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These Digests are issued in the interest of providing an early awareness of the research results emanating from projects in the NCTRP. By making these results known as they are developed, it is hoped that the potential users of the research findings will be encouraged toward their early implementation in operating practices. Persons wanting to pursue the project subject matter in greater depth may do so through contact with the Cooperative Research Programs Staff, Transportation Research Board, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Areas of Interest: 12 planning, 13 forecasting, 14 finance, 15 socioeconomics, 16 user needs, (01) highway transportation, (02) public transit

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Planning Practice for Major Transit Investments

An NCTRP staff digest of the essential findings from the final report on NCTRP Project 36-1(2), "Assessment of Current Planning Practice for Major Transit Investments", conducted by Sydec, Inc., Reston, Virginia.

THE PROBLEM AND ITS SOLUTION

A structured planning process, developed by the Urban Mass Transportation Administration, has been applied over the past ten or more years by local and UMTA officials in the planning of major transit projects for which federal funding is proposed (see Figure 1).

Ideally, the technical work conducted in each phase of the process yields the information necessary to permit informed judgments at each decision point. However, integration of the technical work into decision-making has proven to be challenging. While the basic premises and structure of the process have remained unchanged, the quality and efficiency of many aspects of the procedures have improved as experience has accumulated.

An earlier phase of this project, as reported in NCTRP Report 4, "Improving Decision-Making for Major Urban Transit Investments," contributed to

this evolving process. This follow-on project (36-1(2)) was aimed at evaluating the state of the art of current standard planning practice, leading to further recommendations for improvements with particular emphasis on the alternatives analysis program. A series of tasks was designed, beginning with a workshop to critique the then-current UMTA alternatives analysis document, "Procedures and Technical Methods for Transit Project Planning" (review draft of February, 1986).^{*} This was followed by a survey of transit agencies and officials. Interviews were conducted with alternatives analysis managers and practitioners from across the country. While the number of persons interviewed was limited, they were collectively responsible for managing and conducting the majority of recent alternatives analysis. They were interviewed with regard to their views on the three areas identified

* The February 1986 review draft report was revised to reflect the comments UMTA received at the workshop, and a revised draft was reissued in September 1986. The September 1986 draft was widely disseminated and used as UMTA's guidance on alternatives analysis procedures and techniques. UMTA issued several revised chapters during 1989.

