developed primarily based on local perceptions and local needs, each community should assess the consistency of their goals with national goals and priorities. The Department of Transportation has recently issued a Statement of National Transportation Policy which articulated a set of fundamental principles to guide national transportation development.

In defining the local goals for an alternatives analysis, local areas should be cognizant of this set of transportation related objectives which the Federal Government currently views as most critical in the selection of high priority urban transportation improvement programs. Identification of these objectives which are of particular concern to the Federal Government does not imply that a local community should exclude other social, economic, environmental, and urban development goals which are of concern to that community. Local communities are encouraged to include in their goals structure additional goals and objectives which they believe are relevant to the decisions in their area.

The relationships between major goals areas (i.e., transportation service, environment, energy (resource) conservation, economic, social and urban development) and their attainment is presented in the evaluation section. In addition, a set of measures of effectiveness which can be used to measure the attainment of the identified objectives is also included.

COMPREHENSIVE IDENTIFICATION OF ALTERNATIVES

For purposes of these guidelines, an alternative is defined as one of several candidate means of providing a transportation service improvement. Each alternative offers a mix of services, costs, and resultant impacts.

The analysis of alternatives covers two different time frames and in two different ways. First, an alternatives analysis of sorts, is done focusing on the long range transportation needs within the long range plan. It does not focus on technological, operational, or service level components, but rather alternative travel and demand configurations and their corridors in the long-run. In effect, the focus is on alternative develop-

ment options. Starting with the projected high capacity/demand corridors identified in the longer range planning effort, the specific alternative analysis process outlined here would focus on those corridors which show probable need for fixed guideway in the next 15 years and compare differing technologies with the aim of selecting the one which, in terms of cost, helps move the area the furthest in the attainment of all their transportation, social, economic, environmental, and urban development goals.

It is envisioned that technological and operational components can merge into alternative service elements which do in turn merge into alternative systems that serve the entire region. For comparative purposes, however, what is ultimately being sought is an analysis of varying configurations of service elements. Alternative ways of varying the service elements can be produced by varying both the technological and operational components. Differing combinations of technology and operations can provide a variety of alternatives which can serve local and regional needs. The purpose of the analysis is to find the combination that maximizes goal attainment at the lowest cost.

Evaluating a range of significantly different alternatives is a useful technique to expose the tradeoffs among service opportunities, costs, and resultant impacts implicit in the selection of any particular course of action in a given context.

As has been mentioned, comprehensive planning will require alternatives analysis for different time frames and at different levels of detail. The degree of detail appropriate to the analysis will be a function of:

*The scale of the investment implied by a service element and its permanence—Large-scale fixed guideway-based investments will require the most rigorous alternatives analysis. Other elements of an overall areawide service increment such as areawide coverage, feeder service, or special bus service must be explicitly considered as part of integrated support or complementary services but alternative analysis can be carried out in a less rigorous, detailed fashion.

*The time frame of implementation of a service element—Components of an initial increment of a long range improvement program will require a detailed analysis while longer range elements may be defined in generic terms as future options since long-range system decisions are tentative, subject to later revision.

Throughout the analysis process the emphasis must be placed on selecting with care, for further refinement and analysis, the most promising alternatives. The dismissal of ineffective or infeasible alternatives by a locality must be accompanied by adequate reasons so that the Department can be assured of responsible and complete consideration of all service options at the local level. Although detailed standards cannot be prescribed which will guarantee this outcome, the requirement for a systematic analysis of a reasonable range of alternative actions, as a prerequisite to funding commitments, will substantially improve the system choice decisions and increase the cost-effectiveness of local improvements.

In past transit planning, alternatives analysis has often begun with a limited list of standard technologies defined in physical terms—such as "rapid transit" or "light rail"—applied in a uniform fashion in all corridors throughout a region. Such a rigid application can result in cost-ineffective utilization of any single technology. While vehicle type, propulsion, suspension, and guideway type are important dimensions of alternative service elements, a broader approach to identifying research alternatives may lead to a better match of service to needs and a more appropriate tailoring of hardware to specific corridors or areas since:

*Within each technology there is a variety of different services that can be provided, with very different levels of mobility, costs, and environmental consequences. For example, for a light rail transit system, the available options include: vehicle size, standees allowed, minimum headways, cruise speeds, system operating policies, nature of transfers provided, pricing policy, fare collection procedures, mixture of on-line and off-line stations, network coverage and geometry, guideway lanes on each link, station locations and sizes, urban design integration, etc.

*The variations of service and cost levels within a technology overlap significantly the service and cost characteristics of other technologies. For example, a light rail system with intermediate-size vehicles (25-60 passengers) operating on an exclusive right-of-way is from a service perspective more like an express bus operating on separate right-of-way than it is like a light rail vehicle which rides on major arterial streets and is subject to automobile congestion. Thus, a range of variations in options needs to be explored in order to determine the relative characteristics of a particular technology and avoid premature closing of options.

*Technologies do not completely define impacts. It is service which defines modal use. Alternatives defined in service terms can have their effects interpreted directly in terms related to objectives, such as usage by groups, diversion from automobiles with attendant congestion and environmental benefits, increased accessibility with its development consequences, etc.

An important effect of any proposed technology is the service it provides to prospective users as reflected in such service attributes as travel time, schedule reliability, service frequency, number of transfers, walk distances, access characteristics, monetary costs, perceived security, safety, reliability, privacy, overall service image, etc. Available knowledge of traveler choice behavior will provide significant insight into the particular characteristics or components of a public transport system which should be emphasized in developing real alternatives. Therefore, throughout most of the phase of planning studies, alternative technologies should be described in terms of the service levels, as well as their specific technical characteristics.

Tradeoffs among the ways in which a single technology can be applied must be considered as well as tradeoffs among technologies including:

- *Service priorities among various segments of the travel market whether defined by socioeconomic characteristics, location, or activity patterns.

- *Priority to high speed long-distance peak-period movements oriented to a single activity center vs. more "grid-like" service oriented towards shorter trips, peak- and off-peak service, and a greater number of activity centers.

- *In-vehicle travel time improvements vs. access improvements (walk distances, bus shelters, doorstep service, etc.).

- *Increased market capture (i.e., higher transit mode split) through increased capital investment vs. lower investment and lower ridership.

- *Lower investment cost via guideway substantially elevated or at-grade vs. guideway depressed below ground to gain greater community acceptability but at greater investment cost.

- *Increased capital investment in guideway and rolling stock to gain greater reductions in the time stream of future operating costs (e.g., automated vs. labor-intensive systems).

In examining potential tradeoffs, consideration must be given to the limitations of available systems as well as the experience in current applications. Certain markets and trip types are extremely difficult to service in a cost-effective manner given the characteristics and limitations of existing technologies.

It is both difficult and undesirable to prescribe a "checklist" or standard typology of specific transportation alternatives to be analyzed to meet the requirements for consideration of a wide range of alternatives. Rather than develop and promulgate such types of prescription, it is UMTA's objective that the appropriate local officials and professional staff take primary responsibility for systematically developing a range of alternatives for their region.

The large number of possible service element alternatives and their combinatorial possibilities in terms of alternative systems, requires scaling down the scope of the analysis so that it is manageable without sacrificing accuracy or eliminating important alternative service concepts prematurely. There is no "magic" solution to this problem; it must be dealt with differently in specific situations and will require a variety of analysis techniques. The identification and evaluation of alternatives is necessarily a hierarchical process, beginning with a large number of generally defined options. At successive stages in the process of refinement and evaluation, the analysis gradually focuses in greater detail on a small number of promising options. While the evaluation framework must be comprehensive at all stages the sets of alternatives can be screened using increasingly detailed evaluation techniques on the surviving alternatives at each stage.

The constraints offered by supply-side technology and related costs will provide useful limiting factors if carefully applied. What is necessary is that there be a careful effort to systematically develop a reasonable number of distinctly different service element alternatives and system combinations which "sample" the range of possibilities such that the local community can be aware of the choices available when a decision is made. It is suggested that this "sampling" on a corridor basis corresponds to the major vehicle/guideway/right-of-way options which represent significantly different investment and service levels—bus and light rail in mixed traffic, exclusive lane or grade-separated guideways, and heavy rapid transit—on a corridor by corridor basis.

