be combined with any other actions because they do not interact), complementary (those that can be grouped with other actions in a positive way), or conflicting (those that involve a choice between competing projects). The process of system rationalization would involve the identification of actions by type and the subsequent packaging of actions into a logical system.

Adoption of Plan

The final phase of the process would be adoption of the plan and movement toward implementation. Actions recommended in the planning process should be included in the transportation improvement program.

SUMMARY AND CONCLUSIONS

The revised urban transportation planning process proposed in this paper is intended to better consider and interrelate existing, short-range, middle-range, and long-range transportation needs. In addition, the process is intended to be more unbiased and comprehensive than the conventional planning process because it would consider both systems management and facility improvements as alternatives to short- and long-range problems. Because the facility alternatives considered in the short-range planning process will be those that have been recommended in the long-range plan, an explicit link between short- and long-range planning will be established. It is hoped that this link will allow short-range plan recommendations to provide the sole coordinated planning input into the transportation improvement program. The drawback to this approach is that certain facilities that are necessary to meet long-range needs will not be advanced for implementation until they are also the most appropriate alternative for short-range needs.

This revised transportation planning process has been proposed and is now being considered for implementation in southeastern Wisconsin. It has been partially implemented in that a number of studies have been initiated to examine specific transportation problems and the first annual update of the TSM plan for the region has been completed. Among the studies under way is a subarea study that focuses on alternative TSM actions and facility improvements that can be made in an area where long-planned freeways have been removed from the long-range plan. Another study will examine the benefits and costs of freeway operational control in the Milwaukee area in response to freeway congestion. An effort is also under way to coordinate and promote studies of facility improvements at the "stub ends" of all uncompleted freeways in Milwaukee County. The purpose of these proposed stub-end improvements is to provide better freeway connections to surface arterials, better utilization of existing freeway facilities, and a reduction in congestion and other negative impacts in neighborhoods adjacent to the stub ends of freeways. In addition to these studies, others are now being conducted that point toward improvement in taxicab and transit service in the Milwaukee area and better operation of streets and highways through analysis of major arterial corridors.

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Long-Range Transportation Planning in Southeastern Wisconsin

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The evolution of long-range transportation system planning at one planning agency, the Southeastern Wisconsin Regional Planning Commission (SEWRPC), is examined. Some conclusions about the continued role of long-range planning are drawn, and some directions for further evolution of such planning are suggested. After a brief historical review of longrange transportation system planning at SEWRPC, five recent criticisms of the planning process in southeastern Wisconsin and elsewhere are identified: (a) the need for short-range emphasis; (b) an inability to deal with uncertainty; (c) disregard of fiscal constraints; (d) excessive orientation toward facilities; and (e) neglect of local plan impacts. The eight fundamental principles of transportation planning used by SEWRPC are reviewed in light of these criticisms. Although they are found to be basically sound, they are shown to require expansion to (a) include a provision for subregional planning, (b) deal with uncertainty and explain the approach taken by SEWRPC and a possible method that is under development, (c) alter the planning process to consider all alternatives including system operation and management initiatives, and (d) develop an integrated transportation planning process that effectively brings together long-range and short-range transportation system planning and programming.

In the three or more years since the publication of the joint regulations on transportation improvement programming (TIP) and transportation system management (TSM) planning (1), probably no single conceptual issue has, or perhaps should have, occupied the attention of the transportation planning profession as has the proper continuing role (if any) of long-range transportation system planning. Yet, as metropolitan planning organizations (MPOs) across the country attempt to work out their individual responses to this issue, one thing is clear: The development of the role of long-range planning is and will continue to be an evolutionary, not revolutionary, process. The purpose of this paper is to examine this process from the perspective of a single regional planning agency—the Southeastern Wisconsin Regional Planning Commission (SEWRPC)—to draw some conclusions about the continued role of long-range transportation system planning, and to suggest some possible directions for the further evolution of long-range transportation system planning.

TRANSPORTATION PLANNING AT SEWRPC

SEWRPC was created in 1960 as a voluntary advisory body to assist in cooperative planning for the orderly development of a seven-county region in southeastern Wisconsin that includes the Kenosha, Milwaukee, and Racine urbanized areas. The first major work program of the commission directed toward the preparation of a framework of advisory plans for the physical development of the region was a study of regional land use and transportation. In December 1966, SEWRPC adopted a regional land-use plan and a regional transportation (highway and transit) plan. The regional transportation plan, which had a design year of 1990, recommended construction of an extensive freeway system and implementation of a modified rapid transit system in which motor buses would operate in mixed traffic on freeways and, in corridors where it was warranted by freeway congestion, on exclusive bus transit ways.