Work Flow Diagram For Typical Alternatives Analysis

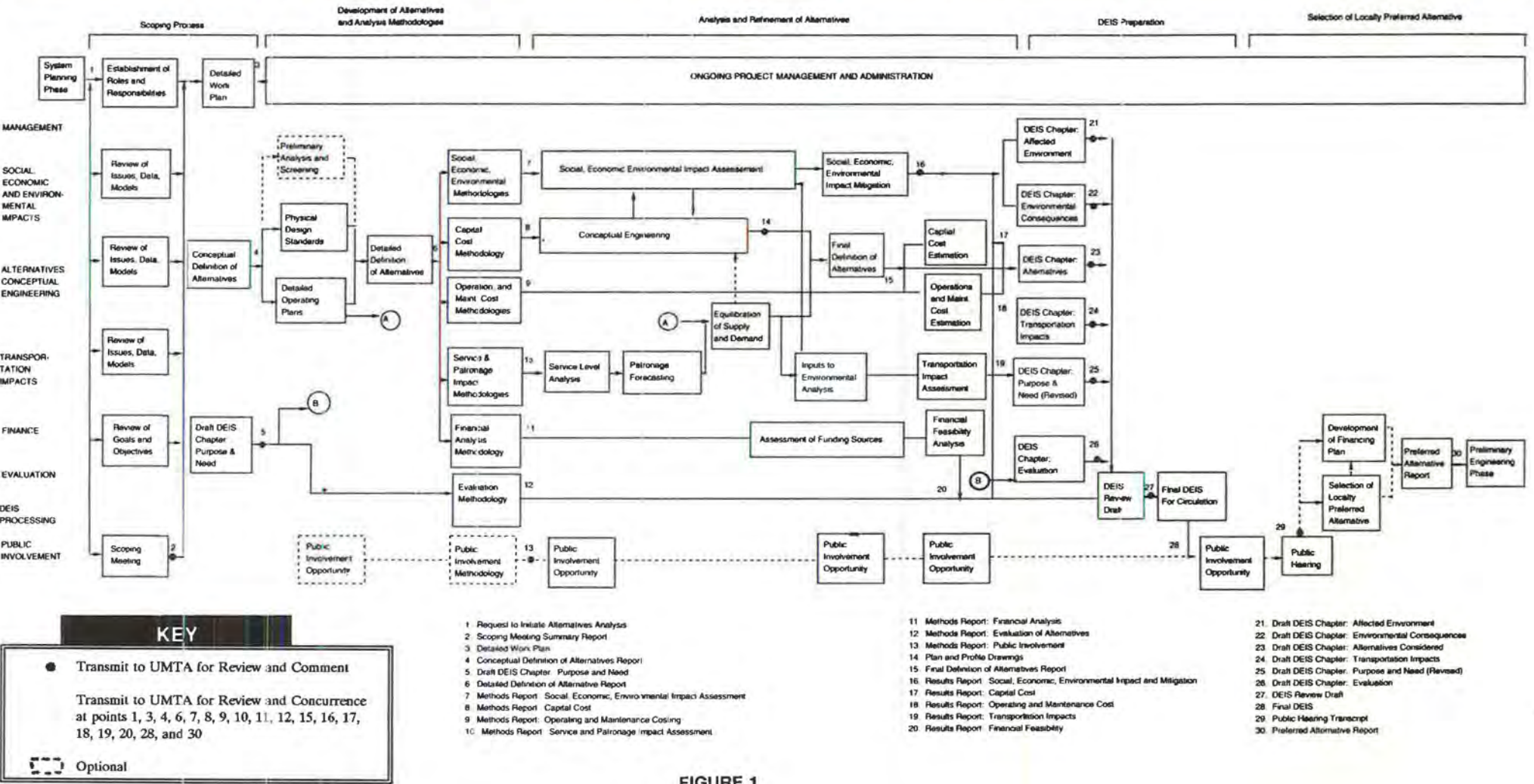


FIGURE 1

at the workshop (cost-effectiveness evaluations, the TSM alternative, and UMTA/FHWA coordination) and any other suggestions they had pertaining to the alternative analysis process.

The final task was to develop recommendations: (1) for UMTA on changes to the guidance document and to UMTA's management of the alternatives analysis process, and (2) for transit and other local agencies to assist them in programming appropriate technical work levels and otherwise improving the quality of alternatives analysis studies.

Because the final report from the project will not be published in the formal series, this digest summarizes the findings with respect to the alternatives analysis process and details the recommendations offered with regard to UMTA's guidance on the alternatives analysis process and local planning practice. Conclusions drawn from the activities of this research together with a definition of those areas warranting further study are also presented.

FINDINGS

Alternatives Analysis Process

The panel workshop, held at the beginning of the project and focused on the February 1986 draft guidance, led to the identification of three basic areas to be addressed in interviews with alternatives analysis experts as well as to priorities for analysis and research. The three areas were cost-effectiveness evaluations, the TSM alternative, and UMTA-FHWA coordination. The findings below are grouped by these subjects.

Cost-Effectiveness Evaluations. UMTA's guidance for cost effectiveness details the methodology for addressing UMTA's May 1984 Major Capital Investment Policy. In particular, the guidance emphasized the use of two ratios: an index of total cost effectiveness and an index of federal cost effectiveness. Each ratio of costs to benefits uses ridership changes as the benefit measure. The total cost-effectiveness index includes all costs and the Federal index uses only those capital costs borne by the Federal Government. Travel time savings are considered in the formula as an offset to costs.