Because of the multiplicity of possible alternatives which can be generated, it is important to have mechanisms to select representative alternatives for full final evaluation. It is also important to structure the analysis so as to reduce the total amount of effort needed while trying to ensure that the most promising alternatives are given adequate consideration.

Several alternative service elements for each corridor or subarea within system alternatives can be defined and evaluated in general terms and can be compared according to similarities in their general service level and costs. Promising service element alternatives can then be selected and defined in greater detail for more thorough analysis. An iterative process cycling between general system level definitions and more specific

service element definitions can be carried out, continually refining each group of alternatives until the most promising ones emerge.

The applicability of formal search methods will vary in different urban areas. Since many techniques are still being perfected, individual urban areas will need to develop theirs. Three approaches in use are:

- *Sketch Planning at the Regional System Scale—Sketch planning consists of an abstracted and aggregated version of travel forecasting. The full sequence of forecasting models can be used to determine patronage response to alternative service elements in various systems contexts. General system service and capacity requirements can then be used to define a reduced number of alternative service elements for evaluation in a more detailed disaggregate framework.

- *Subarea Isolation Techniques—To refine alternatives at the individual corridor or subarea level, a more detailed forecasting framework can be established for testing the mode split responses to modifications in station location, feeder systems, and various operating configurations.

- *Parametric Operations Analysis—Certain detailed operating issues relating to fleet size, consists, and operational configuration can often be carried out in a test framework which assumes patronage is more or less constant and thus enable large number of alternative variations to be quickly tested.

All alternatives analyses need a baseline or "null" alternative to provide a basis for comparison with capital-intensive major mass transit alternatives within the evaluation framework. The baseline case should involve minimum expenditure of funds consistent with Transportation Systems Management planning. It should be designed to preserve the existing level of transit service consistent with population growth and land use changes at the horizon year. The base case alternative must be described and analyzed at a level of detail sufficient to determine its effectiveness compared to alternatives requiring significant new investment.

In addition to the "null" case there are other bases for comparison which can be provided for the analysis. Though TSM is not meant to be a substitute alternative to a highly capital intensive system, it can provide the starting point for justification. As will be explained elsewhere, TSM endeavors to affect both the supply of, and the demand on, the total transportation system with the goal of maximizing its productivity. Using system "slack" to reduce cost and increase capacity, for example, means an area will use the total system better. Maximizing the use of the existing system will help justify an expanded system because the need will become more apparent. In short, at some point a new capital investment becomes reasonable because the present system cannot be expanded, or the proposed investment is a cheaper way to expand than over-taxing the existing network.

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 achievable with the additional investment.

INCREMENTAL DEVELOPMENT

INTRODUCTION AND DEFINITION

Major urban mass transportation investment projects should be implemented incrementally, consistent with the adopted long range comprehensive regional plan. While the policy specifically refers to only the fixed guideway investment, all transportation improvements which are needed to serve the area within the 15 year time frame should be implemented incrementally. Furthermore, the fixed guideway increment might include segments in more than one corridor. For example, the first increment for implementation might propose three miles of fixed guideway in corridor A, four and one-half miles of fixed guideway in corridor D, six miles of exclusive busway in corridor B, express-bus-on-street in corridor C, and a paratransit fleet functioning in all corridors as feeders and for local circulation.

Regardless of total composition, the next "increment" must focus on the fixed guideway investment and must reflect the next most important and contiguous step of the long range plan. For that reason the long range plan should be reassessed and revised periodically as part of a continuing transportation planning process to reflect changes in local goals, priorities and forecasts; to respond to new land development and travel patterns; to adapt to new technologies as they are developed; and to adjust to the impact of previously implemented actions.

Every major corridor must be evaluated individually to determine the action most appropriate for implementation in that corridor within the 15 year time frame. Those corridors which have high projected travel flows within a 15 year time frame, should be chosen for initial fixed guideway investment. Each segment should be capable of justification on its own merits; should be able to generate and sustain its own patron-

age; and should not be dependent upon future extensions for its efficient operation.

Corridors of lower demand should be provided with levels of service appropriate to their near term requirements; the levels of service should be progressively upgraded as demand develops.

Incremental development ensures that high priority corridors receive initial attention; that appropriate balance is maintained between the long range needs of the entire region and the shorter-term needs of local communities within the region; that maximum flexibility is preserved to respond to changing technology, land use patterns and growth objectives; and that the fiscal burden is spread over a longer period of time.

INTEGRATION OF INCREMENTAL DEVELOPMENT AND LONG-RANGE PLANS

Incremental development establishes a bridge between long range plans and the initial implementation program of the area. The increment of the plan should be regionwide and should integrate TSM elements, the initial segment of a fixed-guideway and improvements in other major corridors.

In this context, incremental development alters somewhat the role of the long range plan. That is, incremental development encourages the maintenance of flexibility in implementing the long range plan by allowing for its refinement and reassessment as successive increments of fixed guideway and other service improvements are implemented, and as uncertainties in long range forecast are reduced.

To insure such flexibility, the long range plan must be couched at a level of generality that does not specify the content of the initial increment for meeting specific short-term need, and also preserves options among future technologies until detailed examination occurs during the development of each increment. Incremental development therefore, requires a cyclical relationship in a continuing planning process between generalized long range regional systems, defined in terms of corridor and areawide needs, and more detailed system increments defined in terms of specific service concepts necessary to meeting the 15 year needs.

The required analysis of specific fixed guideway alternatives for the next increment, provides the opportunity to examine options which could have been considered infeasible or were only given a cursory examination during earlier long range planning. Specific alternatives within the increment can then be chosen on the basis of a short-term cost and impact analysis consistent with the long range comprehensive plan. Alternative increments and their final configurations, may differ in the priorities placed on meeting the needs of different market segments, and may therefore imply changes in long range direction.

PLANNING FOR EVOLUTION OF MAJOR URBAN MASS TRANSPORTATION

Any transportation system should be seen as a system which has evolved over time. There is always an existing highway system in an area, and some type of local bus and taxi service. The implementation period for any major new system will be significant, a minimum of six to ten years to implement the initial increment, and probable implementation of a full areawide system stretching to 25 years or longer. This means that the sequence through which particular components of the system are implemented is important, and that at each point in time during the successive stages of implementation of a system the components that are in place by that time should work effectively as part of the total system.

When considering the first segment of a fixed guideway system, alternative future means of service evolution should be kept in mind. If, after implementation of this initial segment, demand projected for the next 5-15 years dictates a need for additional facilities and/or improvements to existing facilities, any of three types of staging for implementation of a successive minimum viable segment can be employed:

- *Technology Evolution—Upgrading service levels or capacity within a single corridor over time by installing sequentially higher capacity transit technology as usage and demand warrant. An example of this process would be an evolution from bus in mixed traffic or preferential lanes to a line-haul technology on a separate right-of-way.

- *Service Evolution—Upgrading service within a given corridor using the existing technology through operational improvements, additional equipment, improved access service, support systems, etc.

- *Service/Technology Extension—Extending the existing service within the existing corridor or to new corridors in sequential minimum viable segments.

MINIMUM VIABLE FIXED-GUIDEWAY SEGMENT

The concept of a minimum viable segment applies to the stage of a long range fixed guideway facility included as part of an increment. Given

the high capital costs, it should be implemented in the corridor or corridors that have high priority needs. TSM improvements should complement the minimum viable segment, in the high priority corridor that has fixed facilities, and supplement the segment in other corridors that do not have fixed facilities.

The viable segment of a fixed guideway project should:

- *Provide efficient and adequate service in the highest priority areas;
- *Be justified on the basis of 15 year ridership, lane use, and impact forecasts;
- *Be economically and logistically sound if no other portion of the fixed guideway system is built;
- *Permit additions, extensions, service, or technology upgrading in the future;
- *Keep maximum number of future extension or addition options open; and
- *Be contiguous with existing system.

It may be confined to a single high priority corridor, or may include multiple corridors.

