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WORKSHOP ON TRANSPORTATION REQUIREMENTS FOR URBAN ACTIVITY CENTERS

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I. INTRODUCTION

Major centers of activity, located outside the traditional central business districts (CBDs) of cities, have become principal areas of growth in urban areas in recent years. As such, they are the focus of much of the transportation and land use planning in many regions. The metamorphosis of development from regional shopping centers and suburban industrial parks to intensive activity centers with mixed-use development has brought with it many of the transportation problems traditionally associated with CBDs. These are: access, parking, internal circulation, pedestrian mobility, and land use conflicts. In addition. new problems are being generated by the unique characteristics of major activity centers. For example, in many cases, locating beyond the reach of strong urban government controls has allowed the pace of development to outstrip the rate of infrastructure improvement needed to support that level of economic growth. Protecting adjoining neighbors from traffic impacts and providing transit services to these growth centers remain as two challenging problems.

Jurisdictions are coping with the implementation of major activity centers in a variety of ways. To take advantage of the income generated by major activity centers and to promote sharing of the cost of off-site improvements necessary to support their operation, some jurisdictions have initiated methods to assess the transportation costs of activity centers. Other tactics include moratoria on development to reduce overload on lagging infrastructure development. The entire question of transportation and parking needs is leading to a number of creative solutions ranging from sophisticated technical answers--such as automated guideway transit for internal circulation--to transportation management organizations which sponsor ridesharing activities and suburban park-and-ride services.

Recognizing these concerns, the Transportation Research Board's Committee on Transportation and Land Development conducted a conference on Transportation Requirements for Major Activity Centers in September 1984 in Phoenix, Arizona.

II. SETTING THE STAGE

Don Williams, of the Rice Center, set the stage for the conference by discussing the nature of current activity centers. He stated that suburban activity centers are growing two to four times as rapidly as central business districts in terms of employees and square footage of office space. This is true even in cities where the downtowns are experiencing very large amounts of growth. For instance, while downtown Houston was adding twenty million square feet of office space between 1980 and 1984, suburban office space in the Post Oak-Galleria area was adding eight million square feet. The Northbelt area near the International Airport was adding six million square feet; the Dallas North Parkway area was adding ten million square feet and the San Antonio I-10, I-410 corridor was adding four million square feet.

These suburban centers have had significant increases in employment. In downtown Houston there will be about two hundred thousand

additional employees in office space within the next five years. In comparison the Post Oak-Galleria area will have about ninety thousand new employees. The Northbelt area in Houston will have about thirty-six thousand additional employees. The North Parkway in Dallas will have about fifty thousand employees and the I-10, I-410 area in San Antonio will have about twenty-eight thousand more employees. Williams' rule of thumb is that for every million square feet of office space, four thousand employees are added, roughly two-hundred-fifty square feet per employee. In addition to office employment, the retail, hotel, and other activities that typically accompany an activity center will increase the total activity center employment by twenty-five to thirty-three percent.

STAGES OF DEVELOPMENT

Williams noted that suburban activity centers go through several stages of development. First, transportation systems are developed along with housing and small retail and service shopping centers. In many cases, the freeway or interstate systems are in place and the rest of the transportation feeder systems come later.

As large numbers of people move to the suburbs, a regional shopping center and a large major office complex of more than one building are added along with more dense housing contruction. There may be some apartments with higher percentage of rental units than in the single family housing. At that point, the area can be defined as a developing activity center, but the location of the centroid will still be unclear.

In the next stage of development a mixed use hub begins to develop with major office buildings constructed by four or five different developers. Next hotels and other office support facilities, including new retail space, are added. At this point, the centroid of the activity center is defined.

In the final stage, you have a major new "downtown." At this point, high rise housing begins to be built. A profile at this stage is not different from a profile of a downtown in terms of density of employment or dwelling units.

TYPES OF TENANTS

The size and nature of the tenants occupying office space in activity centers changes as the centers mature and intensify. For example, Williams pointed out that larger companies take large amounts of space in the older, more mature, higher density centers. Typically, the hundred thousand plus square feet tenants account for about fifteen to twenty-five percent of the tenants in an older center. In a brand new suburban center, perhaps four years into the development state, there would be few large space tenants.

The types of companies also change, and they vary with location and with the image of the activity center. For example, corporate headquarters, financial, accounting, and legal firms are generally downtown. In suburban activity centers, there are more insurance, sales-oriented, medical, and engineering firms. There are many important concerns in the mind of a corporate decision maker about where to locate: the type of workers that are available, the wage rates, the average employee turnover rates, the cost and type of housing and neighborhoods in the area, the availability of hotel and meeting accommodations, etc. Also of concern are access to other activity centers and to airports; employee commuting times from home to work; and adequacy of parking and bus service. The rule of thumb is that employees should not have to travel more than 30 minutes to work. These are really the significant transportation advantages that are of concern.

One of the main reasons for locating in the suburbs is lower cost. If downtown office space costs \$22.00 per square foot per year, and if that same quality space in the suburbs is \$15.00 per square foot, then there is an inducement to move to the suburbs. That doesn't mean that the whole company moves; it just means that parts of it move that don't need to be downtown. The transportation system also acts like a market force. As a corridor fills up and travel time due to congestion increases, there is a shift in the urban area to another corridor and another activity center where costs and congestion are lower. Issues like crime, parking, land use controls, the availability of labor, employee turnover rates, and wage scale rates also can vary greatly between a downtown and a suburban area. Williams pointed out that the employee turnover rates in downtown Houston were higher than employee turnover rates in the suburbs, particularly among the secretarial work force. For an insurance company that needs a dependable supply of clerical labor, that is an important consideration.

ACTIVITY CENTERS' FUTURE

What is the future of activity centers? Williams expects more and larger centers. The major centers within each region will become specialized, each serving a particular function in the larger regional economy. For example, downtowns will continue to have major corporation headquarters, and be the financial, accounting and legal centers.

The airport locations are generally the second largest activity centers. They tend to have the national and international corporations that are very dependent on air service. A third type of activity center, like the Post Oak-Galleria area in Houston or the Galleria in Dallas, is that associated with shopping.

Decentralization of major cities, and of the country as a whole, is a major location trend. Key employees are continuing to be in high demand because their skills are in short supply, and this is going to be the case for the next 15 years. Such employees are continuing to disperse into the countryside. Jobs are chasing housing, which is really the cause of the whole phenomeanon of suburban activity centers. The changing mobility and communication mix is allowing companies to feel comfortable about decentralization. There is an appeal for what we call rural life, a phenomenal interest in the medium-sized cities in America. The San Antonios of the country are a very appealing locational choice. For those who cannot relocate totally, the next best choice is a suburban location. The net result is people move out to the suburbs and the jobs follow because business has no choice if it wants to be competitive.

According to Williams, cities with multiple employment concentrations are here to stay and, in fact, are growing at a very fast pace. No amount of government or land use control is going to stop or even slow the trend. How we connect these developing centers is the urban transportation issue of the late 1980s and early 1990s.

III. PROBLEM DESCRIPTION

Gary Cornell from the Atlanta Regional Commission pointed out that many suburban activity centers generate much more traffic than can be handled by the existing transportation capacity. But they do not create enough multi-directional travel density to support new freeways or rapid transit systems. Even the largest suburban office center in the Atlanta Region contains less than one-fourth of the 50 million square foot office space needed to support a heavy rail line.

TRAVEL PATTERNS

This paradox is compounded by the travel patterns found in suburban activity centers. Whereas work trips account for 90% of the trips to the Atlanta CBD, in suburban activity centers in the Atlanta region they account for only 30 to 50%. While a mixture of both homes and jobs is often found in suburban activity centers, few developments have succeeded in creating the "urban village" lifestyle in which people live and work in the same activity center. Consequently, the mixture of medium density residential and office development results in many conflicts for transportation planners. Local traffic becomes mixed and congested with through traffic, inbound traffic mixes with outbound traffic. There is not nearly enough capacity on the existing and meandering suburban street system, yet there is not enough traffic in a single corridor to make high capacity systems cost effective.