In the late 1960s and early 1970s, SEWRPC devoted its attention to refinement and implementation of the plan. It worked with the state government and local governments to develop detailed functional and jurisdictional highway plans for each county in the region, prepared or assisted in the preparation of transit development programs for each of the three urbanized areas, and helped to develop a detailed plan for the modified rapid transit system in Milwaukee, all within the framework provided by the adopted transportation system plan.

Meanwhile, a number of significant developments occurred in the region on other fronts. Every freeway and major parkway recommended in the 1966 regional transportation plan was put into the preliminary engineering phase, at least to the extent of locating centerlines and preparing large-scale preliminary plans. Thus, projects were no longer lines on a map. Major segments of the regional freeway system, on which construction had begun in the late 1950s and early 1960s, were completed and opened to traffic, and right-of-way acquisition and final engineering proceeded for other major segments. But substantial opposition arose to the completion of all major uncompleted freeway segments in Milwaukee County, and this resulted in public protests and lawsuits against individual freeway projects. Eventually, some local and state legislators were elected who were opposed to further freeway construction and, ultimately, a countywide antifreeway movement emerged that brought virtually all freeway construction and right-of-way acquisition in the county to a halt.

Thus, in the mid-1970s, as SEWRPC proceeded to develop and evaluate alternative plans as part of the first major review, reevaluation, and revision of the regional land-use and transportation plans, it found itself caught in the middle of a great public controversy. On one side stood the freeway proponents, including business and labor, and on the other the freeway opponents, including most neighborhood groups.

OBJECTIONS TO THE LONG-RANGE PLANNING PROCESS

The importance of this controversy is that, in question-

ing the substance of the long-range planning work of SEWRPC, freeway opponents also attacked the validity of the long-range planning process. The arguments used, many of which were also used across the country in both similar and different contexts, include five major points:

1. The need for short-range emphasis—It was agreed that cities are currently confronted with innumerable problems, in transportation and other areas, that call for immediate solutions. Elected officials and the general public are principally interested in the short range. Federal regulations on TIP and TSM seem to reinforce this need for a short-range emphasis. Given this shortrange emphasis, what is the utility of long-range transportation system planning?

2. The inability to deal with uncertainty—Long-range plans have to be based on long-range forecasts of important regional characteristics, such as population size and distribution, economic activity size and distribution, and land use, and on assumptions of other critical factors of the future environment, such as the state of the art of technology, the price and availability of energy, the nature of regulatory constraints, and general social attitudes and behavior. Given the great uncertainty in these forecasts and assumptions—an uncertainty that was brought to public attention by the generally unanticipated major changes in population growth and the energy situation in the late 1960s and early 1970s—what is the validity of long-range transportation system planning?

3. Disregard of fiscal constraints—In many cities, there is an immediate and apparently a long-term chronic shortage of available funds for basic urban services, including transportation. People contend that long-range transportation system plans are not sufficiently sensitive to this problem.

4. Excessive orientation to facilities—It was perceived that long-range transportation system plans emphasized the construction of facilities as a solution to transportation problems and did not give sufficient consideration to potentially useful initiatives in system management and operation. This view was reinforced by the TIP and TSM regulations.

5. Neglect of local plan impacts—Long-range transportation system plans prepared at the regional level could not deal in great detail with impacts of plan recommendations at the community and neighborhood levels. Many people considered this to be a fatal flaw in the long-range planning process.

PRINCIPLES OF TRANSPORTATION PLANNING

In 1965, Bauer (2) identified eight fundamental principles of transportation planning that were used by SEWRPC in the preparation of its initial land-use and transportation plans:

 Transportation planning must be areawide or regional in scope.

2. Transportation planning must be conducted concurrently with, and cannot be separated from, land-use planning.

3. Not only must transportation planning be conducted concurrently with land-use planning but also transportation system plans must be based on long-range areawide land-use plans.

4. Highway and transit systems must be planned together.

5. Transportation facilities must be planned as an integrated system.

6. Both land-use and transportation plans must recognize the existence of a limited base of natural resources. 7. The land-use and transportation planning process must be based on community development objectives.

8. The land-use and transportation planning process must scale plans against the financial resources of the community and against the legal authority available for plan implementation.