The "minimum" viable segment requires a selection from among alternative corridors and lengths of system to determine the most effective alternative based on near-term demand and other impacts. The cost and impact predictions cannot include any unwarranted assumptions concerning population trends, land use patterns, or transportation increments that will not be implemented in the near future. Rather, the forecasts should assume existing trends will continue in the short term unless a clear rationale exists for assuming that present patterns will be altered.

It is important to recognize that, despite the requirement for more detailed analysis of major mass transit investments and their development in terms of minimum viable segments, both the high-capital and low-capital improvements are necessary components of a single increment to the transit system. The integrated implementation of high-capital and TSM improvements should provide new or upgraded services in nearly all corridors and subareas during the most current time period.

EVALUATION OF TRANSPORTATION ALTERNATIVES

OVERVIEW OF THE EVALUATION PROCESS

The evaluation process should be designed to provide meaningful information about the outcome or consequences of the alternatives. These are of two kinds: costs and measures of effectiveness. Costs are defined as all the resources necessary for the design, property acquisition, relocation, construction, operation and maintenance of the system during its useful life. Effectiveness is the degree to which an alternative achieves stated goals or objectives. This section describes the proposed evaluation framework, a framework which allows each locality to assess alternative transportation systems within these parameters.

AN EVALUATION STRATEGY

A broad range of evaluation procedures—each with its strengths and weaknesses—has been identified in the technical literature. Recognizing that the evaluation process should be tailored to the decision process in each community, UMTA does not believe that a standardized evaluation procedure can at this time be specified for use in all local areas. However, the selected evaluation process should adhere to the following general guidelines:

- *The evaluation process should carefully distinguish between the costs and the measures of effectiveness (which may be either positive or negative).
- *The incidence and timing of the costs and effects of each alternative upon various groups within the population—defined in terms of their socioeconomic characteristics and their residential location—should be carefully assessed.
- *The evaluation process should focus on a marginal analysis to assess the impact of additional investments on system effectiveness.
- *The evaluation process should illustrate or elucidate the trade-offs among the alternatives in a manner which facilitates decisions.
- *The uncertainty associated with the forecasts for each alternative should be analyzed, where possible through the conduct of a set of sensitivity analyses.

Distinguishing Between Costs and Measures of Effectiveness

The allocation of scarce financial resources among diverse competing programs and projects is a fundamental resource allocation issue at all levels of government. Consequently, an explicit and accurate estimation of costs is an essential element of an analysis to assess which alternative

investment provides for the metropolitan area's transportation needs in a cost-effective manner. Two types of cost analyses should be included in an alternatives analysis—(1) a project cost and revenue analysis to develop comparable estimates of discounted costs and (2) a project cash flow analysis to define the sources and uses of funds.

Effectiveness can be measured by comparative attainment of objectives by alternative plans. Measures of effectiveness should estimate both the negative as well as the positive impacts of alternatives. Thus, they should include negative impacts such as noise, air pollution, and residential and business displacements and positive impacts such as improved accessibility, energy conservation, and urban center revitalization. Although quantitative estimates of the effectiveness measures are desirable, in some cases it may only be possible to develop indicators of effectiveness or descriptions of impacts. This is particularly the case for such difficult to quantify factors as aesthetics or neighborhood disruption.

Incidence of Effects on Subgroups

The incidence of the effectiveness measures among various groups should be assessed as part of the evaluation process. The extent to which particular groups are beneficially or adversely affected and the level of the impacts upon a particular group relative to those upon the general population may be of major importance to the decision process; these effects should therefore be clearly identified during the evaluation. The following guidelines are offered to assist local planners in defining the groups of concern:

- *Economic group incidence—The differential incidence upon various income groups should be assessed. At least three income levels—(1) below the poverty level, (2) moderate income, and (3) high income—should be utilized.

- *Age group incidence—The number and proportion of the elderly (residents who are 65 years or older) within the project area who can use the alternatives should be assessed.

- *Transportation handicapped—The number and proportion of the transportation handicapped within the project area who can utilize the alternatives should be assessed.

Structuring a Marginal Analysis

The evaluation process should focus on the marginal effectiveness which would result from additional transit system 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 (1) the null system, (2) the existing system, (3) the TSM alternative, and (4) the other alternatives.

Assessing Trade-Offs Among the Alternatives

The formats used to display the evaluation data should emphasize the critical trade-offs among the alternatives. To this end, UMTA requires that the evaluation data be presented in a disaggregate format. That is, all of the measures of effectiveness should be presented for the current situation, the null alternative, the TSM alternative and each of the alternatives.

The anticipated levels of each measure of effectiveness should be presented in the units in which they are estimated (e.g., patronage should be presented in rides per day, air pollution should be presented as the volumes of hydrocarbons, carbon monoxide, and oxides of nitrogen discharged). In measuring goal attainment, the effort should reflect the national goals discussed earlier, and the set of local goals and objectives which the community believes are required to fully represent the values structure of its residents.

The marginal effectiveness of an alternative is defined as the difference between the level of goal attainment for that alternative and the level of attainment for the baseline alternatives. Similarly, the marginal cost of an alternative is defined as the difference between the discounted net project cost (defined in the subsection on Project Cost and Revenue Analysis) for that alternative and the baseline alternatives. A cost-effectiveness ratio may then be computed for each alternative by comparing the marginal effectiveness and the marginal discounted net project cost. These cost-effectiveness comparisons should be presented in the alternatives analysis report for the goals and objectives and each of the alternatives.

Presentation of the evaluation data in a disaggregate format does not preclude the subsequent summarization of the data to assist the local community in reaching a decision. Planners may wish to selectively aggregate the results to clarify the critical trade-offs. Principal reliance in the decision process should be placed on evaluation displays at that level of aggregation which best illustrates the critical trade-offs among the alternatives.

Requirement for Sensitivity Analysis to Assess Uncertainty of Forecasts

Estimates of the effects of each alternative should include an assessment of the range of uncertainty of the estimates. Where formal impact prediction procedures are used (such as computer or mathematical models), appropriate sensitivity analyses should be accomplished to identify the effects of key assumptions.

Critical assumptions for which sensitivity analyses might be performed include:

- *Future conditions with respect to: employment and its location within the metropolitan area (particularly the level of CBD employment), residential population and its location within the metropolitan area (particularly residential population densities in areas proximate to fixed guideway transit stations), income levels and automobile ownership rates of the residential population, and price and availability of energy;

- *Consumer response to the new transit service: automobile and transit travel times (particularly anticipated levels of automobile congestion), automobile and transit travel costs, transit terminal and access times, and elasticities of travel demand to the attributes of the transit and competitive services;

- *Capital and operating costs of the new transit service (with particular emphasis on the staffing requirements and personnel costs for full system operations);

- *Performance of the new transit service: equipment failure rates, maintainability, and operating performance;

- *Net discount rates used in the cost assessment (see the subsection on Project Cost and Revenue Analysis); and

- *The weights (if any) used to aggregate the measures of effectiveness and the objectives in the evaluation.

The number of potential sensitivity analyses which might be conducted is extremely large; care should be taken to focus the investigation on those sensitivity analyses which are of greatest relevance to the decision-making.

The sensitivity analyses should identify those ranges of conditions which are "significant" to the decision-making process—that is, the ranges of conditions which change the ordering of which alternatives are most promising. The probabilities that these ranges of "significant" conditions might occur should be assessed. If these probabilities are relatively great, consideration should be given to: (1) implementing projects and programs which are sufficiently flexible so that they serve transportation needs in a cost-effective manner for the most probable sets of future conditions, (2) conducting activities to reduce the uncertainty associated with the decision (e.g., demonstration projects to reduce uncertainty about consumer response to new service), and (3) incremental implementation of the improvements to reduce uncertainty.

MEASURES OF EFFECTIVENESS

For purposes of these guidelines, effectiveness is measured by the degree to which an alternative meets the localities transportation requirements and attains its social, economic, environmental, and urban preservation goals. To compare alternatives in this regard, the analysis should estimate each alternative's capital and operating costs; ridership attraction; capital and operating efficiency and productivity; effects on modal choice, level of automobile use, air quality, and energy consumption; impact on land use and development patterns; extent of neighborhood disruption and displacement; job creation impact; and such other factors as are considered important by the local community.