TRANSIT LIMITATIONS

It has been difficult to introduce adequate bus service in these suburban activity centers. The only public transit service provider in the 15-county Atlanta SMSA is the Metropolitan Atlanta Rapid Transit Authority (MARTA). However, its service area is only the central two counties--Fulton and DeKalb. The two fastest growing counties--Cobb and Gwinnett--have no transit service. Fortunately, more than half of the 18 presently identified activity centers in the region are technically inside the area which MARTA serves.

PLANNING, DESIGN, AND INSTITUTIONAL PROBLEMS

Cornell set forth MARTA's list of the planning, design, operational, and institutional problems presented by suburban activity centers:

 Planning--Suburban activity centers grow and change very fast. In many areas, land uses change rapidly from low density residential uses to moderate density commercial office and retail uses.

When land uses change from residential to commercial use, the orientation of routes is different. The previous residential neighborhood generated a low volume of trips. Most of them were work bound during peak hours. The new commercial development is likely to become the focus of an array of trips from many directions without a clear, linear corridor which could be efficiently served with bus routes.

Second, as the activity center grows, more vacant residential land is converted to commercial uses. This disperses the homes of workers in the activity center, causing more dispersed trip patterns as time passes. The low density of trip origins makes fixed route transit service less feasible even though the number of centralized trip destinations is growing. Trips become mostly peak hour work trips destined for the activity center. This leads to empty backhauls on transit routes.

- (2) Design and Operations--Generally, new suburban office parks and shopping centers are scattered across large expanses of low density residential land. They often are developed with long landscaped approach roads and surrounded by enormous parking lots. These design features attract automobile-oriented clients, but are major frustrations to pedestrians and transit operators. Unlike the case in downtown CBDs, parking is free and encourages driving.
- (3) Institutional Problems--The biggest institutional problem to providing better transit service to suburban actitivy centers is that most developers, building managers, and employers are not interested in transit service, and are unwilling to plan for it or accommodate it. Their emphasis is on free parking and car oriented access, not transit or pedestrian access.

Free parking is a uniform benefit provided throughout suburbia by developers and managers and is a major competitive issue for financing and marketing new developments.

LACK OF STABLE LAND USE PLANS

Another major problem, according to Cornell, is the lack of stable land use plans agreed upon by local governments, developers, and the courts. This problem has several aspects.

 Many of the suburban activity centers overlap county and municipal boundaries. Local governments compete for new developments, and there is little authority given to state or regional planning bodies to create or implement multi-jurisdictional land use and transportation plans.

- (2) Local governments have competing expectations about how much of the expansion of the suburban office, residential and industrial markets they will capture. Their optimism leads them to zone too much land for commercial development and to demand more transportation improvements than can be programmed given scarce state and federal resources.
- (3) Developers compete among themselves and exploit the competition between local governments to achieve rezonings in excess of what the market will support. This form of land speculation results in havoc with the land use plan and frustrates attempts to predict which developments will actually occur.
- (4) Courts in the State of Georgia have interpreted the state constitution strictly with regard to private property rights and generally uphold the "highest and best use" principle in zoning litigation. As commercial development occurs, the "highest and best use" principle permits zoning changes that are in excess of total demand. Land prices are artificially forced upward, and residential land is forced to locate farther away from the growing centers even though there is vacant land.

IV. CHARACTERISTICS OF ACTIVITY CENTER ACCESS PROBLEMS

A series of speakers characterized transportation-related problems at activity centers. Virgil Stover, Texas A & M University, said that if the speed of a grid street system decreases from 40 to 30 miles an hour, the trade or market area is reduced to about 60% of its original size. A 50% decrease in a speed results in a trade area that is about one-quarter of the original size.

He emphasized that expansions and changes in the transportation system will change relative land accessibility. In San Antonio, the CBD traditionally was the most accessible location. With the construction of the I-10 corridor, the growth area in San Antonio has been to the northwest corridor, not downtown. Accessibility in the corridor is in the range of three or four times that of the CBD. The locations of activity centers are going to occur at major confluences in the transportation system because of their great accessibility.

Edward Davis, Atlanta University, commented that the linkage between transit and land-use development has been recognized for decades. Yet there are apparently few successful efforts to fully integrate transit and suburban development.

TRANSIT ACCESS OPTIONS

According to Davis, major activity centers (MACs) fall into three general categories in terms of transit options available. First, there are MACs that are located outside the traditional CBD, but have extensive transit service already available. Examples of such enters are: North Avenue and Lenox Square in Atlanta, Dadeland South in Miami, Bethesda in Washington, and Lloyd Center in Portland. Second, there are major mixed-use office, retail and residential complexes located farther away from the CBD with (usually) good freeway access and large amounts of parking. These generally have limited or less frequent transit service. Perimeter Center in Atlanta, Crabtree Valley in Raleigh, North Carolina and Tri-County in Cincinnati are examples of these. Third, there are major industrial and office parks with little residential and retail. Research Triangle Park in North Carolina typifies this type of MAC. Generally, there is no transit service to these office parks.

Davis said that the transportation issues facing major activity centers are precisely those that have caused their existence. The problems of access, parking, internal circulation, pedestrian mobility, and land use conflicts have followed from the CBD to suburbia. Among the critical questions to be answered are:

- What are the roles of public transit and private providers in serving suburban activity centers?
- Can MACs support high occupancy transportation modes (ridesharing and fixed route transit)?
- 3. Can transit stations stimulate development?
- How can a greater public/private partnership between transportation and development be promoted?

COMMUTING DATA NEEDS

Robert Dunphy, Urban Land Institute, suggested that we must develop a better definition of how far and how long people will travel daily to work. Commuting data is now available for over 200 areas from the Census. It would be useful to report such data in a unified format for case studies of different types of major activity centers in different regions and identify common characteristics which result in high transit use. Comparisons also could be made to CBD data for each city.

He also argued for a consistent set of internal design standards which would encourage transit-oriented development. Many MACs are developed on a parcel by parcel basis, with large distances and little possibility of pedestrian access. What can be done to promote a more unified development which could be served by transit? Can a fixed transit station location affect overall development or location of development? How much can parking requirements be reduced? Can such centers serve as focal points for circumferential transit travel in a suburban area? What is the potential for non-peak travel, especially for firms needing occasional access to the CBD?

RIDESHARING AND CAR POOLING

In contrast to Dunphy's consideration of fixed transit solutions, James Bautz, Urban Mass Transportation Administration, asserted out that conventional fixed route transit services probably never will carry more than a small percentage of trips to non-CBD activity centers. He argued that the only mode with any chance of achieving a significant percentage of trips is ridesharing, particularly carpooling.

Until recently, little attention has been paid to the development of high occupancy transportation modes at non-CBD activity centers. Parking lots were constructed, and the employee and shopper were assumed to use a private car to get to and from the location. Non-CBD activity centers still do not have the levels of congestion and parking costs which cause a significant mode shift. Density levels usually are not sufficient to support traditional transit service. New institutional arrangements must be established, according to Bautz, if there is to be any chance of effecting a significant modal shift.

As bad as it is to drive on congested roads, it is probably better than taking the bus or pooling. This is due to increased trip time and lack of service by transit, need for a car during the day, low densities, overtime, and a host of other reasons. All of these problems can be addressed but they take time, money, and a change in attitude.

Bautz stated that, at the Tyson's Corner development in Northern Virginia, an employers' association was formed to promote ridesharing and start an internal circulation bus. The program met with little success. At the El Segundo Employment Center in Los Angeles, a high quality commuter service was started to attract short commuter trips. Although a significant number of commuters were attracted (over 1,000 trips per day at one time), it was a small percentage of the total market. The demand for the service subsequently dropped off.