Each index is an incremental index of an alternative's costs and ridership changes compared to the base case defined as the Transportation System Management (or TSM) alternative, which is

intended to be the best that can be done with low cost changes. The cost-effectiveness indices are used to compare alternatives within a given corridor to determine whether projects meet UMTA's threshold criteria for further planning or investment, and to help in national priority setting.

In general, the guidance has had a significant positive effect in terms of how the cost-effectiveness and financial feasibility analyses are conducted.

Most of those persons interviewed had confidence in the estimates of costs, ridership, and benefits that have been recently produced. Perhaps not surprisingly, most of the negative comments were made about older studies. More preliminary engineering is now being done within the framework of alternatives analysis studies, resulting in more detailed and better cost estimates. Equally important, UMTA staff have been very critical of irresponsible past work, and have been insisting on entering into agreements that limit the Federal commitment to cost estimates developed in these studies.

In some studies, respondents believed that no set of evaluation guidelines would have any significant effect on the local decision-making process. Decisions are inherently political, and minds are often made up long before the evaluation results are available. Even in these cases, however, those interviewed usually acknowledged that there was a chance that study results would influence decisions.

Most respondents understood the cost-effectiveness approach in UMTA's guidance and the 1984 Major Capital Investment Policy and many agreed with the approach. The greatest amount of disagreement was with the use of the TSM alternative as the baseline for the evaluation of other alternatives. Several people also had difficulty with what they considered to be a focus on benefits related to ridership improvements and lack of attention to other potential benefits such as relief of congestion, quality of life impacts, air quality, service to the poor and disadvantaged, joint development opportunities, or economic development objectives. While UMTA's view has been that ridership impacts are a proxy measure for many of these impacts, several respondents desired that explicit attention be given to these other benefits. Some respondents preferred an alternative approach based on more traditional economic investment criteria, such as benefit-cost analysis.

Disagreement over using the TSM alternative as the baseline may reflect the way earlier guidelines were applied. Several respondents did not think it was necessary to insist on having a single required baseline so long as the incremental costs and benefits of each alternative are presented, including the TSM alternative.

Several respondents objected to the use of the Federal cost effectiveness index, which considers only the portion of capital cost to be met with Federal funds. They felt that the Federal index was unfair to cities with lower levels of resources.

UMTA has been providing support in recent studies for an adequate amount of preliminary engineering work during the alternatives analysis (AA) phase. The guidance received some compliments in this area. All would probably agree that the appropriate level of preliminary engineering work to include in AA studies is the amount necessary to obtain sufficiently accurate cost estimates on which to base decisions on the choice of the preferred alternative.

Unfortunately, the budgets for many studies are developed without sufficient involvement of experienced engineers who can judge the amount of engineering work required under the various situations. This is particularly true for new starts, unlike extension studies, because the agencies involved do not usually have the necessary engineering expertise. Regardless of how well initial budgets may be formulated, however, there are always special problems that arise -- often engineering or environmental problems that could not have been anticipated.

The TSM Alternative. The development of a TSM alternative is intended by UMTA to serve two purposes. First, the TSM alternative is intended to assure that low-cost solutions are not overlooked. Second, the TSM alternative is intended to provide the common baseline for the cost-effectiveness evaluation, isolating the costs and benefits of the guideway and assuring comparability among cities competing for Federal discretionary funds.

UMTA requires that one or more TSM alternatives be included in each AA. The TSM alternative is meant to represent the best that can be done to improve transit without investing in a new fixed guideway. TSM alternatives typically include such actions as expanded bus service, high occupancy vehicle lanes that do not require major new construction, park-and-ride lots, and traffic engineering measures. Other strategies often as-

sociated with the transportation system management concept, demand management strategies in particular, normally are not included in the TSM alternative.