During the past three years, confronted with the criticisms of its long-range transportation planning process, SEWRPC has undertaken the reevaluation of its longrange transportation system plans and its initial transportation system management plan and preparation of a transportation planning work program for the late 1970s and early 1980s. Through these efforts, SEWRPC was able to reexamine the validity of Bauer's eight benchmark principles. Most were confirmed to be valid. Some required elaboration or amplification in light of changing values. But their basic soundness was substantiated. They now stand as guideposts for SEWRPC in the continuing evolution of its transportation planning process, and as such they may be valuable to other planning agencies that are struggling with the same or similar problems.

REEXAMINATION OF THE PRINCIPLES OF LONG-RANGE PLANNING

The first conclusion reached by SEWRPC in its reexamination of the validity of the principles of long-range planning was that long-range planning itself was, is, and increasingly will be a valuable and useful process. It was recognized that many of the impacts of long-range plan recommendations that led some people to criticize both the plans and the process that produced them, such as the dislocation caused by urban freeway construction, were in fact not the product of long-range planning but the direct result of a lack of long-range planning earlier in the region's history. It is clear that decisions on the disposition of nonrenewable natural resources-the most important of which is land-and on the overall development pattern of an urban area can only be made in a long-term context. Similarly, commitments to implementation of new fixed-facility systems or major expansions of existing systems can also only be made through a long-range plan. Finally, implementation of difficult major changes in societal attitudes, such as use of the automobile, use of transit, and ride sharing, need to be at least addressed on a long-range basis. Although long-range planning has historically been an early and attractive target for budget cutters during times of apparent scarcity or retrenchment, it is at such times that long-range planning is of most value if for no other reason than that long-range planning identifies those options that are left open and those that are foreclosed by specific courses of action. Highly desirable alternatives have been thoughtlessly foreclosed in the past without such planning, an unfortunate occurrence that would undoubtedly happen again. SEWRPC and its staff was convinced, therefore, of the continuing and ever-growing importance and validity of long-range planning as they reconsidered the eight planning principles.

Scope of Transportation Planning

SEWRPC had always conceived of planning as a cyclic process. Under this concept, it is recognized that it is quite difficult at the system planning level to identify and consider all of the costs and other effects of implementing a proposed transportation facility or service. Thus, although the first iteration of system planning does the best possible job of identifying and considering the costs and other impacts of system alternatives, it has always to and acceptance of proposed projects. If plan elements that were judged to be desirable at the system level were found to be unacceptable at the project level, this would be carefully considered in the next cycle of system planning and alternatives to the objectionable plan elements would be sought. However, although in theory the cyclic notion of planning functions to reconcile regional plans and subregional impacts, in practice the project development process has become so lengthy (because of so-called "action plans" and environmental assessment processes, among other things) that the cyclic notion of planning, although still valid, has not resulted in the timely feedback of project-level data to the regional level.

Wachs and others (3), Hansen and Lockwood (4), and others have identified the need for a less-than-regional component to the transportation planning process. In the conception of SEWRPC, a relatively short but intensive subregional transportation planning process would be pursued in carefully selected portions of the region, at first primarily in those areas where controversy had developed over previous plan recommendations. Thus, a subregional planning process could identify communityand neighborhood-level impacts of plan elements and test the acceptability of alternative proposals.

SEWRPC is currently mounting such a major subregional transportation planning study in an area of northwest Milwaukee County and north-suburban Ozaukee County, an area where controversy over two planned freeway segments led SEWRPC to delete the freeways from the plan in late 1977. The study, which includes a heavy component of public involvement, is being carried out as a highly cooperative effort in which substantial technical staff and resources are being provided by the Wisconsin Department of Transportation, Milwaukee and Ozaukee Counties, the Milwaukee in addition to SEWRPC itself.

The major remaining conceptual hurdle is the problematical task of reconciling regional perspectives, which tend to be long-range, and subregional perspectives, which tend to be more immediate, and arriving at a true system plan that serves the needs of both the subregion and the region and addresses both short- and long-range needs. Hansen and Lockwood (4) and Schulz and others (5) are among those who have suggested that this problem can be solved by cycling so quickly and frequently between the regional and subregional levels that, in effect, regional and subregional planning processes are being pursued simultaneously. If we assume that this approach will be successful, the first of Bauer's basic principles can be expanded: Transportation planning must be areawide or regional in scope, but it must be a cyclic process that considers both region-level and community- and neighborhood-level impacts of plan elements through a series of successive iterations of regional and subregional planning efforts.