There has been some success in attracting long commuter trips (greater than 15 miles one way) to ridesharing and express bus service. There are a number of private bus services carrying long distance commuters to the El Segundo Employment Center. Hughes Aircraft has a program to support bus service for its employees. Vanpooling and carpooling also have been used with some success. But the percentage of commuters who travel long distances is relatively small. However, it does constitute a market that readily can be served by bus and commuter carpools.

V. CHARACTERISTICS OF ACTIVITY CENTER INTERNAL CIRCULATION PROBLEMS

According to Darwin Stuart of Barton Aschman Associates, the sheer size of major activity centers is certainly a primary determinant of internal circulation needs. For example, office and retail mixes (which generate travel between one another), density (employees per acre), and shape (particularly strongly linear patterns of development) all are significant in influencing internal circulation patterns. Overall size, extent of sprawl (lower densities), and linearity (over one mile in length) are all physical characteristics of major activity centers that affect internal travel volumes. These internal travel volumes, and the modes chosen for them, reflect both the land-use mix and the typical lengths of desired trips. Depending on land-use mix, major activity centers may experience morning and evening peaks (office employment-oriented), mid-day peaks (retail/service-oriented), or both. For very large centers, the peaking patterns may lead to automobile congestion, pedestrian congestion, or both. Where both office and retail/service concentrations are large, congestion may exist throughout the day.

PEDESTRIAN/VEHICULAR CONFLICTS

For major activity centers which involve multiple land developers and an underlying grid-like street network, opportunities for pedestrian/vehicular conflict are many. Grade separations for major flows of pedestrian and vehicular traffic represent clear, but costly, alternatives. The vehicle-free pedestrian mall, associated with both regional shopping centers and revitalized central business districts, represents one solution.

Multi-developer or multiple-node activity centers may vary in the extent to which pedestrian connections are fully integrated with adjacent land-uses. Unevenness in the provision of amenities (landscaping, walking surfaces, street furniture, etc.) can represent a kind of negative impact (or at least the incomplete achievement of overall urban design goals).

IMAGE OF CENTERS

Recognition and image as a specific, identifiable, and unique urban place is one of the important goals of diversified MACs. However, as such centers become large and as multiple developers are involved, the maintenance of an overall theme becomes more difficult. Disjointed and unclear pedestrian/transit/auto connections to the fringes of major centers tend to diminish the participation of those fringe areas in the overall retail sales volume, achievable office rental rates, and marketability of the center itself.

LACK OF TRANSIT EQUIPMENT CHOICES

Tom McGean, of Lea, Elliott, McGean addressed the issue of transit technology. It was his opinion that a key problem is the lack of an adequate choice of equipment which matches the system requirements. Part of this is just lack of imagination on the part of the planner, since a great deal can be done with nothing more than a simple special purpose bus. Nonetheless, too many users have been victimized by poorly designed special purpose equipment sold by suppliers who have failed to deliver on their promises. Electric buses have been sold for missions far in excess of the limited range of their batteries. Special purpose cars have not been adequately tested to hold up to rugged daily use. Houston Airport had to tear out two people movers before finally being satisfied with its present system.

VI. INSTITUTIONAL ISSUES OF ACTIVITY CENTERS

Dr J. Douglas Carroll, from Princeton University, said we are concerned mainly in the repair, rehabilitation, and reconstruction of the highway systems. Localities basically control land use in most states. State and county highway departments control the road systems. The perceived needs of the highway agencies and the land developers often are not the same or are not in the same timeframe. To the developer, time delay may be the most costly item in developing the land. The developer is concerned with how to get his development completed and sold or rented. Delays and lack of adequate transportation increase construction costs and potentially lower rents because congested sites are less attractive. The central questions are how to coordinate the needs of the land developer with the transportation programs and who is to pay the transportation costs and other public costs associated with major land development projects.

COORDINATING TRANSPORTATION AND DEVELOPMENT

Steven Lockwood, of Dallas North-Central Project, agreed that a change in attitude and orientation was needed if the transportation problems associated with activity centers are to be addressed. Transportation problems associated with MACs are considered to be the primary responsibilities of urban public authorities yet often are not under single control. Private developers want to limit their front-end and total infrastructure investment costs and pass on to the public as much of the costs as possible.

As a result, transportation problems are often recognized <u>after</u> MAC development is planned or committed. Opportunities to coordinate development with supply of transportation services are lost. Many MACs are the cumulative result of separate, private, unplanned, uncoordinated developer activities in response to a developing or changing market. This process makes it difficult for a public authority or public-private cooperative activity to plan for or capitalize on potential synergism between land-use and transportation systems.

The issues transportation and major activity centers pose for the communities surrounding a major activity center were discussed by Mildred Cox, of the City of Dallas. Cox suggested that when activity centers first start there is little public interest. There is even a "boosterism" attitude on the part of public officials who feel it may be beneficial to have some construction in their area. Conflicting objectives emerge between developers, public officials, and citizens. Neighborhood groups don't want traffic problems or for the development to intrude on their environment. The developer wants to maximize the return on his investment. Public officials want satisfied, safe neighborhoods and increased tax income.

DEFINING IMPACTS

Terry Lathrop, from the City of Charlotte, listed three general concerns regarding transportation problems at activity centers. First, there are problems in isolating and defining the impacts of activity centers. There is an assumed regional trip intensity in the planning process which tends to blur the specifics of any center. However, beyond a certain size, an individual center does make a significant ripple in the surface of travel demand in the region. Second, because it is difficult to project where activity centers will locate, planning must be reactive. Third, questions are raised as to how activity centers should be accommodated in a region's transportation plan.

ASSIGNING COSTS

Lathrop then addressed three general questions: (1) What are the costs of accommodating activity centers in a region? (2) How should these costs be paid? (3) How do we assess construction costs to those who occasion the increased traffic capacity? Do we use average cost, marginal cost, pre-payments and/or taxes? How do we apportion it among existing land development and new development, or among local versus regional traffic generators?

COMPUTER-BASED MODELS

What methodology will be appropriate to answer these questions? Is there really a need for computer-based models to analyze activity center transportation? Can manual analysis do all that's necessary? How do we handle the simulation of a large number of alternative solutions to transportation problems at or within the activity center, particularly at the micro-scale? What are the real contributions of micro computers? Does availability of micro computers to the analyst, at reduced cost, offset problems of definition, zone scale and limitation on detail? What is the potential utility for truly interactive techniques and methodology? What do we do about demographic changes? How do we include, in a model, the changing nature of employment? What implications are there for new location charateristics for activity centers? Non-home based trips appear to be a larger component of travel within activity centers; yet our knowledge of non-home based trips is limited.

VII. MAJOR ACTIVITY CENTER TRANSPORTATION PLANNING ELEMENTS

There are seven major elements to be considered in developing a transportation plan for urban activity centers. These are:

- 1. Traffic access
- 2. Internal circulation
- 3. Transit requirements
- 4. Parking requirements
- 5. Land use procedures
- Financing the transportation infrastructure
- Coordinated planning with the community and the developers

The issues embodied in these planning elements were addressed by workshop sessions. Highlights of these workshops are presented in the following sections.

TRAFFIC ACCESS

Travel delay and highway congestion resulting from new major activity centers (MACs) are phenomena observed in all parts of the United States. Adding MAC-generated traffic to existing through traffic often exceeds the capacity of the highway system and leads to travel delay and driver frustration. The frustrated driver often seeks his own solution by intruding into local residential streets. Dangerous queues develop on freeway ramps and mainlines. These negative impacts of a new MAC may extend to traffic flow several miles from the center itself. While recognizing wide variations in development and regulatory climates across the U.S., there appear to be three kinds of problems relating to traffic access: 1) lack of synchronized development and highway construction; 2) inadequate framework for analyzing and mitigating traffic impacts; 3) lack of, or insufficient application of, adequate design standards for both on-site and off-site facilities.