The experiences which the practitioners have had generally indicate that they were able to define a TSM alternative that had merit. In many cities, some aspects of the TSM alternatives have since been implemented or are likely to be implemented in the near future.

Some staff also felt that the identification of TSM actions as alternatives to major capital investments might actually decrease the likelihood that these actions would be embraced, if they were perceived to jeopardize an area's chances to receive substantial UMTA capital funding. Some said that continuing TSM planning and continuing planning for major capital improvements should be viewed as complementary rather than competitive activities.

Some said that, in the past, local agencies have been pressured into analyzing TSM actions that have no chance of being implemented. TSM is generally regarded as not having any political constituency. In contrast, the very existence of alternatives analysis in the cities was indicative that a political constituency did exist for some major capital investment.

Many respondents said that the TSM alternative would have been taken more seriously in past studies if the guidance had been available. Others commented that the TSM requirement was not matched by similar requirements in highway programs.

Many practitioners believed that the intent which UMTA is pursuing by treating the TSM alternative as the baseline is laudable, but that it will never be practical to enforce a "level playing field" on different cities. Some who believed they had done a diligent job of defining a TSM alternative did not believe other cities had done so, and thought that their diligence would work to their disadvantage.

A common view was that it is nearly impossible to have lay persons or public officials understand the use of the TSM alternative as a baseline, and that confusion could result from an attempt to explain evaluation results based on the TSM option as a baseline.

Most respondents said that the "do nothing" alternative should be used as the baseline for local evaluation. One opponent of the TSM baseline cited the fact that FHWA wants the do-nothing

condition as the baseline, as does UMTA for the environmental assessment. In addition to the few who supported the TSM baseline, some respondents suggested that both bases should be presented.

The survey showed that practitioners were almost unanimous in agreeing that TSM alternatives found to be both feasible and successful in cities of comparable size should be a necessary part of the planning process. Yet almost everyone had some reservations. Most agreed that UMTA should urge agencies to consider seriously any TSM action that has proven successful under similar circumstances, but that the decision on actual incorporation of the TSM action as an alternative should be a local one.

Others argued that consistency is almost impossible because it is so easy to manipulate TSM definitions and influence the outcome of the evaluation process when TSM is used as the baseline. Some noted that larger cities with more experience are apt to be astute at manipulating TSM alternatives in order to improve the cost-effectiveness ratings of preferred alternatives.

Most practitioners supported the idea of a checklist for use by UMTA and local agencies as a means of achieving consistency. Again, the only disagreement came from those who believed the achievement of consistency is not possible to any meaningful extent.

UMTA-FHWA Coordination. Interviews with staff in 12 metropolitan areas, many of whom had experience in several cities, showed that most areas have had no recent significant issues related to UMTA-FHWA coordination. However, where such issues do arise they are particularly vexing.

The likelihood of coordination issues is high where the preferred alternative may be partially funded by UMTA and partially funded by FHWA, as is likely with corridor improvements involving HOV facilities or both highway and rail facilities in one right-of-way. If the UMTA and FHWA elements proceed, each at its own pace, with the required procedures, the timing of major decision-points will not coincide and ultimate implementation of an integrated program may be difficult.

The two agencies frequently differ in their work program requirements, particularly in their application of the National Environmental Policy Act, the choice of horizon years, and the point in the process where decisions on mode are made. For example, in contrast to FHWA, UMTA requires much more detail on several alternatives for

a draft environmental impact statement (EIS). A draft EIS for FHWA might not, for example, discuss alternative modes.

Other Issues. Several respondents described efforts they or agencies in their area were making to involve the private sector. The general thrust of UMTA's initiative in this area was being well received; however, people expressed both confusion and concern about UMTA's policy and intentions. Concerns were expressed that the general policy initiative could easily result in politically based decisions undercutting the entire alternative analysis process.