Transportation Planning and Land-Use Planning

If anything, the underlying soundness of the notion that transportation planning must be conducted concurrently with, and cannot be separated from, land-use planning has become more accepted over time.

Long-Range Areawide Land-Use Plans as Basis of Transportation System Plans

It is in the principle that transportation system plans

must be based on long-range areawide land-use plans that the problem of uncertainty arises. The idea underlying this principle is that the SEWRPC planning process is partially normative and partially accommodative. It is normative in that it produces land-use and transportation plans that provide direction to the region and, in a sense, represent a future seen as desirable by SEWRPC. It is accommodative in that the plans prescribe a set of actions by which the region can accommodate itself to a future expected by SEWRPC. The normative nature of the process is particularly evident in SEWRPC's historic use of a land-use plan, as opposed to a land-use projection, as a basis on which the transportation plan is constructed. A normative land-use plan is developed that reflects a sound pattern of development and land use based on forecasts of population and economic activity. Transportation plan alternatives are then developed to accommodate the travel demand that is forecast to result from the land-use plan, and the "best" alternative in terms of meeting the demand and satisfying the other transportation plan objectives and standards is chosen. Thus, the transportation plan is designed to be supportive of the desired land-use plan.

Although in practice this approach has been generally successful in the region, it is subject to a number of pitfalls:

1. The selected transportation plan may not be completely or exactly implemented.

2. The supporting public water supply, sewers, parks and open space, housing, and other public utility and service plans, which together with the land-use and transportation plans make up the comprehensive physical development plan for the region and, like the transportation plan, are based on the land-use plan, may not themselves be completely or exactly implemented.

3. The provision of public facilities and services such as highways, transit, and sanitary sewers is not the sole, or in many cases even the primary, determinant of the pattern of urban development. Land-use controls, life-style preference, and the operation of the urban land market represent other important factors.

4. Still other factors, many of which are external to and thus uncontrollable by the region—such as the price and availability of energy, the state of the national economy, the state of the art of technology, and the availability of federal and state financial assistance—affect land-use development and transportation needs. In short, there is considerable uncertainty inherent in land-use and transportation system development.

SEWRPC has developed what it believes is a pragmatic and interesting approach to this problem. In its recently completed reevaluation of the long-range regional transportation system plan (6), SEWRPC used a "two-tier" concept in dealing with controversial freeways in Milwaukee County. Those freeways that SEWRPC judged would not be needed and could not be implemented under most conceivable circumstances by the plan design year 2000 were deleted from the plan. Those freeways that it was judged would be needed in and could be implemented by the year 2000 under most conceivable circumstances were included in the "lower" tier of the plan and recommended for immediate implementation. Those freeways that SEWRPC was uncertain would be needed in or could be implemented by the year 2000 were included in the "upper" tier of the plan, which meant that SEWRPC recommended that no further work be accomplished to construct these freeways for a period of at least 10 years, until the next plan reevaluation, but also that nothing be done during that period to preclude their implementation, such as infilling of cleared freeway corridors or development of undeveloped freeway corridors. Cleared or undeveloped land would be held as recreational open space in a transportation land bank. In the meantime, a variety of TSM-type actions-including, among others, areawide freeway ramp metering with preferential access for high-occupancy vehicles, carpooling and vanpooling, improved transit service, traffic signing and signalization, parking prohibitions, selected arterial improvements, and work-time rescheduling-are recommended in an effort to improve the efficiency of the existing transportation system and to manage and possibly reduce peak travel demands on that system. At the next plan reevaluation, the upper-tier freeways could be moved to the lower tier if the TSM actions are unsuccessful, deleted from the plan if they are successful, or left in the upper tier if uncertainty remains.

Recently, SEWRPC received preliminary approval from the Urban Mass Transportation Administration (UMTA) to extend, refine, and apply the two-tier concept to transit in the Milwaukee urbanized area through an areawide alternatives analysis that incorporates an "alternative futures" planning technique. Alternative futures planning has been discussed in the literature by Pollock (7), the Chicago Area Transportation Study (8), Schulz and others (5), and Bernard (9), among others. In this application, two scenarios would be developed that are intentionally relatively extreme and consist of linked forecasts of regional population and employment and important external environmental factors such as the price and availability of transportation energy, life-style, technology, and the availability of federal, state, and local transportation financing. For each scenario, a centralized land-use plan that represents a normative future with a relatively high degree of success in shaping urban development and a decentralized land-use plan that represents an accommodative future with a relatively low degree of success in shaping development would be prepared. For each of these four alternative futures, the best transit system plan for the region would be determined through a sketch-planning process.