In order to assess the degree to which the alternatives attain goals in the aforementioned areas, comparisons for each alternative must be made according to the following sets of data (see Table I). For the projected increments both the costs and effectiveness measures must be projected for the same year up to the fifteenth year from the filing of the capital grant application.

Table I. Factors for measuring the effectiveness of transportation alternatives.

- I. Description
 - A. Technology
 - B. Miles of technology
 1. Total

2. Elevated guideway
3. At-grade guideway
4. Subway
5. New feeder; route mileage
- C. Alternative's related jobs
 1. Construction
 2. Operation
- II. Resource Requirements (financial)
 - A. Costs
 1. Total capital
 2. Annual operating and maintenance
 - B. Section 3 funds required
 - C. Projected revenues
 - D. Operating deficits (system)
 1. Current
 2. Forecast
 3. Forecast deficit per person in urbanized area
 - E. Available Title 23 funds
 1. Interstate
 2. Urban system funds
- III. Transit ridership
 - A. Service area (forecast average daily ridership)
 - B. Peak hour (forecast each alternative)
 - C. Current modal split
 - D. Special groups
 1. Low income: percent increase in transit ridership (service area)
 2. Minority: percent increase in transit ridership (service area)
 3. Elderly: percent increase in transit ridership (service area)
- IV. Operating efficiency
 - A. Annualized total cost per trip
 - B. Annualized total cost per passenger mile
 - C. Capital cost per trip
 - D. Capital cost per passenger mile
 - E. Subsidy per trip
 - F. Subsidy per passenger mile
- V. General
 - A. Level of service—highway system in service area—change in average peak hour door-to-door travel time per rider (existing versus forecast) (e.g., 45 min—35 min)
 - B. Level of service—alternative system in service area—change in average peak-hour door-to-door travel time per rider (existing versus forecast)
 - C. Energy—air quality
 1. Percent change in regional auto VMT—forecast versus existing
 2. Compliance with EPA Transportation Control Plan (qualitative assessment)
 - D. Extent of technological risk (qualitative assessment)
 - E. Flexibility to accommodate future change (qualitative assessment)

COST ANALYSES

Project Cost and Revenue Analysis

A project cost and revenue analysis should be conducted for each of the alternatives to ensure that comparable cost estimates are developed. The project costs and revenues of each alternative should be estimated on an annual basis from the current year to an appropriate time horizon and discounted to present value. The time horizon selected should be the same for each of the alternatives; horizons of 25 to 40 years into the future are generally employed. This approach will allow economic comparison among alternatives to be made on a uniform basis.

As an example, a busway alternative is being compared with a rail alternative. If it is estimated that the rail facility will last 36 years, rail cars 24 years, the busway 18 years, and buses 12 years, the economic analysis would be carried out over a (say) 36 year time frame. Included in the cost of the rail alternative would be a cost of replacing the rail cars after 24 years (since only 1½ rail cars will have consumed after 36 years—a salvage value will have to be calculated). The busway alternative would include the cost of rebuilding the busway after 18 years and 3 sets of buses. In this way the two alternatives can be compared on a common basis for the economic analysis.

The project cost and revenue analysis should be performed using constant dollars; thereby excluding consideration of inflation. That is, the capital and operating costs and the revenues should be expressed in dollars for a single year—generally the year in which the analysis is being conducted. A discussion of the rationale for conducting the cost and revenue analysis using constant dollars and excluding inflation is presented in the subsection on Selection of Discount Rates.

The following time streams of costs and revenues of the increment should be estimated:

* Annual project capital cost—includes all capital costs for such items as right-of-way acquisition, route development, station and terminal construction, rolling stock, and related facilities.

* Annual operations, maintenance, and administration costs—all costs associated with the annual operation, maintenance, and administration of the increment.

* Annual gross revenue—all revenues of the project obtained from such sources as fares, parking fees, and other users charges and advertising and other non-user revenues.

* Annual net project cost—the annual gross revenues should be subtracted from the sum of the annual project capital cost and the annual operations, maintenance, and administration costs.

Interest costs associated with bond financing of capital costs should be excluded from all of the time streams.

The cost and revenue time streams should be discounted to a base year using the following assumptions:

* Usable life:

- Bus vehicles, 12 years,
- Rail vehicles, 25-30 years,
- Other fixed assets, 40 years,
- Right-of-way, 40 years, unless documentation is provided that the right-of-way has a marketable potential at the end of 40 years.

* Discount rates—the analysis should be performed for net discount rates (i.e., the discount rate exclusive of inflation) of 4, 7, and 10 percent.

All assets should be assumed to have no salvage value at the end of their usable lives—unless documentation justifying a salvage value for a particular asset is provided to UMTA.

The present value of the net project cost (that is, the discounted value of the net project cost) is the basic cost measure which should be used in comparing the costs and the effectiveness of the alternatives. The reports describing the alternatives analysis should contain detailed descriptions of the assumptions, planning procedures, and data utilized to develop estimates of project costs and revenues. Where possible, assumptions utilized in the analyses should be justified by comparing them to historical data for the local area or to corresponding data for other areas.

Selection of Discount Rates

An important consideration in any cost and revenue analysis of transit projects is the selection of an appropriate discount rate. The choice of the discount rate to be used in discounting future costs and revenues to present value requires decisions with respect to the treatment of inflation and the determination of the factors to be considered in selecting the appropriate discount rate.

Three factors may be considered in selecting an appropriate discount rate:

* The "rent" for the use of money—In private investment, this factor acknowledges the value of using money for investment or earnings. For public investment decisions, the rent for money implicitly reflects the value society places on the benefits to be received.

* Risk compensation—In essence, this component can be considered as an insurance premium.

* Inflation—The presence of inflation is acknowledged as a charge for the expected decline in the value of money.

Of these three considerations, rent for the use of money is the most significant in evaluating alternative transit systems. It is the largest component of the discount rate which should be applied to convert future costs and revenues to present values. Risk is an element that will vary from city to city. There are several reasons for using a discount rate which does not reflect inflation (i.e. a Net Discount Rate) when comparing alternatives. Among these are:

* It is difficult to make long range forecasts of inflation rates. In the late 1960s and early 1970s there were a number of special factors which affected the rate of inflation. It is not necessarily reasonable to assume that the inflation rate experienced during this period will continue for the long run future. If long run inflation rates are projected, they should be based upon long term, not short term, inflation trends.

* The analysis will not be biased if inflation is excluded, because in essence, a constant inflation factor is being added to the analysis. Depending upon the inflation factor selected, the estimates may be overstated or understated; these errors will however occur for all alternatives and will therefore not alter the ordering of the alternatives. In other words, the relative desirability or ranking of the alternatives will not significantly change, if inflation is not considered.

UMTA therefore recommends that the analysis of cost and revenues be conducted using constant dollars for the year in which the analysis is being undertaken and that it employ a Net Discount Rate. The analysis should be conducted employing a range of Net Discount Rates—4, 7, and 10 percent.

Project Cash Flow Analysis

As part of the final report to UMTA, local areas should prepare a cash flow (or sources and uses of funds) analysis on an annual basis recommended alternative. This requirement for a cash flow analysis is primarily motivated by two major concerns:

*To provide information on the total financial requirements of the project over time to decision-makers at all levels of government.

*To encourage local communities to examine financial resources other than federal assistance for funding transit projects.

In this analysis, all dollar estimates are to be presented in terms of current dollars—that is, the effects of inflation should be explicitly considered. This is because Federal and local funding commitments are based upon the total project cost with implementation staged over several years. Thus, expected inflation must be taken into account in order to determine the total costs of the project. Price rises due to resource scarcity (as opposed to general inflation) should also be incorporated into the determination of the total project cost. Insofar as possible, anticipated increases in prices should be calculated for the various components. This should be easier than making long range inflation predictions because of the relatively shorter time frame of the cash flow analysis. Local areas are encouraged in this analysis to be realistic regarding anticipated future rates of inflation.

The time horizon for the cash flow analysis should be the longer of the following time periods:

*From the filing of the capital grant application for an elapsed period of 15 years; or

*The implementation period for full project operation plus ten years of project operations.