Some respondents also were concerned that achieving financial participation by private developers or other firms in major capital projects is jeopardized by the different time-frames in which private enterprise and public transit agencies make decisions. Major transit capital investments take a long time to move to the implementation phase. On the other hand, private developers must move very quickly when they have their initial investments made.

Concerns were expressed about statements suggesting that a simpler study process would be allowed if local agencies provided a significant "overmatch." This policy would tend to discriminate against older, slower growing, and economically depressed areas that do not have the resources required to overmatch.

Many respondents felt that the guidance gave insufficient attention to the importance of integrating transit and land use planning and decision-making, in that not including these concerns in the indices for cost-effectiveness biases the decision against rail investments.

Several respondents stressed the need for attention to financial feasibility throughout the alternatives analysis process rather than just at the end, which is what the current process implies. UMTA was criticized for placing too little emphasis in the guidance on equity analysis and for being unable to cite good examples of such work.

Almost all of those interviewed complained about the number of interim reports that must be prepared. The sheer volume of these reports is a major factor in the difficulty cited about obtaining timely responses from UMTA reviews.

Several respondents emphasized the need for the guidance to be interpreted in a flexible manner by both local staff and UMTA. Experience is quite mixed around the country. Some UMTA representatives have reportedly tended to treat the gui-

dance as legally binding requirements, despite stated intentions. Some consultants and local staff were reportedly making the same rigid interpretations. Yet, some practitioners complimented UMTA staff on their flexibility in interpreting the guidance when a good case was made. One person advised planners to make their case for simplifying studies and eliminating options or "required" study elements. Others with contrary experience advised that the guidance be made much more specific on limiting the amount of analysis appropriate to various situations.

Recent experience showed UMTA headquarters staff assigned to AA studies were spread too thin to keep close contact with the various studies, another factor leading to extended review times. While current UMTA staff were frequently praised for their technical competence, particularly as transit planners, staff engineering and operational experience were lacking.

Some of the more experienced persons interviewed said that the entire AA process was being discredited by the way grants were being earmarked for cities by Congress. Some persons commented that the process was now seen as just a bureaucratic hurdle in the grant application process. As a result, local officials are convinced that lobbying is the only route to grant approvals. If the congressional earmarking process continues, the guidance objectives will be increasingly difficult to achieve. An increasing proportion of professionals will soon lose respect for the process unless a way is found to break out of the current impasse.

Recommended Revisions to the Alternatives Analysis Process

UMTA's September 1986 draft guidance on, "Procedures and Technical Methods for Transit Project Planning," has been well received by professionals in the field and is seen as a useful reference document advancing the state of practice. Although criticisms have been expressed, the document was considered to be a generally accurate reflection of current good practice. The guidance also reflects substantial improvement toward an accepted definition of the roles of local and Federal agencies in the decision-making process under UMTA's grant program.

However, several changes are recommended, many of which are judged to be important to the decision making process at both the local and Federal levels; but, none of which involve fundamental changes in policy or procedures.

There is no need to deviate from the general approach to evaluation recommended in the 1984 Policy and the supporting guidance; however, local agencies should be encouraged to conduct more rigorous analyses and to experiment with innovative ways to advance the state of current practice. Innovative approaches might include different ways of communicating evaluation results and incorporating evaluation throughout the AA process.

Additional stress should be placed on public involvement in the evaluation process. In order to achieve this, the evaluation process should begin as early in the AA process as feasible, and evaluation formats should be kept as simple as possible to facilitate effective involvement. The guidance should stress the fact that it requires sustained effort over the course of the project to develop understanding of the alternatives, the criteria, and the evaluation process.

The AA process should be revised to emphasize the need for long range planning. Long range benefits should be included because they are important considerations in major transit investments. Land use and related forecasts should be developed in an integrated fashion with plans for transit alternatives, rather than merely taken from forecasts compiled by regional agencies. To address UMTA's concern about the speculative nature of longer range benefits, however, serious consideration should be given to the discounting of all future benefits and costs.