Lack of Synchronized Development and Infrastructure Construction

Fred Goettemoeller pointed out that:

1. Major activity centers are large enough by themselves to contribute a significant increase to the traffic flow on the regional highway network, often requiring a major concurrent public highway investment.

2. Private development follows a schedule dictated by market conditions, but public facility construction follows a schedule established through political debate, heavily oriented toward fixing the problems caused by past development. Diverting public funds to provide for a future development whose problems do not yet exist is very difficult.

3. The question of who pays for off-site roadway improvements also frequently stalls decision-making. Transportation agencies often are willing to provide facilities to a large public user, such as an airport, or to a concentration of many private users, such as a CBD. However, providing facilities for a single private user immediately creates unfamiliar problems, including who is to pay for the improvement and when it is to be built.

Steve Alderson suggested that jurisdictions are reluctant to spend scarce roadway funds to provide access to proposed projects which may be abandoned later by the developer.

Framework for Analysis and Mitigation of Traffic Impacts

There was general agreement among the workshop panelists that:

1. Jurisdictions frequently do not demand that developers trace the extent of traffic impacts far enough from the point of generation. The usual practice is to examine the capacity and turning movements at the intersections, at the site boundary, and perhaps within a half mile to one mile of the point.

2. Traffic generated by the center may have a significant impact on adjacent jurisdictions which have no advanced knowledge or power to intervene in the planning process. The multiplicity of jurisdictions within an area can result in disjointed access improvements if careful coordination is not done to insure continuous route improvements.

3. Existing trip distribution and assignment models may lack the sensitivity or accuracy to analyze satisfactorily the effects on access routes of trips generated by a MAC. The political and development decision framework is generally less sophisticated than the analytical process and thus would not benefit from more complex modeling processes.

Design Standards

Inadequate design may be one reason for traffic problems at or near the entrances to MACs. Poorly placed access points and parking facilities, lack of signal coordination, insufficient capacity of the on-site circulation system and inadequately-designed driveways, intersections and ramps all contribute to delays for through traffic as well as for activity center travelers.

Fred Goettemoeller noted that there is frequently a lack of fit between the standard activity center layout (large buildings adrift in a sea of parking) and the design standards of the freeways required to serve them. Buildings are too close together to accommodate the ramp spacing and curvatures required for direct freeway access. On-site physical solutions to the problems--deck parking and grade-separated access ramps--require too much up-front investment during the early days of a project when the pattern is being set but when the project is not financially strong enough to bear the expense by developers.

Specific suggestions for improving access generally fell into three categories: reducing the amount of vehicular traffic generated by MACs; protecting surrounding areas from the impact of MAC traffic; and strengthening jurisdictional control over development.

Measures to Reduce Vehicular Traffic

David Curry presented a Transportation Systems Management ordinance adopted by Pleasanton, California, to respond to the challenge of maintaining a TSM program after the developer has completed construction. The ordinance is aimed at reducing the number of single-occupant autos by 30% to 50% through ridesharing. According to Curry, to realize such reductions in single occupant auto use, at least four critical conditions or steps are required:

1. Understanding of the traffic problem and commitment to its solution by the principal developer.

2. Development of an activity center transportation system management (TSM) plan with specific traffic mitigation targets.

3. Support for the TSM plan by the activity center tenants or employers, which usually means their participation in a transportation management association and appointment of an employee transportation coordinator.

4. Implementation and monitoring of the plan to assure that its traffic mitigation objectives are met.

The keystone of Pleasanton's new development philosophy is a TSM ordinance that requires all employers of 50 or more persons, and all employers in complexes, to implement a TSM program. The program must be designed to achieve a 45% reduction in the peak period employee commuter trips that would occur if all trips were made by solo drivers. Three to four years are allowed for full implementation, and annual surveys of employee commuting modes are required to verify achievement of the ordinance's objectives. This TSM ordinance appears to be the most comprehensive and ambitious piece of local traffic mitigation regulation to date in the United States.

Protecting Surrounding Areas

Judson Mathias described various examples of planned or implemented neighborhood protection programs in Phoenix using channelization and turn restrictions. These strategies inhibit traffic movements through neighborhoods by making access difficult or by physically denying vehicular access. Cul-de-sacs also have been used to restrict traffic on local streets that would otherwise provide access to activity centers. The Phoenix facilities appear to be effective in reducing through-traffic, but they also restrict local traffic flow. Physical barriers to pedestrian travel have been used to restrict MAC employees from parking in adjoining local streets, but such barriers also restrict neighborhood access to the MAC.

Stronger Control Over Development

While there was general agreement that present development processes frequently result in insufficient transportation access, disagreement exists over the solutions.

Some suggested improvements included:

1. Training in negotiation techniques for public agency employees to help them persuade developers to accept access designs which benefit the traffic system as well as the center;

Use of development guidelines based on trip generation rates rather than land use types;

 Development of design standards for roads serving MACS;

4. Requiring development proposals to conform to regional plans as well as local ordinances to prevent developers from using lax controls in one jurisdiction as a threat to obtain concessions in a neighboring jurisdiction;

 Use of more sophisticated traffic assignment models to trace impacts of MACs to near and remote traffic facilities;

6. Implementation of mechanisms to determine the developer's fair share of highway improvement costs and to ensure collection;

 New research into congestion and acceptable levels of service to establish tolerance limits.

INTERNAL CIRCULATION

Attempts to resolve internal circulation problems within major activity centers involve the expansion, extension, or improvement of an existing mode, or the introduction of a new mode.

Pedestrian Improvements

Nearly all major activity centers have one major commercial core with an enclosed,

weather-protected pedestrian mall connecting a variety of department stores and related shops. Grade-separated extensions between separate buildings are costly, yet may be desirable to improve linkages with other areas of a center. Variety of surface treatments, edging, street furniture, lighting, and other features may be used to strengthen overall pedestrian walkway systems, involving both open and weather-protected elements.

Moving walkways suffer from several deficiencies. Safety codes limit speed to between 125 to 180 feet per minute or 1.4 to 2 mph. Since walking speeds average 250 feet per minute or about 3 mph, slow speed is a major limitation of moving walkways, but by walking on the moving walkway the passenger can achieve a net speed of up to 6 mph. Advantages of moving walkways include no waiting time and a passenger carrying capacity of about 6000 to 7200 people per hour on a 40 inch wide belt. Moving walkways are limited in length to a maximum of about 600 feet. The length limitation can be circumvented by placing several walkways in tandem with landings between them. Even so, the slow speed of the system makes it unacceptable to many passengers for distances of more than 600 to 1000 feet. Reliability tends to be poor due to the high mechanical complexity. Capital costs are also high.

The low speed of moving walkways has been addressed by attempts to develop an accelerating walkway. By accelerating the passenger, the speed differential at the entrance and exit can be kept low while attaining speeds four to five times as fast as conventional walkways or about twice as fast as walking. The problem with accelerating walkways has been mechanical complexity and the difficulty of devising an accelerating handrail coordinated with the walkway.

Automobile/Parking Improvements

The most common approach to solving automobile congestion is to seek ways to provide additional street capacity through traffic engineering measures and reorganization of traffic flow patterns. Double-decking or other structure treatment for parking facilities also is common.

TRANSIT REQUIREMENTS

A number of conventional bus and specialized trolleybus or streetcar services have been inaugurated in several major centers, with mixed success. One of the keys to success has been the extent to which such services provide easily recognized and available linkages (for example, in a strongly linear corridor), and the extent to which they are not themselves impeded by at-grade street traffic congestion. Conventional buses have difficulty maintaining required headways without bunching. Noise and pollution are also a problem. In general, the performance and scale of the typical transit bus is in excess of the low speeds required for activity center circulation. Low speed buses with low level, wide doors for simple boarding and deboarding are needed for such service. The bus should capture the theme of the area, perhaps looking like a trolley or cable car where appropriate, or alternatively having a high tech futuristic appearance for other settings. Honor fare or free fare system should be used to speed boarding and encourage impulse use for short trips. Electronic vehicle spacing and schedule keeping should be used to prevent bunching.