This specification of the time horizon is designed to provide decision-makers with information on cash flow during a significant period of normal system operations.

The uses of funds in the cash flow analysis should be disaggregated to:

- *Capital cost of right-of-way;
- *Capital cost of fixed facilities;
- *Capital cost of vehicles;
- *Construction management and engineering costs;
- *Amortization of the interest and principal on bonds;
- *Transportation operations (including police services);
- *Power;
- *Maintenance; and
- *General and administration.

The sources of funds in the cash flow analysis should be disaggregated to:

- *Fare box revenues;
- *Other user revenues;
- *Non-user revenues;
- *State capital cost contribution;
- *State operating cost contribution;
- *Local capital cost contribution;
- *Local operating cost contribution;
- *Receipts from the sale of bonds;
- *Other non-federal funding sources (which should be specified);
- *UMTA Section 5 funding;
- *UMTA Section 3 funding;
- *Interstate and Urban System funds transfers; and
- *Other federal funding sources (which should be specified).

The assumptions used to estimate inflation rates should be clearly specified in the documentation. Further, the documentation should clearly indicate the policy which was assumed for funding inflationary increases in operating costs (e.g., will fares be increased sufficiently to offset inflationary operating cost increases or will these be offset by increased operating assistance). The impacts of changes in fare policy upon transit patronage and revenue should be clearly identified.

OTHER EVALUATION DATA

Because of the disaggregation of data by alternatives evaluated, requested

in previous sections, it would be helpful for UMTA analysis to include one set of identifying data for the metropolitan area.

Description of Metropolitan Area Characteristics

Metropolitan area characteristic data should be presented for the historical period from the last two census to the present and projected for the forecast period(s) assuming the null alternative. The requested data items appear in Table II.

Table II. Metropolitan area characteristics.

- I. Background
 - A. Population—urbanized area
 1. Current
 2. Forecast
 3. Population growth rate—past decade
 4. Population growth rate—forecast over current
 - B. Population—service area
 1. Current
 2. Forecast
 3. Population growth rate—past decade
 4. Population growth percentage—forecast
 - C. Population density—service area
 - D. Total daily travel (all modes)—service area
 1. Current
 2. Forecast
 - E. Peak hour trips (all modes)—service area
 1. Current
 2. Forecast
 - F. CBD employment
 1. Percent change: forecast over present
 2. Current percentage change—past decade
 3. Forecast
- II. Transit ridership
 - A. Urbanized area (current average daily)
 - B. Peak hour (current)
 - C. Forecast modal split
- III. General
 - A. Level of service: highway system in service area—current peak hour average travel speed
 - B. Level of service—transit service area—current peak hour average travel speed
 - C. Energy/pollution
 1. Current auto VMT
 2. Forecast auto VMT
 3. Forecast auto VMT without project
 - D. Special groups
 1. Low-income
 - (a) Number in urbanized area
 - (b) Number in service area
 - (c) Number currently served in service area
 - (d) Number forecasted to be served
 2. Minority
 - (a) Number in urbanized area
 - (b) Number in service area
 - (c) Number currently served in service area
 - (d) Number forecasted to be served
 3. Elderly
 - (a) Number in urbanized area
 - (b) Number in service area
 - (c) Number currently served in service area
 - (d) Number forecasted to be served
 - E. Land development
 1. Adequacy of land use controls (qualitative assessment)
 2. Funding available for land development (ample, marginal, scarce)
 - F. Past UMTA assistance per capital (urbanized area)
 - G. Percent of current UMTA funds which have been expended by locality

Changes between the existing and the forecast conditions should be compared to historical trends. If significant changes in historical trends are anticipated, a discussion of these should be provided. In particular, explanations should be provided for significant future changes in historical trends for CBD employment, metropolitan and project area population, and residential and employment densities within the project area. If a significant increase in CBD employment is forecast, the explanation should include an estimate and description of the levels of public and private investment in the CBD between the current and forecast periods and the justification for this estimate.

SELECTION OF A RECOMMENDED ALTERNATIVE

Although it should attempt to eliminate as many alternatives as possible, the alternatives analysis report may present several "recommended" alternatives. Justification for the elimination of alternatives should be provided in the technical documentation. A local community must, however, select a single "recommended alternative" for inclusion in the final report to UMTA.

To assist in selecting a recommended alternative, UMTA encourages local communities to utilize whichever decision tools are most relevant for their situations. UMTA requires, however, that a detailed statement of the community's rationale for selecting the "recommended alternative" from among those considered in the alternatives analysis process be submitted to UMTA as part of the report. That is UMTA wishes to develop a full appreciation of the decision logic which lead the community to select the recommended alternative from among those considered in the alternatives analysis process.

Examination of the Cost-Effectiveness Measures

One approach to selecting a recommended alternative would rely upon an examination of the measures of cost and effectiveness and the cost-effectiveness ratios.

This involves three types of examinations as follows:

*Dominance—occurs when one alternative is "better" than another in one or more measures of cost and effectiveness while being about equal in the remainder of the measures.

*Incremental tradeoffs—occurs when one or more undesirable measures (usually cost) increase at the same time as a desirable effectiveness measure (e.g., ridership, accessibility, level of service); selection of an alternative may be based on the worth of added increments of effectiveness for different cost increments.

*Conflict tradeoffs—occur when two or more measures of effectiveness are in conflict as cost increases; one measure may be desirably impacted as cost increases while a conflicting measure will be undesirably impacted at the same time.

Once the costs and measures of effectiveness have been predicted, evaluative judgments must be made about the alternative courses of action. Judgments (either implicit or explicit) must be made by the decision maker about the relative importance of the different objectives to be attained by the alternatives. The importance assigned to the attainment of specific objectives will, of course, differ among communities and among residents within a community. It is therefore particularly important to view the differences among the alternatives from various perspectives. An example of such an analysis is presented in the section entitled Illustrative Examination of Multiple Measures of Cost and Effectiveness.

Aids to Decision Making

Local communities may wish to employ various decision tools to formalize the decision process. A broad range of aids to decision-making have been described in the literature, these include:

- *Balance sheet,
- *Economic analysis (e.g., benefit-cost analysis),
- *Ranking method,
- *Rating method,
- *Cost-effectiveness analysis with weighting of objectives, and
- *Desirability rating based on utility theory.

Each of these techniques has its advantages and disadvantages and no single technique should be exclusively relied upon to develop a decision. The use of such tools can, however, provide useful additional evaluation data to aid in making a decision.

ILLUSTRATIVE EXAMINATION OF MULTIPLE MEASURES OF COST AND EFFECTIVENESS

A brief example is presented to introduce the concept of analyzing multiple measures of cost and effectiveness. For simplicity and clarity of presentation, the number of alternatives and their corresponding measures of effectiveness are reduced from the number which would normally be analyzed in a study of a major metropolitan transit improvement. This type of analysis would be essentially the same for a greater number of alternatives and measures of cost and effectiveness; the only difference would be the number of comparisons and trade-offs which must be considered. The next column depicts the predicted costs and measures of effectiveness for six of the "best" alternatives for a typical major transit improvement program.

The analysis initially focuses on whether any of the alternatives are

dominated. Alternatives 1 and 7 both achieve the same approximate level of total transit ridership. Average travel times are slightly lower for alternative 1 and accessibility slightly higher than alternative 7; most of the other significant measures of effectiveness are about the same. Since 1 is a lower-cost way of achieving those levels of effectiveness, 1 dominates 7 and consequently 7 can be eliminated from further consideration.

After those alternatives which are dominated have been eliminated, the analysis focuses on an assessment of incremented trade-offs. Alternative 13 obtains another 9 million riders per year over alternative 1, an increase of 30% with a corresponding increase in operating costs of about 15%, for a major capital investment of 360 million dollars more than alternative 1. For another 120 million dollars capital cost, alternative 14 increases ridership by another 10% but with a substantial increase in operating costs. These relative values are reflected also in the costs per rider served. The differences in projected federal costs are similar to the total cost figures, although the percentage increase in operating costs of alternative 14 over alternative 13 is much greater than the corresponding increase in federal capital cost. The conclusion was reached that, because of the substantial increase in ridership of 13 over 1, the major capital investment required would be cost-effective. Further it was concluded that the increase in ridership of 14 over 13, relative to the increased capital and operation costs, would not be cost-effective.