The financial feasibility evaluations should include initial assessments early in the process so that all alternatives are screened as to the region's potential ability to afford them with available and reasonably foreseeable resources. However, the guidance should be clear that state and local governments are not expected to take official positions prior to the completion of the evaluation process and the selection of a preferred alternative, at which time local decisions on funding plans are in order.

The material on equity analysis should be elaborated to provide additional guidance. UMTA staff should be able to make significant improvements in the current draft, drawing on what is readily available from previous studies and research.

It is recommended that the guidance on alternatives analysis be revised to place somewhat more emphasis on nonridership benefits, such as relief of congestion, increased mobility, impacts on air quality, service to the poor and disadvantaged, joint development opportunities, and economic

development objectives. An evaluation should be made of the relative levels of service provided to the poor and transportation disadvantaged by the alternatives. This is widely recognized as a principal rationale for subsidizing transit. Although ridership may in many cases be a proxy, it is for these other purposes that transit investments are being promoted, and, therefore, explicit attention to whether an investment is serving these purposes is useful for decision-making.

The composite index or average cost-effectiveness measure is not as useful as the more specific incremental cost-effectiveness measures, and, therefore, it is recommended that UMTA should not rely on it.

Information on cost-effectiveness should be prepared using both the TSM baseline and the "do nothing" baseline and should be considered in both Federal and local decision-making. This will make the issue of using the TSM alternative as the baseline much less controversial. A checklist should be prepared of the types of TSM actions to consider, along with guidance on the conditions under which each item is likely to be successful. The inclusion of bus expansion programs as part of a TSM alternative may be appropriate in many corridors, but should be realistic in magnitude.

The AA guidance should caution against allowing public involvement to detract from the responsibility for conservative design of transit systems. The guidance should stress the importance of frugality in system design, show how to achieve it, and define the skills required.

UMTA and FHWA should conduct a review of the coordination problems that have occurred. Based on this review, the guidance should be revised to specify how the U.S. DOT will administer such projects in the future to assure that the problems will no longer occur.

The guidance should illustrate how to consider private service provision and private financing in the alternatives analysis. UMTA should attempt to provide a means for entering into early agreement with developers that provides for fast tracking of the process and a firm commitment for Federal funding at the earliest possible date.

"Overmatch" should not be used as a criterion in evaluating competing grant applications and UMTA should revise its policies to make it clear that competing projects will be evaluated solely on the basis of the technical evaluation criteria.

UMTA should relieve those with demonstrated competence from having to submit methodology reports for each corridor. UMTA could, of course,

withhold approval for those whose predictions had proven inaccurate.

UMTA should also generally review the interim report requirements in an attempt to reduce the burden on local agencies as well as the burden of review on UMTA staff. UMTA should also attempt to add advice in the AA process on how to keep the level of effort to the minimum required, as appropriate to various conditions. Examples should be cited from past studies as to when particular study elements or alternatives could be eliminated.

Recommendations for Local Planning Practice

The practice of alternatives analysis, or transit capital planning and decision-making in general, has made great strides in terms of quality over the last two decades since Federal funds became available for transit capital improvements. The skills are, however, not very widespread. There is a small and easily identifiable number of practitioners for any aspect of transit alternatives analysis.

Local planning practice can be further improved, both through UMTA and through borrowing successful practices from other areas. Seminars sponsored by UMTA for alternatives analysis practitioners should be continued and should be regularly scheduled each year. Such seminars can be very productive forums for exchanging information as well as opportunities to explore new approaches to performing the analyses in an efficient and comprehensive manner. Local or state officials can take the lead in inviting UMTA to organize seminars in their regions at convenient times. Consultants should be invited to participate or to assist in their organization, in view of the broad national experience that many have.