Fixed-guideway plan elements that appear in all or most of the best alternative future transportation plans (if any) would nominally constitute a lower-tier fixedguideway plan subject to an intensive process of system rationalization to ensure a connective, functioning system that is consistent with the guidelines of the alternatives analysis and would be recommended for immediate progress toward implementation, again in a manner consistent with the process of alternatives analysis. Fixedguideway plan elements that appear in at least one of the best alternative future transportation plans (if any) would nominally constitute an upper-tier fixed-guideway plan, again subject to system rationalization. Although uppertier fixed-guideway elements would not be pushed toward implementation, it would be recommended that available or potentially available upper-tier fixed-guideway corridors (rail rights-of-way, portions of cleared freeway rights-of-way, or utility rights-of-way) be preserved for possible future fixed-guideway development, if necessary through acquisition and placement in the transportation land bank. It is the intention of SEWRPC to further pursue, expand, and apply the alternative futures planning process both in transportation and other functional planning areas.

Although researchers like Manheim and others (10) have suggested different methods such as structured contingency analysis for dealing with this uncertainty, the need to confront it is unquestioned. Thus, the third of Bauer's basic principles can be augmented as follows: Not only must transportation planning be conducted with land-use planning, but also transportation system plans must be based on long-range areawide land-use plans. However, the transportation planning process must explicitly recognize and confront the uncertainty in both the implementation of that land-use plan and the underlying planning assumptions about important factors such as energy, technology, financing, and life-style.

Joint Planning of Highway and Transit Systems

The original SEWRPC transportation system plan adopted in 1966 contained four recommendations that would be categorized today as TSM: greatly improved transit service, express-bus use of uncongested freeways in mixed traffic, a reduction in the availability of parking in the Milwaukee central business district (CBD), and prohibition of peak-hour parking in the peak direction on congested arterial streets and highways. The year 2000 plan expands on these initiatives by recommending an areawide freeway ramp-metering system with preferential access for high-occupancy vehicles. The SEWRPC transportation system management plan (<u>11</u>) provides a comprehensive program of TSM actions for the region, and SEWRPC is currently embarked on a major integrated program of TSM implementation and further study.

Thus, the fourth of Bauer's principles can be amplified as follows: Highway and transit systems must be planned together, and all alternatives, including system operation and management and construction of facilities, must be considered.

Planning Transportation Facilities as an Integrated System

The notion that transportation facilities must be planned as an integrated system is unchallenged, but there is a need to expand its scope. Faced with transportation improvement programs, TSM plans, transportation plans for the elderly and the handicapped, long-range plans, alternatives analysis, and other related and unrelated transportation planning work, MPOs are threatened with the possibility that their resources and energies will be spent on a variety of competing tasks, and all to little effect, unless the various elements of programming and long-range and short-range planning can be integrated into a single transportation planning process. In another paper in this Record, Beimborn and others describe the integrated planning process being developed by SEWRPC.

Bauer's fifth principle can thus be stated as follows: Transportation facilities and services must be planned as an integrated system through a process that integrates programming and short-range and long-range planning.

Natural Resources

SEWRPC's past and present consideration of conservation and enhancement of the remaining natural-resource base in the region as a primary objective of all its planning efforts reflects the fact that the principle of recognition of the limited base of natural resources is unchallenged. It is interesting to note, however, two developments that have occurred since the principle was first articulated:

1. Many regional planning agencies, including SEWRPC, have become heavily involved in environmental planning, especially in areawide water quality management and air quality maintenance. Thus, the importance of environmental considerations in the longrange planning process, and the resultant need to carefully coordinate the various affected planning programs, have greatly increased.

2. Many people feel that the process for assessment

of environmental impacts, as required by the National Environmental Policy Act of 1969 and especially as implemented since the passage of that landmark legislation, has served to undermine the role and effect of all planning, especially long-range planning. If an environmental impact assessment is indeed the basis for making a go/no-go decision on a project, then the local or regional plan that recommended that project as a plan element has less validity as a decision tool. SEWRPC is currently attempting to reconcile the unquestionable need for an environmental impact assessment with the role of the planning process. One possible approach is to prepare a system-level environmental impact assessment that can then serve as a structural framework for more detailed impact assessment work as a plan element or project progresses toward implementation. To this end, SEWRPC has prepared, as an appendix to its recently completed plan, a first attempt at such a system-level assessment. This issue remains, however, a vexing problem that will undoubtedly occupy considerable thought and energy in the future.