Alternative 19-A attracts 12 million (30%) more riders per year than alternative 13 for an additional \$170 million (45%) in capital investment. Average trip times are decreased 6.6% for alternative 13 as compared to alternative 1, but the additional investment for 19-A decreases trip times only 4.2% from 13. A significant advantage is realized by 19-A over 13 in average out-of-vehicle times (22%) as well as in average accessibility (28%). For these reasons a judgement was made that the advantages of alternative 19-A outweighed the additional capital investment which would be necessary to implement it rather than alternative 13.

Finally, the analysis focuses on an assessment of conflict trade-offs. Alternative 19 can achieve a 30% increase in transit ridership over alternative 13, but at an additional capital cost of 320 million dollars or about 84%. The additional federally-financed capital cost for alternative 19 would be 170 million dollars or about 60% more than alternative 13. This

Example of an evaluation matrix.

Item	Alternatives					
	1	7	13	14	19	19-A
Measures of effectiveness						
Ridership						
Total	31	30	40	44	52	52
Low income	20	21	24	24	28	28
Elderly/handicapped	6	6	10	10	11	11
Modal split, %	11	11	15	16	19	19
Average travel times						
Total	25.7	27.3	24.0	24.5	22.7	23.0
In vehicle	22.0	21.5	19.6	20.3	19.5	19.5
Out of vehicle	3.7	5.8	4.5	4.2	3.2	3.5
Accessibility, number of residents (1000's) within 20 min of:						
CBD	345	353	391	420	485	505
Government complex	196	177	203	262	288	270
University center	83	79	85	110	99	96
Avg accessibility index	208	203	226	264	291	290
Displacement						
Residences	0	0	25	50	200	150
Businesses	0	0	5	13	18	12
Jobs	0	0	72	155	410	160
Air quality						
Energy consumption (1000 gal/d, total transport system)	756	759	753	752	750	750
Employment benefits	Low	Low	Mod-erate	High	Mod-erate	Mod-erate
Visual intrusion	Low	Low	Low	Mod-erate	Mod-erate	High
Future flexibility	High	High	Mod-erate	Low	Low	Low
Costs						
Total project cost						
Capital	22	110	380	500	700	550
Annualized Operating	6	9	7	12	9	9
Total	9	19	47	65	84	68
Federal project cost						
Capital	18	88	285	350	455	385
Annualized Operating	2	3	2	4	3	3
Total	4	11	32	41	52	44

total capital cost can be reduced, while still achieving the same ridership. Alternative 19-A does this, but the consequence is a high level of visual intrusion, due to the substantially greater mileage of elevated guideway. The greater number of job displacements caused by alternative 19 are mostly of a temporary nature because of the "cut and cover" operation to depress portions of the guideway. (All of the displacements caused by each alternative have been judged to be easily relocated in the same or nearby neighborhoods.)

In assessing the relative cost-effectiveness of these alternatives, the conclusion was reached that, in this case, the adverse effects of visual intrusion outweighed the importance of the cost saving of 19-A over 19. Further, it was concluded that, considering the relative ridership levels achieved and the larger share of the additional cost which the metropolitan area is willing to bear, the additional cost of 19 over 13 is a worthwhile expenditure. It is therefore concluded that alternative 19 be recommended for immediate implementation.

This example has been amplified to emphasize the basic concepts of the analysis. Both the evaluation data and the documentation of the evaluation process would, of course, have to be much more complete than the example shown above.

TRANSPORTATION SYSTEMS MANAGEMENT

Before considering fixed guideway systems, transportation improvements should first be sought through more efficient operation and management of existing transportation facilities. The importance of such activities with respect to major mass transit investments is even more obvious due to rising costs of constructing and operating new facilities, coupled with the fact that many existing systems are not currently being utilized in full capacity.

The purpose of this section is not to describe the range of technical aspects encompassed by TSM. Specific information of this nature will be disseminated later this year. Instead, the effort is to outline the place of TSM in the alternatives analysis process. It should be realized that TSM improvements must be viewed separately in terms of immediate system improvements and those included as part of the somewhat longer range 15 year analysis. In the sense of immediate actions, TSM would include actions that modify the current institutional and operational characteristics of the existing transportation system in an effort to achieve maximum productivity without major capital investment. In many areas this would be identified as a maximum bus option or a bus on freeway option coupled with certain auto restraints.

However, in the context of 15 year needs, the TSM actions can be considered in some cases as an alternative to a major capital investment or in all cases to complement and supplement the new capital investment. In terms of our alternative analysis, TSM actions may improve system productivity to the point where the 15 year demand can be adequately served without further capital investment. In this latter case, TSM would become a viable alternative to new investment and has established the maximum level of service which can be achieved without new major investments.

As a complement or supplement to the proposed major investment,

TSM provides the opportunity of assuring greater productivity of the proposed system. For example, institutionally restricted auto usage could encourage greater usage of a fixed guideway investment. Operationally, TSM can initiate changes which lead to better feeder or access service to the fixed guideway investment.

PUBLIC INVOLVEMENT

There should be full opportunity for public involvement in the development and evaluation of alternatives so that every group or sector of the public which may be potentially affected by the proposed project has full access to all relevant information and has full opportunity to influence the process in a constructive fashion. Interested parties, including local governments and metropolitan, regional, State and Federal agencies, as well as the general public, all should have adequate opportunities to express their views throughout the transportation alternatives analysis process.

Public involvement should begin early enough so as to be able as appropriate to influence the direction of planning studies, as well as major decisions during the studies. The study design for an alternatives analysis should indicate the procedures to be followed in order to integrate public involvement activities constructively with the technical analysis. Procedures should be established to ensure that relevant information is made available to other agencies and the general public throughout the duration of project studies. Also it should include a time table of planning and project development activities and indicate major milestone points.

The procedures established should ensure that interested parties, including local governments and metropolitan, regional, State and Federal agencies, and the public have adequate opportunity to participate in an open exchange of views throughout the studies and to influence the decisions taken at major decision points.

A series of public forums or charettes may be an effective way to involve the public at various points in the process. The several milestone points which are important for public involvement are:

- *Determination of local goals,
- *Determination of the range of alternatives to be considered,
- *Determination of impacts and the measures to assess the attainment of local goals,
- *Actions to be considered to minimize adverse impacts,
- *The comparative evaluation of alternatives to determine relative effectiveness, and
- *Decision on priority and recommended alternative.

The widespread and timely dissemination of study documents and other pertinent information to all interested parties can be a useful catalyst to constructive and timely public involvement. Procedures should be established to ensure that appropriate documentation is prepared in language comprehensible to laymen and is disseminated widely in draft and final form.

MAJOR URBAN MASS TRANSPORTATION INVESTMENTS: STATEMENT OF POLICY

Federal Register, Volume 41, No. 185, September 22, 1976, pp. 41511-41514.

The purpose of this notice is to issue a Statement of Federal Policy with respect to decisions on major urban mass transportation investments assisted under the Urban Mass Transportation Act of 1964, as amended. The need for such a Statement has resulted from the growing complexity of the UMTA capital program and the increasing demands placed upon the available funds.

At the outset of the urban mass transportation assistance program in 1964, the \$75 million annual budget was directed toward the preservation of urban transit service in selected cities through the conversion of failing private transit companies to public ownership. A decade later UMTA's annual capital assistance budget exceeds \$1 billion, and is primarily devoted to modernizing existing transit properties and constructing new transit facilities. Not only has the magnitude and duration of Federal transit investments increased and changed significantly but the number of potential recipients has grown. The pressure of these competing demands requires the Department of Transportation to ensure

that the available Federal resources are utilized in the most prudent and effective manner.

In the interest of making all urban areas aware of the procedures which are followed and the issues considered in Federal decisions to participate in the financing of locally initiated major mass transportation investments, the Department of Transportation is promulgating this Statement of Federal Policy. The policy represents a process-oriented approach designed to allow each urban area to take into account its unique characteristics in the planning, design and implementation of transportation improvements. As a condition of eligibility for Federal assistance, the policy requires that alternative investment strategies be considered in order to determine which investment best serves the locality's transportation needs, promotes its social, economic, environmental and urban development goals, and supports national aims and objectives. The policy stresses the need to consider combinations of transit modes and technologies appropriate to the service requirements of specific corridors,

and requires major fixed guideway systems to be implemented incrementally, with priority given to the most immediate needs of the locality.