One area of local practice for which many staffs had practical suggestions is the area of presenting evaluation results. Although the presentation of indices as part of the evaluation is prescribed as the Federal level, there is a great deal of latitude in presenting the results for the purpose of local decision-making. Several approaches may have merit:

- First, evaluation can be used throughout the planning process as a way of informing those involved in making interim decisions on the development of alternatives and the prediction of the most important impacts.

- Second, evaluation reports can illustrate the major issues of choice both at interim and final planning stages. They should show the advantages and disadvantages of each alternative from an overall perspective as well as from the perspective of major interest groups.
- Third, a level of detail of evaluation material should be available to each agency or group, consistent with its needs for reviews or decisions.

In planning all work programs for alternative analysis studies, local and state officials should insist on firm deadlines for receiving UMTA staff comments on interim reports, and should put these deadlines in the work programs.

In planning work programs for alternative analysis projects that may potentially involve joint funding, local and state officials should make special efforts to avoid conflicts between requirements of UMTA and FHWA. Commitments should be sought in writing from the U.S. DOT regarding the handling of reviews and other items that have been troublesome in past studies.

Those preparing alternative analysis work programs and methodologies should seek to avoid unnecessary study elements and alternatives by performing simple reviews and "back of the envelope" analyses that will provide good rationales for study simplification to UMTA and other interested participants. This can often save much time and study funds, and help to concentrate available resources on more critical issues and alternatives.

Engineers with experience in major transit studies should be brought into the process of preparing technical work programs to assure that sufficient study resources are devoted to items that may be critical in affecting costs. Particular attention should be devoted to the possible need for soil borings or special studies that may be needed in underground sections or in areas where complex structures or very tight dimensions may be involved.

Finally, budgets for alternative analysis studies should provide a contingency fund for resolution of unforeseen problems by technical staff or consultants. Perhaps 20 percent should be set aside initially, and 10 percent reserved for technical support at the end of the study schedule when conflict resolution efforts are almost always needed. Management of these contingency funds should be very conservative, recognizing that critical pro-

blems are often not identified until the scheduled evaluation process is complete and decision-makers are confronted with the real trade-offs among the alternatives and the difficult choices involved in making funding commitments. An aggressive continuing participatory process can often bring out these critical issues early in the study, but cannot be counted on to do so.

CONCLUSIONS AND SUGGESTED RESEARCH

On the positive side, in addition to the major achievement of the draft guidance, UMTA staff have continued to improve their own technical capabilities and the state of current practice in the field as a whole. More experience has been gained by people in the field and this has been widely shared through movement of staff and consultants among cities, through distribution of reports, and through seminars organized by UMTA in cooperation with practitioners.

On the negative side, cynicism is growing because of an increased political nature of decision-making at the expense of the rational, technically based planning process that UMTA staff have tried to achieve. This cynicism is fed by congressional earmarking of capital grants.

UMTA should make a renewed commitment to the AA process, recognizing that the credibility of the entire program is being threatened by events, and that UMTA's commitment to participate constructively is a crucial factor. To achieve this objective, UMTA will probably have to increase the level of effort devoted to the program, both in terms of existing staff assignments, new staff, training of field office staff (including FHWA staff), and research effort. In particular, additional UMTA staff expertise is needed in engineering. Thus, it is recommended that UMTA continue to organize the training seminars for local staffs on a regular basis each year.

The research panel for NCTRP Project 36-1(2) defined five critical topics pertaining to the guidance, and prepared work statements for each of those topics. The panel concluded that further study was warranted for these five topics:

1. Assessment of cost estimation experience.
2. Transit ridership forecasting.
3. Using the "do nothing" alternative as the baseline.
4. Definition of the TSM alternative.

5. Development of unit capital costs for alternatives analysis.

Topic 1, the Assessment of Cost Estimation Experience, should include case studies of how estimates were prepared "on target" as well as case studies where cost estimates did not prove to be consistent with actual costs incurred. The purpose should be to attempt to determine the specific contribution of particular technical inputs and procedures, as distinct from changes in design or requirements, to the eventual errors in costs. The product should be conclusions and recommendations as to how to avoid all the pitfalls in future alternatives analysis projects.