The Planning Process and Community Development Objectives

Bauer's principle that the land-use and transportation planning process must be based on community development objectives stands without need of amplification. However, the need to consider and balance, to the extent possible, both short-range values and long-range goals must be recognized.

Scaling Plans Against Community Financial Resources and Legal Authority for Implementation

During the years since adoption of the initial SEWRPC land-use and transportation plans and especially during the recent, sometimes painful, process of plan reevaluation, the overriding impression received by SEWRPC and its staff is one of fragmenting authority and responsibility. It is apparent that, in the last two decades of the twentieth century, the institutional structures of federal government, state government, local government, private sector, and citizenry and the intricate interinstitutional relations that control and influence the planning, implementation, management, and operation of major, complex urban service systems such as transportation or sewers may be inadequate to the task. That is, power is so fragmented and transitory in major urban areas that it is becoming ever more difficult to assemble and maintain the coalition of interests and institutions necessary to plan and then implement a major system. Widely differing symptoms of this problem are appearing. Two examples can be mentioned: (a) the UMTA emphasis on a free-standing, independent "usable segment" in implementing fixed-guideway transit systems and (b) the emerging "appropriate technology" movement. The implications of this development for planning processes based on systems engineering are not as yet entirely clear but are bound to be profound. Although this development requires no amendment to Bauer's eighth principle, it represents an important institutional constraint in future plan development, especially in longrange systems planning.

SUMMARY AND CONCLUSIONS

In southeastern Wisconsin as elsewhere in the United States, the long-range transportation system planning process was subjected to criticism during the late 1960s and 1970s. As this process continues to evolve, an examination of the underlying basic principles of the process indicates that they remain basically valid and require only some expansion to provide a technically sound and sensible basis for extending the evolutionary process of transportation system planning into the 1980s and beyond.

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Parametric Analysis: A Sketch-Planning Tool

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An analytical procedure to conduct sketch-planning analysis for exclusive transit facilities and its application in the Jacksonville, Florida, metropolitan area are described. Unlike detailed testing, in which the objective is to select a single recommended transportation scheme, the sketch-planning technique only screens alternatives to identify candidate transportation systems for more detailed testing. The method suggested for assessing the feasibility of rapid transit is termed parametric analysis and generally conforms to the transportation planning process currently used throughout the nation. Two major differences are that the parametric analysis is usually conducted at a larger-than-zonal scale and, instead of computing a single modal split, assumes various transit capture rates. In addition, each transit technology is specified in terms of performance parameters such as minimum headways, speeds, and unit costs. The consequences for patronage, revenue, and cost can be determined for each capture rate and test situation, and thus the feasibility of exclusive transit facilities can be assessed. Parametric analysis provides a useful, costeffective procedure for conducting rapid transit sketch planning.

During the past two decades, the focus of most longrange transportation research and analysis has been on the detailed study of transportation alternatives. Because of the effort and cost involved in detailed testing of transportation networks, planners have been limited in the number of alternatives that could be considered. In response to this constraint, analytical techniques are needed that can inexpensively examine a large number of alternatives at a less detailed level. The intent of these procedures, which are termed sketch planning, is not to select a recommended plan but rather to identify promising alternatives that should be subjected to more detailed planning and to eliminate from further analysis those schemes that do not prove workable. The use of a two-tiered testing process (sketch planning and detailed) provides a cost-effective method for examining a wide range of alternatives and ultimately selecting a recommended transportation plan.

One such sketch-planning tool is the community aggregate planning model (CAPM), which has been successfully used in conducting analysis of highway alternatives. Unfortunately, transit analysis lacks a comparable, widely accepted planning tool.

This paper describes one such approach—a sketchplanning tool called parametric analysis—and its application to the testing of the feasibility of exclusive transit facilities and the desirability of various regional land-use schemes in the Jacksonville, Florida, metropolitan area.

OUTLINE OF METHODOLOGY

In detailed evaluation, a transit system is specified and ridership estimates are determined from sophisticated travel simulation models. The resulting patronage permits the calculation of revenue and the computation of both system operating and capital costs to satisfy the forecast demand. In parametric analysis, various levels of modal split are assumed for alternative test systems.