Automated Guideway Transit and People Movers

Although automated guideway transit circulation systems have been well proven in a growing number of airport and "theme" recreation park settings, they have yet to be implemented in non-downtown, mixed-use major activity centers. The downtown people movers currently being implementated in Miami and Detroit should be examined carefully for their transferability to other MAC settings.

Automated people movers have been developed and used in a number of activity centers including airports, hospitals, and shopping centers. The major limitations have been high capital and operating costs and the need for a full time on-site maintenance staff. There also have been reliability problems at some sites, but by and large this problem seems now under control and 97-99% availability is common.

Special tractor-pulled trams also can be used for MAC circulation. Such vehicles can use either gasoline or diesel tractors or electric propulsion. Bidirectional and single direction loop operation can be considered.

While the results for grade-separated modes are not based on real-world experience, but only upon preliminary feasibility studies, it is important to examine the mixed experience with surface bus distributor modes in activity centers across the country. A shuttle bus distributor along the north-south axis of Post Oak was implemented several years ago, but terminated due to low ridership levels. These low ridership levels reflected the slow speeds achieved in mixed traffic congestion, and led to an unacceptable operating cost per passenger. Similar low ridership experience was encountered in an internal shuttle bus operation associated with the sprawling Tyson's Corner, Virginia, MAC in 1982-1983. Ten different routes across the center were finally terminated after about a year of operation, in spite of free fares. A linear shuttle bus service along Central Avenue in Phoenix, on the other hand, is currently experiencing economically viable ridership levels.

Congestion Reduction

It is important to realize that supplemental transit ridership represent diversions of former <u>pedestrian</u> travelers. The impact on internal auto vehicular travel is estimated to be quite modest. Such reduction ranges from one to five percent. Significant ridership levels for an internal transit distributor mode therefore might best be regarded as an additional environmental plus, improving discretionary travel opportunities within the center but not really solving the major congestion problems of activity centers.

Air Quality and Energy Consumption

Transit provides only modest impacts on VMT and equally modest impacts on air pollutant emissions and energy consumption. When the energy to operate a transit distributor mode is considered, there may be no net energy savings, and possibly an increased energy requiremnt of 10% or more for automated guideway transit modes.

Transit Performance Requirements

Tom McGean listed the general user requirements which internal circulation transit systems must satisfy in major activity centers. These are:

SPEED - low--5-15 mph is usually adequate.

WAITING TIME - short--1-3 minutes preferred, 5 minutes maximum.

TRIP LENGTHS - short--1000 to 5000 feet is typical.

LINE CAPACITY - moderate--typically need to move 500-3000 passengers/hour.

ACCESS - high--should have stations no more than 1000 feet apart.

NETWORKING - not critical--shuttle and loop systems with little switching are acceptable.

BOARDING/FARE COLLECTION - simple and quick; short trips make this a necessity; free fare often is preferred.

INTRUSIVENESS - low--must blend in with the MAC environment and contribute to the atmosphere.

NOISE - low--about 72 dBA maximum.

POLLUTION - low--electric is often preferred; diesel can be objectionable.

COMFORT - not critical--trips are short and semi-open cars without air conditioning and with mostly standees often are acceptable.

SAFETY - high-- comparable to public transit and elevators.

RELIABILITY - high--97-99% system availability.

MAINTAINABILITY - good--should not require full time on-site staff.

OPERATING COST - low--50 cents per passenger trip as a goal.

CAPITAL COST - low--no more than 5% of value of MAC development.

PARKING

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Pat Gibson of Barton Aschman discussed the topic of shared parking as a means of reducing the total supply of parking that an activity center needs. All the activities within a development may not have peak parking demand at the same time of day even though the zoning ordinance may assume that they do. In major activity centers (or in mixed-use developments), there is potential for multi-use trips. Hourly parking fluctuates by different types of land use. If the right kinds of land use are put together in a development, the total parking supply needed to serve the development may be reduced. For example, retail demand peaks in the middle of the day and while residences generally have a lower portion of parking during the middle of the day. Office demand peaks at one time, retail/entertainment centers peak at another time. Shared parking can (1) lower the total needed supply of parking, (2) provide better utilization of spaces available, (3) improve the cash flow of the development, (4) increase turnover per parking space, and (5) increase the density of the project with the same number of spaces.

Traditional zoning ordinances, which require a fixed number of parking spaces per square foot of construction, may not be responsive to varying needs associated with uses in suburban activity centers. The typical zoning ordinance requires provision of peak parking for every individual land use within the project and doesn't allow for shared parking.

Space devoted to parking also can be reduced when there is a direct connection to transit. At Eaton Center in downtown Toronto, for example, users can go immediately from the shopping center down into the rail system, so parking demand is one space per 1000 square feet instead of the norm of one space per 500 square feet. In downtown Portland, at the Morrison Street project which has offices and retail space and a hotel located right on the Portland transit mall, l or 2 parking spaces per thousand square feet have been allocated instead of the 5 spaces per thousand square feet usually provided in a suburban mall.

FINANCING TRANSPORTATION INFRASTRUCTURE

According to Douglas Carroll, newcomers should be responsible for the added transportation costs required to accommodate the added demands they will generate. These new highway facilities usually will require capital investment for expansion of existing facilities as well as continuing maintenance costs.

Land owners (via developers) should pay for the needed transportation investment. Such investment costs should go against the land which is to be benefited. Otherwise, the landowner will receive a value as though the land were adequately serviced with infrastructure to receive the new development. Once capital improvements are made, the owners should provide payments for continuing operation, maintenance, and replacement since they are receiving the transportation benefits.

Should developers pay if there is existing surplus transportation capacity? Won't such charges inhibit new development, thereby withholding benefits and jobs from the community? Clearly, both the costs and benefits generated by activity centers must be considered in making an equitable charge on new development.

Another question is whether such capital charges are fixed--i.e. so much per square foot or so much per bedroom or dwelling unit--or variable, wherein the cost depends upon the particular local situation. Certainly simplicity argues for a fixed charge, whereas equity and community planning may suggest variable charges.

Traditionally developers have provided the on-site infrastructure-- roads, sewer and water connections, and even parks or schools--as part of the development cost. Such costs, according to Carroll, are significant, running as high as \$7,000 to \$12,000 per dwelling unit in some California developments. These infrastructure costs are added to the price of each unit.

There is wide agreement that such on-site costs are first borne by the developer and then passed on to the tenant/owner. The developer expects to pay for such on-site features, and he usually prefers to construct these facilities and then turn them over to the local government because this allows him better control of costs and timing.

While there is broad agreement about the responsibility of the developer to finance on-site infrastructure, assessing charges for off-site improvements is relatively new and not widely accepted as a charge against developers or land owners. The financial pressures on local governments have made it increasingly popular to assess charges on developers for off-site improvements. Devices such as special assessments, exactions, increment financing and impact fees are being used to recoup public infrastructure costs.

Governmental Jurisdiction

The sheer size of new activity centers makes the determination of proper governmental jurisdiction more complicated. Seldom will off-site impacts be contained within one city or town and not often in a single county. Thus there is need for intergovernmental understanding, agreement and division or delegation of public responsibility. These complexities often are a horror for the developer who seeks to minimize uncertainty and to reduce the time he has to carry development costs without revenues.

Some specific issues which play a part in these negotiations are:

<u>Cash or In-kind Contribution</u>. Many times in-kind contributions, for example land donations, or undertakings such as building a transit station and turning it over to a public operator, are possible in lieu of cash exactions or contributions.