Topic 2, Transit Ridership Forecasting, could include studies of all implemented projects and of the estimates prepared at every stage. A common occurrence is that ridership estimates get scaled down substantially just prior to opening a line. Then, ridership is said to "exceed" forecasts, although the ridership numbers accompanying the alternative analysis or capital grant request may have been well above what was achieved.

The project should attempt to separate the relative contributions of different sources of errors, including such factors as:

- Forecasts of population, employment, and related regional growth indicators.
- Forecasts of CBD development and/or corridor development patterns.
- Peaking characteristics, including midday peaks and day or the week patterns.
- Average trip lengths.
- Transfers.
- Access mode.
- Model structure.
- Model parameters.
- Parking prices and transit fees.

Topic 3, Using the "Do Nothing" Alternative as the Baseline, was evaluated informally by UMTA staff as a result of the panel's suggestions. A comprehensive analysis across all cases could illustrate how the use of the TSM alternative as a baseline affects all indices examined for either Federal or local evaluation.

Topic 4, the Definition of the TSM Alternative, should involve the development of specific guidance on how TSM actions can be taken in a manner that is complementary with other transit plans and proposals, as well as toward guidelines that UMTA can use in helping local agencies

develop TSM alternatives that are reasonably consistent across all cities when used as a baseline alternative for comparing major capital investments. A checklist, with an appropriate explanation of how to use it, should be one product of the research.

Topic 5, Development of Unit Capital Costs for Alternatives Analysis, could logically be combined with the research suggested by the panel on Topic 1, Assessment of Cost Estimation Experience. One product of this project should be a set of standard unit cost categories for transit cost estimation. This would provide a basis for UMTA to compile continuing data on actual cost experience, in a manner similar to what FHWA does for highway costs.

In addition to the critical topic areas identified by the panel, and those identified in Project 36-1, contributions should be made to enhance the guidelines in four other areas: (1) private enterprise involvement in the process, (2) UMTA-FHWA coordination, (3) land use impact assessment, and (4) equity assessment

The first of these topics should seek to determine how best to involve private enterprise in alternatives analysis, so that full consideration will be given to the cost and other impacts of private involvement in the alternatives being evaluated. This should include a synthesis of recent practice and case studies of successful examples of joint development projects.

The second topic involves research that will help to assure early identification of likely issues involving UMTA-FHWA coordination. The objective should be to develop means through which the staffs of UMTA and FHWA can assure that coordination takes place so that unnecessary problems are not created for state and local agencies. This research should be based on case studies of successful and unsuccessful examples of projects that involved potential joint funding of transit highways or HOV facilities.

Research should also be sponsored on land use impact assessment to provide additional guidance material on such subjects as (a) accommodating factors considered by private developers more effectively in the evaluation process, (b) identifying opportunities for joint development and achievement of land use objectives, (c) projecting land use impacts and associated transit ridership increases due to major transit improvements, and (d) evaluating options regarding the timing of transit development and the preservation of rights of way for future transit corridors or extensions.

further guidance for equity assessments. This research will involve the development of relatively new methods because of the apparent lack of good examples from past alternatives analysis studies.

APPLICATIONS

Research completed under this project has achieved its twin objectives of recommending changes to the UMTA guidance and providing assistance to local agencies that implement them. The detailed findings in the study report have been forwarded to the program sponsor of the Urban Mass Transportation Administration for consideration in the continuing evolution of guidance for

alternatives analysis. Similarly, an elaboration of research needs has been provided in the form of work statements encompassing the problem descriptions, research objectives and suggested ways for accomplishing the research.

Those interested in the alternatives analysis process from the local agency viewpoint who desire more information on the research conducted in this project than is presented in this digest may obtain loan copies of the draft final report. Requests should be directed to:

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