This Statement of Policy has been developed in concert with Federal, State and local transportation and planning officials, transit operators, public interest groups and other parties potentially affected by the Policy. Comments and opinions from these diverse groups have been sought by UMTA through individual solicitations, through interest groups such as the American Public Transit Association (APTA), and through two major UMTA-sponsored consultative conferences (Airlie House Conference and Hunt Valley Conference).

The Policy Statement was first issued for public comment on August 1, 1975 (FR, Vol. 40, No. 149). Sixty-eight responses were received from local, State and transit agencies, metropolitan planning organizations and other interested parties. These comments led to a revision of the Statement and the addition of a description of UMTA procedures. By spelling out clearly the process by which it makes major capital grant decisions, UMTA hoped to increase its own accountability and add a measure of predictability to the discretionary grant award process.

The revised Statement of Policy was discussed at a working conference held under the auspices of the Transportation Research Board at Hunt Valley, Maryland on March 29 through April 1. In arriving at this final Statement of Policy, UMTA has taken careful account of the views and comments expressed at that conference and throughout the 20-month consultative process.

The following significant changes have been made from the initially proposed text of the Statement as issued in the Federal Register on August 1, 1975.

The section entitled "Extent of Federal Commitment" which appeared in the earlier version of the Policy Statement has been deleted. The proposition that the Federal Government might provide funding for alternatives which the local analysis had determined as not cost-effective is deemed to be inconsistent with the Federal obligation to ensure prudent and effective use of the taxpayers' money. The Department's policy of confining Federal financial support to cost-effective alternatives remains unchanged.

Review of the comments received indicated also the desirability of removing certain ambiguities and making certain clarifications in the Policy Statement. These changes are discussed below.

1. A number of respondents felt that no single overall measure of transportation cost-effectiveness could fully reflect all of the significant issues which must be considered in reaching responsible decisions. A single measure was not the intent of the policy. The statement now makes it clear that multiple measures of cost and of levels of effectiveness should be considered, and that effectiveness is measured by the degree to which the proposed investment meets the locality's transportation needs, promotes its social, economic, environmental and urban development goals, and supports national objectives.

2. Some comments interpreted the emphasis on a short planning horizon as a rejection of the concept of comprehensive metropolitan planning. The policy does not challenge the concept of long range planning, and UMTA recognizes the need for such planning as a means of giving an overall direction to metropolitan development. However, UMTA believes that it is not prudent for either a locality or the Federal Government to make a massive commitment to a fixed course of action for mass transportation based solely on the necessarily speculative projections that must characterize plans which target 30 or 25 years in the future. Changing social priorities, demographic shifts, environmental concerns, accelerated inflation and other unanticipated developments can drastically alter even the most carefully conceived long range plans. It is desirable therefore to base immediate investment decisions on a shorter planning horizon. The sections on "Long Range Plan" and "Incremental Development" now bring out more clearly these considerations.

3. A number of respondents felt that a 10-year horizon for the short term analysis was too close in the future to permit investments, such as advanced acquisition of rights-of-way, that pay off only in the long run. These comments are well taken. Considering the long lead times that are required for most fixed guideway projects, a somewhat longer planning horizon is justified. The policy has now adopted a horizon of up to 15 years, counting from the time the analysis was carried out. Since major fixed guideway projects taken up to 5-8 years to complete, this is tantamount to a 7-10 year horizon from the date of initial start-up operation.

4. Several comments expressed doubt about the feasibility of the incremental approach to transit system implementation because of the need to offer benefits more or less simultaneously to the entire region. UMTA agrees that there must be some geographic equity in transit development. But the incremental approach is not inconsistent with an equitable distribution of transit benefits. An "increment" of the plan may contain a package of projects designed to benefit an entire metropolitan area. For example, the initial "increment" of the plan may in-

clude express bus service in exclusive lanes, new fringe parking facilities, improved feeder services in suburban communities, as well as the first localized segment of a fixed guideway system.

5. The original conception of requiring Transportation System Management improvements in the operation of the existing transportation system as an alternative to the construction of new facilities was felt by many observers to be too confining. The policy now distinguishes between two concepts: the need to assess the potential of low-cost alternatives (e.g., express bus service in reserved lanes) as a discrete option to more capital intensive alternatives; and the need to employ various types of Transportation System Management actions to support and complement (but not substitute for) the proposed fixed guideway investment.

6. A more precise definition of a "major urban mass transportation investment" was urged by several respondents. This point has been clarified by bringing under the coverage of the policy all projects involving new construction or extension of existing fixed guideway systems, except projects identified by UMTA as part of a demonstration program (such as the proposed "Downtown People Mover" demonstrations). Projects involving rehabilitation or modernization of existing facilities are not within the scope of the alternatives analysis requirement. Fixed facilities by nature of their permanence and irreversibility have potentially the greatest impact upon the urban area in terms of land use, financial burden, and urban growth. Decisions concerning construction of new fixed facilities, therefore, deserve particular care, regardless of their financial scope.

7. Questions were raised concerning the relationship of the Environmental Impact Assessment to the analysis of alternatives. The Policy now explicitly integrates the two processes and calls for the circulation of a final Environmental Impact Statement prior to a decision on the award of the preliminary engineering grant.

Issued in Washington, D.C. on September 9, 1976.

William T. Coleman, Jr.
Secretary

FEDERAL POLICY ON ASSISTANCE FOR MAJOR URBAN MASS TRANSPORTATION INVESTMENTS

Since the beginning of this decade, the Federal Government has provided an increasing share of the Nation's capital investment in urban mass transportation. In the years ahead, as more and more communities seek Federal financial aid to improve and expand their mass transportation systems, it is more essential than ever that Federal funds be effectively and efficiently utilized.

Since each metropolitan area has differing characteristics, Federal mass transportation assistance cannot be based on standardized prescriptions. Rather, Federal support should be flexible, relying heavily on local ability to assess present and anticipated transportation needs, identify and evaluate alternative opportunities for improvement, and initiate needed actions.

The Federal Government does, however, have a strong interest in ensuring that Federal funds available for mass transportation investments be used prudently and with maximum effectiveness. While there are no simple or standard procedures that will guarantee this outcome, a careful and systematic evaluation of the implications of alternative courses of action in advance of a Federal commitment should improve the quality of decision. To this end an analysis of transportation alternatives and the filing of a final Environmental Impact Statement will be required as a condition of eligibility for Federal assistance for a major mass transportation investment. Federal support will be available only for those alternatives which the analysis has demonstrated to be cost-effective, where effectiveness is measured by the degree to which an alternative meets the locality's transportation needs, promotes its social, economic, environmental and urban development goals, and supports national aims and objectives.

A major mass transportation investment for purposes of this Statement is any project which involves new construction or extension of a fixed guideway system (rapid rail, light rail, commuter rail, automated guideway transit) or a busway, except where such project is determined by the Administrator to be of importance as a demonstration of advanced technology. Rehabilitation and modernization projects are not included in the scope of this definition.

The analysis of alternatives shall be carried out as part of a comprehensive transportation planning process in accordance with the following principles:

A. LONG RANGE PLAN

Proposals for major mass transportation investments shall be consistent with an urban area's comprehensive long range plan which articulates the overall direction for metropolitan development and identifies

major transportation corridors.

The long range plan should reflect an awareness that different levels and types of transportation service may be needed in different portions of the metropolitan area. Each major corridor should be considered individually to determine the level and type of service that will best meet its projected requirements.

The long range plan should further recognize the need for local community-level transit service as well as for express line-haul connections that foster region-wide accessibility.

As an example, a comprehensive transportation plan may call for the construction of a rail rapid transit line in a corridor of heavy demand, a "people mover" to facilitate local circulation in the central business district, a light rail network or busways to serve intermediate capacity corridors in the lower density portions of the metropolitan area, and fleets of fixed route buses and flexibly routed paratransit vehicles acting as feeders and distributors to the higher capacity line-haul systems and providing neighborhood circulation service in the local communities within the metropolitan region.