Handling Funds for Future Use. If developer exactions are made, who receives and manages the funds? Clearly a one-time payment in cash or in-kind will take care of the question of discounting, but is it fair to hold such funds for long periods without undertaking intended project improvements? Who is responsible for continuing maintenance costs and reconstruction when they are necessary?

Lead Agency Designation. One agency must be responsible for designing and executing the improvement plan for off-site infrastructure. This requires cooperation and coordination between all the governmental units and agencies involved and with the developers.

LAND USE PROCEDURES

Rick Counts, of the City of Phoenix, questioned whether major transportation access routes for activity centers should be through or be to the activity center? Can the activity center be started with a concept of contributing transportation improvements not only financially but also functionally? Is it reasonable to suggest to a developer that, in addition to a million square foot office space center, or as part of it, he ought to create a mixture of uses in order to encourage pedestrian trips?

PLANNING BETWEEN THE COMMUNITY AND DEVELOPERS

MAC negotiations among developers and the community generally center on two issues: development intensity and off-site infrastructure improvements. Although the process can be quiet, cooperative and efficient, more often it is noisy, combative and cumbersome. Frequently, the loudest disagreements involve planning and funding transportation improvements.

Mildred Cox, from the City of Dallas, summarized the interests of all the parties. The developer wants to maximize his return on investment, to get quick answers and to incur only costs that promise direct returns. The community wants to minimize change and improve amenities. The government wants to expand its tax base without overloading its infrastructure, keep its neighborhoods safe and prosperous and avoid political trauma.

Flaws In the Process

Kathleen Stein-Hudson discussed the procedural and attitudinal flaws that make the process more difficult. Four major problems are:

- The crucial development decision often is made too early, before adequate information, impact analyses, cost sharing models, and projections of net benefit are available and before the community is organized and able to respond.
- (2) The negotiation process is often pushed too fast, causing later delays and changes and exaggerating community fears.
- (3) Available information often is ignored. Overall community plans and policies may not be synchronized with the activity center. How transportation impacts and new needs will be paid for may not be considered.
- (4) The parties often do not understand each other well, creating miscommunication, mistrust, and prolonged negotiation.

Kenneth Voorhies of R.B.A. Associates raised a fifth problem, which was the actual funding and implementation of agreements for developersponsored infrastructure improvements. Once the parties have agreed, what mechanisms are available to be sure that the developer lives up to his commitments?

Getting Better Information Earlier

Both Cox and Stein-Hudson concentrated on the need to get better information into the negotiating process early. Reliable and understandable fiscal impact analyses and cost sharing models are most needed, argued Cox. Stein-Hudson drew on her New York experience to propose several solutions. New York requires developers to prepare an environmental impact assessment, in which transportation plays a significant part, and to pay a fee, which covers some of the city's review and evaluation costs. The Environmental Impact Analysis forces attention to the development's costs and benefits and helps set forth public costs, mitigation measures, and community amenities. Second, Stein-Hudson advocates a more forward-looking analytical process, not just to anticipate future impacts, but also to look carefully at who gets what, and thus develop more complete and equitable agreements about who should pay. Third, transportation planners need to integrate their work with that of other public offices particularly those in land use planning, zoning and public finance.

Stein-Hudson also advocated the use of "value assessment" in negotiating the transportation requirements of activity centers. "Value assessment" means examining the present and future economic value of the development package components. Public sector professionals can use skills that investment and real estate communities employ to estimate an investment's worth. This knowledge would help value the development rights public officials confer and to gauge what the public can fairly expect in the way of public/private cost sharing for transportation needs. It should help warn of unsound investments, where a public investment would exceed either the public's ability to pay or the benefit to be derived. "Value assessment" also is useful after adverse impacts of a particular project are identified. It can help to accurately value what mitigating measures will cost, what the costs are to the total system as a result of adding incremental facilities and services, and what long-term expenditures will be required to maintain today's transportation improvements.

Improving Communication Among the Parties

The key to working successfully with neighborhoods and developers in planning activity centers, said Cox, is communication and understanding. The project and its implications must be fully understood by the neighborhoods and the government. Elected bodies tend to postpone decision-making when communities complain about inadequate understanding of the project.

Involving citizens early is important. When the costs of delay can run over \$2 million a month, getting everyone involved at the beginning seems a natural step. Kirk Williams, of Gary, Stahl and Spencer, suggested that finding the right neighborhood individuals, with the time and inclination to listen, is a key. An education process to explain development terms may be needed before negotiation can begin. And neighborhood representatives may want tangible evidence, like Planned Development Zoning Districts or deed restrictions, to be sure the developer will stick to his representations.

Cox also suggested that developers should be prepared to address neighborhood concerns in a realistic way and be willing to spend money to evaluate and resolve them. They also need to understand that neighborhoods have a legitimate interest and real power over elected officials. In a similar fashion, neighborhoods ought to do their homework by getting a good sense of their community's concerns, appointing good negotiators, and knowing their legal rights. Neighborhood representatives also should approach the process constructively and recognize that good development is an asset. Kenneth Voorhies argued that, as long as the process is political, politicians will tend to make decisions based on revenues or community image rather than neighborhood concerns.

Allocating the Cost of Infrastructure Improvements

No one disputes that MAC developers should bear some of the infrastructure improvement costs associated with their projects. In the past, however, these costs have generally been confined to improvements in areas immediately adjacent to their property. Generally, developer-sponsored improvements are road widenings, intersection improvements, and signal improvements, although occasionally they may involve major roadway links and interchanges.

Voorhies suggested that one way to fund these improvements is to require the developer to advance funds to cover construction costs into an escrow account to be drawn down by the developer as the improvements are made. Denver's quite different solution also has worked well. In the Denver area, the board of directors of the tax district are the land owners of office or institutional property. They decide which projects are to be built and what the schedule of construction will be. Tax money collected from property owners is used to sell bonds that then provide for engineering and constructing roadway improvements.

Finally, actually getting the improvements completed sometimes becomes an issue. Local governments can manage the work themselves, but this may not be the most efficient process. Voorhies believes that making developer-sponsored road improvements a condition of zoning has been most successful. Conditioning the receipt of building permits or a certificate of occupancy on the completion of road improvements would also be effective.

VIII. ANALYTICAL TECHNIQUES

The impacts of activity centers can be wide-ranging given the extreme variation in their characteristics. A variety of analytical approaches and methodologies are needed if impacts are to be anticipated and addressed.

According to Pat Costinett, of the Planning Research Corporation, analytical techniques which consider potential impacts and examine alternative solutions must be sensitive to: (1) the magnitude and extent of the impacts, (2) the level of disaggregation required, (3) activity center generated traffic vs. through traffic, (4) the dimensions of alternatives, including alternate land use mixes, (5) alternate staging plans, (6) alternate transport measures, and (7) the timeframe and technical capabilities available. Unfortunately, the lack of activity center specific data has inhibited the development of techniques sensitive to these concerns. Traditional sources of data are generalized travel characteristics from O-D surveys or trip generation models. There is a lack of data on trip distribution, modal split, time-of-day distribution, through vs. internal traffic, and demand management.

Fred Ducca underscored the need for allocation models which can address sub-regions as well as regions. Subregional models need to consider available land in terms of land and site availability and proximity to major highways and water and sewer service. If employment forecasting models are to be appropriate for activity centers they need to be sensitive to service sector employment.

MODELING SOFTWARE PACKAGES

In assessing the relevance of existing modeling software packages available for the micro computer, Phillipos Loukissas identified TMODEL (Transportation Modeling System), QRS (Quick Response System), and IMPAX (Traffic Impact Analysis), which can simulate travel demand for small urban sub-areas, as well as models which integrate urban land use allocation with transportation planning, such as ITLUP (Integrated Transportation and Land Use Package). Pat Costinett noted that software packages such as MICROTRIPS, MINUTP and TMODEL adapt conventional travel forecasting models by modeling all traffic through a subregion. They are large enough to encompass all significant traffic impacts and the effects of alternative improvement measures, yet they can disaggregate activity center related traffic by land use, mode, purpose, or time of day. They can incorporate internal pedestrian and transit demand and reflect actual parking facility location. Advantages of these types of models are that they permit consistency with regional forecasts and allow objective simulation of impacts on through traffic. Nevertheless, they include a considerable model set up effort.

In contrast to these broad-based models, Costinett pointed out that smaller micro packages, such as IMPAX and IRAP, can model activity center traffic alone. They use actual traffic counts, user-specific trip distribution and network routing. They are simpler to use and can be supported by generic spreadsheets and DBMS packages. The disadvantages are in time spent in manual coding and lack of objectivity. Potential data sources for either set of models are UTPP journey to work data, zip code surveys of employees, and computer processing of tax records.

MICRO-SCALE MODELING

Tom Noguchi, of Bellevue Washington, agreed that a large-scale regional transportation model is too gross and slow to be applicable to activity centers. He expressed a need for a micro-scale model which can depict a network similar to the actual physical and traffic conditions in a specific activity center location. He also noted the need for a micro-scale model to relate to the regional travel distribution pattern and a model capable of operating in an interactive mode.

Noguchi found that a sketch model was suitable for analysis of the capacity of a future transportation system as long as there was sufficient detail to reflect peak hour level of service. He also found that it is more cost-effective to use assumed values for transit mode split and auto occupancy as input rather than predicting them. To date, he has not found an effective way to model changes in travel pattern due to severe congestion in one or more corridors or to model non-home base trips during evening

peak periods.

Richard Thomas, Orlando Bureau of Planning and Zoning, also underscored the rationale for using available micro-computer software in simulating activity center impacts. Cost and time were major factors in Orlando's decision to use MicroTRIPS, an interactive microcomputer software package similar to UTPS, and IMPAX, an interactive microcomputer software package for traffic impact analysis of projects or subareas.

It also is essential to coordinate subregional thoroughfare planning with the activity center studies. Orlando's modeling was made compatible with the regional Orlando Urban Area Transportation Study (OUATS), although the OUATS models were simplified for application to microcomputers. The OUATS traffic zones were reduced from 722 to 103, and the number of roadway links were reduced through the elimination of centroid connectors and insignificant roadways. Nevertheless, adaptation of the OUATS process has enabled the city to exchange data with the State DOT and other local jurisdictions with relative ease. Data base management software (dBase II) was utilized to aggregate or modify OUATS socio-economic and link data files for subregional or activity center modeling.

Subregional impacts of an activity center can be analyzed by focusing on the center's primary impact area through refinement of the traffic zone system and roadway network. Impacts of proposed developments on the internal circulation system of existing major activity centers can be analyzed by windowing out the primary impact area and developing a detailed model of the area.

The recent experience of the City of Orlando indicates that microcomputer transportation modeling software is a reasonable and appropriate solution to the need to expand a local jurisdiction's transportation planning capabilities. When used in conjunction with other growth management 'tools,' microcomputer models can help local jurisdictions cope with the impacts of rapidly growing urban activity centers.

IX. CASE STUDIES

NEW JERSEY CASE STUDIES

Carolyn McCallum, New Jersey DOT, described the situation in the rapidly developing activity centers along U.S. Route 1 in New Jersey. Route 1 is a corridor route between two large metropolitan areas--Philadelphia and New York. Employers have migrated from the major urban centers to the suburban and rural areas along Route 1 because of amenities such as a lower rate of taxation, land for expansion, and an environment conducive to professional growth. The intense office development currently occurring in suburban areas is largely under the control of local and township municipal planning agencies.

The Route 1 corridor, betwen Trenton and New Brunswick, has been one of the highest growth professional centers in the country. An increase in employment of 78% and an increase in housing units of 63% is anticipated. This corridor is actually a series of activity centers located on both sides of the highway in 13 different municipalities. Recognizing the Route 1 Corridor's real estate potential for land development, the state Department of Transportation developed a Route 1 Corridor Advisory Committee. This committee is composed of local officials, area developers, state officials, and others. The primary objective of this committee is to improve the capacity of Route 1 to accommodate the traffic to be generated by new activity centers.

The Hackensack Meadowlands Development Commission was established in 1969 to provide for the orderly and comprehensive development of the Meadowlands and also to preserve the delicate balance of nature. Each acre of land is assigned a specific use as a part of the whole 31 square mile development zone. Certain areas are zoned as environmentally sensitive, which makes potential tax ratables unequally divided among the 14 municipalities. Therefore tax-sharing is employed for ratables within the Meadowlands. Presently the Hackensack Meadowlands Development District has 80,000 employees that commute daily. An increase of 50% by the end of the decade is expected. The Meadowlands Transportation Brokerage Corporation has been organized to develop a regional transportation program. Efforts include encouraging employers to appoint employee transportation coordinators, training these coordinators, determining employees' origins and destinations, identifying existing or required new services, and directing promotion of the most efficient services to their employees based upon their origins and group densities. The Brokerage Corporation facilitates contract with third party vanpool suppliers and charter bus services. Eventually, a telephone information system will be established to respond to public inquiries regarding commuter transportation. The Meadowlands Brokerage has been publicly funded by the New Jersey Turnpike Authority, the Port Authority of New York and New Jersey and by the Sports Authorities. After a 27 month start-up period, funds will be sought from private employers and from service fees.

In both instances, traffic congestion is an impediment to the full realization of development potential, and traffic conditions will worsen in the absence of private funding because public funding alone is grossly inadequate to finance needed improvements.

A number of remedies have been attempted:

Analyzing the overall problem. NJDOT is in the midst of a comprehensive analysis of present and future needs, with extensive interaction between NJDOT, other state agencies with jurisdiction, affected counties, municipalities, developers, and regional agencies.

Using regulatory powers to enlist municipal and developer cooperation. Developments requiring driveway access to state highways must secure access permits from NJDOT. In the case of the waterfront, developments are also subject to the jurisdiction of the State Department of Environmental Protection. Using such regulatory authority, the State can affect development plans, access provisions, etc.

Promotion of Public Transit as a principal means of access. NJDOT and its sister state agency, NJ TRANSIT, are attempting to preserve intact freight railroad rights of way along the waterfront for the construction of a future transitway. The two agencies are contemplating accelerated construction of a transitway in advance of the bulk of development in an effort to persuade municipalities and developers to count heavily on transit as a means of access to the congested waterfront, with corresponding downscaling of on-site parking and roadway plans.

It is too soon to evaluate the success of these proposed remedies. As part of the comprehensive analyses, NJDOT has retained specialized financial and legal counsel to analyze the equity and legality of various financing instruments.

Morton Goldfein from Hartz Mountain Construction also drew examples from New Jersey. He pointed out that the private sector has difficulty solving its individual transit needs in an atmosphere colored by regional problems. Goldfein underscored the importance of incorporating public transit planning into private consideration of MAC developments. Taking advantage of existing rail lines, reserving a corridor for future location of a transit option, and the use of private shuttles are examples of the type of opportunities that should be included in MAC planning.

PHOENIX, A CASE STUDY

Mathew Betz indicated that the "village" concept can provide an opportunity to shorten, disperse, and even change the mode of the home to work commuting trip. A key to the success of the village concept is to establish an activity center that provides a balance of economic and residential opportunities.

Prior to extensive village development, further research is needed on basic questions such as: what is the role of neighborhood activity centers; what is the impact of the electronic revolution as it applies to larger numbers of employees who may be able to conduct increasing percentages of their work at remote sites? How would this impact urban activity centers, neighborhood employment centers, the home, or even locations outside the metropolitan area?