The long range plan should be reassessed and revised periodically as part of a continuing transportation planning process to reflect changes in local goals, priorities and long range forecasts; to respond to new land development and travel patterns; to adapt to new technologies as they are developed; and to adjust to the impact of previously implemented actions.

B. INCREMENTAL DEVELOPMENT

Where an area's comprehensive long range transportation plan calls for the creation of a fixed guideway system, the system should be proposed for implementation incrementally. Initial segments of the system should be proposed in corridors which can justify the need for fixed guideway service within 15 years of the date of the analysis. Each segment should be capable of justification on its own merits.

Corridors which cannot justify fixed guideway transit service within 15 years of the date of the analysis should be provided with levels and types of service appropriate to their needs, with the level of service being progressively upgraded as demand develops. Incremental developmental aims to ensure that high priority corridors receive initial attention; that appropriate balance is maintained between the transportation requirements of the entire region and those of local communities within the region, and between long range and short range needs for transportation improvements; that flexibility is preserved to respond to changing technology, land use patterns and growth objectives; and that the fiscal burden is spread over a long period of time.

C. EVALUATION OF ALTERNATIVES

In the interest of improving the quality of the local planning and investment decisions, any metropolitan area which intends to apply for Federal assistance for a major mass transportation investment must undertake an analysis of transportation alternatives with regard to any corridors in which fixed guideway facilities have been proposed for implementation. The analysis should consider a range of alternatives, including improvements involving better management and operation of the existing street and highway network, e.g., through provision of reserved lanes for buses and other high occupancy vehicles.

This analysis should assess each alternative's capital and operating costs; ridership attraction; capital and operating efficiency and productivity; effects on modal choice, level of automobile use, environmental impacts and energy consumption; impact on land use and development patterns; extent of neighborhood disruption and displacement; job creation impact; and such other factors as are considered important by the local community.

The analysis should also compare the relative costs and effectiveness of each alternative, where effectiveness is measured by the degree to which the alternative meets the locality's transportation needs, promotes its social, economic, environmental and urban development goals, and supports national aims and objectives.

As part of the analysis of alternatives, a draft Environmental Impact Statement shall be prepared jointly by UMTA and the applicant in accordance with published guidelines.

D. TRANSPORTATION SYSTEM MANAGEMENT

Plans for a fixed guideway project should include transportation system management (TSM) actions to enhance the project's accessibility and convenience and to improve the quality of transportation service in other parts of the metropolitan area which will not be served by the fixed guideway project. Supportive TSM actions shall include the provision of adequate bus and paratransit feeder services and parking facilities at transit stations, and may include other measures aimed at increasing transit ridership and reducing unnecessary use of private auto-

mobiles within the transit corridor.

E. PUBLIC INVOLVEMENT

There should be full opportunity for the timely involvement of the public, local elected officials, and all levels of government in the alternatives analysis process. This involvement should be initiated early, so that all affected groups have an opportunity to influence the process in a timely and constructive fashion, particularly as to the alternatives to be considered, measures of effectiveness to be used, actions to be taken to minimize or avoid adverse effects and priority actions for implementation.

After completion of the draft Environmental Impact Statement a formal public hearing shall be held as required by the Urban Mass Transportation Act of 1964, covering both the analysis of alternatives and the draft Environmental Impact Statement.

PROCEDURES

This section states the procedures which UMTA will normally follow in reviewing the alternatives analysis, in implementing the Environmental Impact Statement requirement of the National Environmental Policy Act of 1969, and in making funding commitments to support major mass transportation investments.

1. The initial phase of the alternatives analysis process shall involve a preliminary analysis leading to the development of a citizen involvement mechanism, the choice of appropriate demand forecasting techniques and cost-effectiveness analysis methodology, the designation of a priority corridor(s), and the selection of a small set of promising transportation alternatives for analysis. UMTA must concur in these elements of analysis before the applicant may proceed with a detailed evaluation of the alternatives.

2. After obtaining UMTA's concurrence, the applicant shall proceed with the alternatives analysis and the preparation of a proposed draft Environmental Impact Statement (EIS). The proposed draft EIS shall be combined in a single document with the results of the alternatives analysis and shall be prepared jointly by UMTA and the applicant in accordance with published UMTA guidelines. Each alternative selected for study shall be presented at the same level of detail.

The applicant shall designate, in a separate document to be submitted simultaneously, the preferred cost-effective alternative which he recommends for implementation, and state a rationale for his choice. The recommended alternative shall be described in terms of its corridor location, length of initial segment(s), technology, horizontal and vertical alignment, grade separation, station location and other relevant factors. This document shall clearly state that any recommendation is solely that of the applicant and that UMTA's judgment is reserved until the environmental process is complete.

3. Upon receipt of the combined alternatives analysis and proposed draft Environmental Impact Statement, UMTA will undertake a review of the document to ensure that the analysis has been carried out in conformance with UMTA policy and UMTA guidelines. This review will normally be completed within 90 days of the receipt of the draft alternatives analysis and proposed draft EIS.

4. After the consolidated alternatives analysis and proposed draft Environmental Impact Statement has been found in conformance with UMTA guidelines, UMTA will circulate it for comment. During the circulation period the applicant will hold a public hearing on the document and may, at applicant's option, include in such hearing consideration of any application for a grant for preliminary engineering on the applicant's preferred alternative.

5. At the end of the circulation period UMTA and the applicant will address the questions and comments received, correct any deficiencies in the analysis, and begin preparation of a final Environmental Impact Statement on a recommended alternative. The final EIS shall be prepared at the same level of detail as the draft EIS.

The final Environmental Impact Statement may also incorporate UMTA's decision with respect to a preliminary engineering grant, subject to the condition of satisfactory completion of the 30-day circulation period required for the final Environmental Impact Statement. This decision will be based upon a comparison of projects emerging from the alternatives analysis process.

UMTA may admit projects into preliminary engineering whose combined cost exceeds available Federal contract authority. This will be done in anticipation of any of several possibilities: the withdrawal of projects as a result of changing local priorities; a local decision to use non-Federal resources to finance more than 20 percent of total cost; or changing conditions such as the availability of detailed cost estimates which might lead to a later decision that a particular project cannot be Federally financed.

6. During the execution of preliminary engineering, the applicant will be expected to complete all the steps which must precede a full Federal

commitment of capital grant funds to the project. These steps include providing evidence of firm commitment of the non-Federal capital share, providing evidence of State and/or local consensus regarding the financing of operating deficits, and planning for and gaining financial commitment to necessary supportive actions to promote effective utilization of the proposed fixed guideway system.

7. Upon completion of the preliminary engineering phase, the applicant may prepare a capital grant application for the construction (includ-

ing final engineering and right of way acquisition) of the proposed project, and shall hold a public hearing thereon.

8. A definite funding commitment by UMTA for construction in a specific dollar amount will be made upon review of the capital grant application, the transcript of the public hearing and the detailed cost estimates emerging from preliminary engineering. The decision will be based upon a comparison of projects then pending.

6 Conference Participants

Those who attended the Airlie House Conference are indicated by a 1, and those who attended the Hunt Valley Conference by a 2. No numbers are given for those who attended both conferences. Organizational affiliations are those of the participants at the time of the conference.

Workshop chairmen at the Airlie House Conference were Kurt W. Bauer, Manuel Carballo, John T. Doolittle, Kenneth W. Heathington, William F. Hein, Jack Kinstlinger, and John T. Mauro. Workshop recorders were Harold H. Geissenheimer, Howard L. Goode, Louis E. Keefer, Joseph Misner, B. Thomas Moore, David Norstrom, and Susan Richardson.

Workshop chairmen at the Hunt Valley Conference were Richard J. Bouchard, Daniel Brand, Lowell K. Bridwell, Aubrey David, Jr., John A. Dyer, and Jack Kinstlinger. Workshop recorders were Matthew Coogan, Trond Grenager, Woodrow L. Moore, Ken Mowll, Donald F. Munro, and Jean Murfin.

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