Rick Counts, from the City of Phoenix, explained the evolution of Phoenix' Concept Plan 2000. The plan identifies nine village planning areas, each with a designated core or activity center. The City of Phoenix offers incentives to encourage the types of development desired in each of the planning areas. In addition to providing a community in which one can work, live, and play, the village concept will create nine "communities," each with distinct character and a sense of identity for its inhabitants.

William King, from the City of Scottsdale, discussed approaches used by Scottsdale to minimize transportation problems associated with urban sprawl. Scottsdale has identified three types of activity centers, and has placed them in strategic locations that help reduce the number of trips generated. The three types are:

 Neighborhood Activity Centers - located away from the major arterials.

- Community Activity Centers located on major arterials.
- Regional Activity Center (Downtown) one large area, very focused, and usually providing a variety of activities.

In downtown Scottsdale, the road system has been developed to alleviate some of the congestion created by activity centers. The system carries automobiles around the area, rather than through it, and internal circulation is designed to minimize traffic.

X. SUMMARY

Reports from each of the seven workshop sessions attempted to summarize observations and identify potential research areas.

Access and Parking

Frank Daro noted that there is a lot of concern about the effect of major activity center traffic on through traffic. A central problem is how to reduce the trips that are generated from major activity centers. Two areas that require more research are the development of detailed design standards for roads serving activity centers, and the need for better tools to control development.

In order to plan for auto access, we need some idea of what size MAC will develop. What is a reasonable size and should limits be established?

Concern was expressed that there are not adequate mechanisms to get developers to share the infrastructure cost and to be assured that such mechanisms are fair and equitable.

Another topic was: what level of services is acceptable? People may be willing to accept a higher level of congestion.

Transit Access

Art Black presented the comments from the Transit group. The overriding issue which the group identified was mobility in the suburbs. That issue will rise to the top of the transportation agenda in the 1990s and along with it concern about the type of institutional arrangements which should be established to promote high-occupancy vehicle transportation.

The second major focus was on transit impacts on major activity centers. Transit carries 5 to 10 percent of travelers, and there is little indication that this percentage will increase. However, major activity centers have formed coalitions of major employers that are employing transit services. Transit is not generally designed to be able to respond to fast breaking development projects.

Internal Circulation

In summarizing the observations of the internal circulation group, Tom McGean commented that it is important to the activity center that pedestrians have uninterrupted access throughout the center. Often a major arterial road, cut through the activity center area, disrupts

pedestrian circulation. Public/private cooperation is often necessary to accomplish free pedestrian flow. This is especially true when one developer does not control the whole development package. If circulation cannot be handled with walking, the next approach is to use some form of The routes must be clear and the service bus. must be frequent. This is very important in activity centers where the trips are going to be only a few thousand feet. If the headway interval is too long, nobody will use the service. The type of bus used has a strong influence on whether it will be used. Instead of a conventional bus, which is big and noisy and out of scale in an activity center, a lower performance vehicle like a trolley bus or a futuristic, disneyland system may be more appropriate. Transit should be fun, and an activity center should be exciting. Transit should have appeal, not just provide a transportation service. One limitation on operating buses below a 15 minute headway interval is bunching-up and schedule maintenance. There is bunching-up and schedule maintenance. are some new technology solutions which involve automated vehicle location and make 6 minute headways feasible without severe schedule problems. If the headway needs to be shorter than 6 to 10 minutes, the capacity need is greater than that which can be handled with small vehicles.

For higher capacity vehicles, the group discussed automated people movers. There are examples of automated people movers being used in airports and some college campuses. People movers do not have a driver, and consequently there is no labor cost to limit the frequency of services. The problems are the initial capital outlay, vehicular operating costs and the need for on-site maintenance. It was noted that cable systems can cost half as much as regular automated people movers.

Land Use Management

There was general agreement that a cooperative relationship between the public and private sector should be fostered and based on compromise between the groups. The public agency should be ready with good basic urban design proposals for the development area and allow the planners to act rather than react. The trend in courts is to require zoning to be consistent with the plans. There is a need for an overall policy on development; zoning or rezoning should not be done on a case by case basis.

Planning with the Community and Developers

The group discussed how to involve the public in major decisions and how to identify their values and integrate them into technical decisions. The process of siting and building an activity center is a political as well as technical process. There seems to be agreement that, in addition to the technical experts, public acceptance also is needed. At what point should citizens get involved? There is a risk of involving them too early. The precise timing is still uncertain, but it seems better to involve the public early rather than wait for them to react at the end of the planning process. If concerns and issues that people have are taken into consideration early in the process, perhaps the solutions will achieve a more realistic compromise. It is important to understand each party's agenda and how far each party is willing

to compromise. What is suggested is not a formal negotiation process, but an early awareness process. This is far more productive than getting to the point of conflict where one side is marshalled against the other. The positive approach is to get things resolved before there is confrontation on non-negotiable items.

Financial Planning

The five points of good financial planning in order of importance are: first, there is a need for clarity of community objectives in the process of negotiation between the developer and public agencies. When public objectives are not sufficiently clear, there is no way to tell what is being bargaining for. The community must decide: does it want ratables; does it want jobs; or does it want development? Second, the developer or the land owner is expected to be more involved in financing transportation improvements in the future. Therefore, there is need to examine the many devices that are available for that purpose, such as special assessment districts, tax increment financing, or exaction fees.

Third, the question of fixed or variable development fees was argued both ways. Fixed fees, such as an increment value tax or unit cost of so many dollars per square foot, would be equitable for everybody. The opposite would be to have a variable development fee, such as the Broward County Florida Computer Program where each individual developer's impact fee is separately calculated. Fourth, costs which can be measured and calculated should be tempered by the benefits which are generated by the development. This balancing of costs and benefits is more acceptable from the developer's standpoint. Fifth, new tools and models are needed. Without a usable model. all parties to the negotiations are speaking different languages in terms of the accounting that is used.

Techniques and Models

Because of the physical size of activity centers, there are questions of precision in the use of simulation techniques. A concern with the simplicity of some of the techniques was raised. Some of the simple techniques tend to break down when used to analyze large centers or in the face of interaction among centers. Large groups of centers may require much more comprehensive and more resource-consuming techniques than small centers.

The group concluded that they did not see much hope for projecting the location of centers in a region. Models are reactive in that transportation generally accommodates activity centers. Having said that, the group also spoke of the necessity for identifying activity centers early in their development, recognizing that they take a period of time to grow. Analytical techniques do not provide all the answers, but they can be helpful. In addition, they serve a very useful function of communication among the various participants in the development process.

Overview

Bruce Douglas summarized the workshop by noting that awareness of MAC transportation needs

has become acute and universal. More importantly, the general perception of the nature of the transportation needs has changed. If this meeting had been held 20 years ago, the discussion would have focused on regional rail transit and high speed transit. Fifteen years ago, it would have been about connecting MACs with regional rail systems and bus systems. Ten years ago, it would have been about light rail and bus-ways. Five years ago, the focus would have been on car pools, van pools and TSM. Today, we are talking about public-private cooperation.

We acknowledge the existence of local jurisdictions, developers and neighborhood citizens as stakeholders in the process of MAC development. We accept the fact that each group has a legitimate view point, and that we must better understand each other and negotiate for an equitable distribution of all the costs among all the participants as well as an equitable distribution of benefits.

The relative influence of developers and local agencies does vary in different locations. It appears to relate directly to the market strength of the particular region, and on how much power the public planning process has. Trying to stop an activity center or slow it down may really only change its location as developers look for a favorable climate for their projects.

Several major research topics were identified in the workshops. These were:

- Private/public negotiation techniques and concepts of cost and benefit sharing.
- Improved design standards to support local decision making.
- Increased knowledge about the travel behavior to MACs and differences with travel to CBDs.

A casebook of documented solutions with attention to the hazards of transferability of results from one region to another would be a valuable tool for everyone. This workshop has heightened our awareness of the present and anticipated transportation challenges of Major Activity Centers. PARTICIPANTS

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