TRANSPORTATION CENTER

TRATEGIES AND OPTIONS FOR DEVELOPMENT OF THE CHI :GIONAL PASSENGER TRANSPORT NETWORK TO THE YEAR

by

James A. Bunch
Joseph L. Schofer

RESEARCH REPORT

NORTHWESTERN UNIVERSITY EVANSTON • ILLINOIS

STRATEGIES AND OPTIONS FOR DEVELOPMENT OF THE CHICAGO REGIONAL PASSENGER TRANSPORT NETWORK TO THE YEAR 2000

by

James A. Bunch
Joseph L. Schofer
Northwestern University

Prepared under the auspices of the Illinois Universities Transportation Research Consortium

for the

Metropolitan Housing and Planning Council
Chicago, Illinois

July, 1982

EXECUTIVE SUMMARY

Strategies and Options for Development of the Chicago Regional Passenger Transport Network to the Year 2000

James A. Bunch
Joseph L. Schofer

The environment affecting the performance and development of the passenger transportation system in the Chicago area is changing. The physical system is aging, population and employment are shifting in location, costs are increasing, and the financial base is growing more slowly. Contemporary approaches to transportation development, which treat needs, functions, and finances of each part of the system, and each mode, as independent, will not provide the cost-effective transportation services this region will need in the next two decades.

Instead, a wholistic management strategy is required which explicitly recognizes the need for flexibility in resource allocation between modes and jurisdictions, the functional interactions between transit and the auto, the relative differences in efficiencies of competing technologies, and the need to disinvest--as well as to reinvest--in transportation facilities and services. Under such an approach, special attention must be devoted to distributional effects and to the long term implications of politically attractive short term choices.

Consideration of major new structural development options for the development of the region's transportation system must recognize the emerging population and employment patterns, changing economic base, resulting trends in travel demands, and the performance and costs of the existing system. The menu of development options in this report responds to three alternative scenarios defined in these terms and emphasizes the potential advantages of disinvesting to eliminate unnecessary service duplication and carefully directed investment to strengthen a multimodal, polycentric transportation network.

Future transportation investments must be coordinated with other public policies from the wholistic perspective of the good of the region, because resources and opportunities are scarce and must be shared. This requires coordination and cooperation in regional decision processes, as well as rationalization of the institutions which provide transportation policy analysis.

STRATEGIES AND OPTIONS FOR DEVELOPMENT OF THE CHICAGO REGIONAL PASSENGER TRANSPORT NETWORK TO THE YEAR 2000

I. INTRODUCTION

As we proceed into the decade of the 80's it is apparent that major changes are occuring that effect the Chicago region's transportation needs and desired future transportation system. This paper reviews and evaluates strategies and options for the region's passenger network over the next 20 years in light of these changes. The primary concern is with the fixed system, or infrastructure, due to its permanance, resistance to change, and effects on other systems. It is written in three major parts. The first focuses on the critical strategic issues in system planning and development; the second explores key trade-offs to be considered; the third investigates the spatial opportunities for investment, reinvestment, and disinvestment under the 3 MAP 2000 scenarios.

Several initial premises and assumptions are important to this work. First, we are in an era of increasing resource and fiscal scarcity. This increases the opportunity costs of transportation decisions and requires increased scrutiny of the alternatives and their impacts. Second, a wholistic development approach, in terms of the region and the entire multimodal transportation system, is needed. Resources are no longer available to endorse counterproductive policies that pit highways against mass transit, encourage inefficient growth, and ignore future operating and maintenance costs. This calls for a new philosophy of planning and decision making. No longer can the present system be taken as fixed or preservation of the investment in the existing system be "the governing aspect of the plan" (36). Instead investment and disinvestment should be examined under the goal of providing a system that will best meet the changing needs of the region. We must change from

approaches designed to foster the best, short-term, incremental growth to policies designed to rationalize our transportation resources to the highest degree possible.

II. INVESTMENT CONCERNS AND STRATEGIES

The New Planning/Decision-Making Environment

The emerging planning/decision-making environment in Chicago and the nation is characterized by three attributes: 1) shift in population to the suburbs, 2) increase in financial constraints; and 3) deterioration of the existing infrastructure. The 1970's saw a reversal of population trends with a decline in Chicago's central city by 10.6% to approximately 3 million and an increase in suburban cities by 13.5% to 4.2 million, resulting in total overall growth of only 1.8% (43). This decentralization is expected to continue to the year 2000 along with an aging of the population and decrease in household size. This has several effects on transportation. First, it causes a change in needs: as the population shifts so does the demand for travel by type and place. Second, it causes underutilization of existing infrastructure and increased demands for new infrastructure, thus increasing costs. A 1979 NIPC study found that arresting the present trends of sprawl could save roughly 9.4% in future public capital costs of the area, and reversing the trends could save up to 16.7% (27). Finally, since state motor fuel tax road fund allocation to local jurisdictions is now based upon population, the trend in the distribution of available funds is from maintenance and improvement of older, built-up areas to new investment in developing areas. This reinforces suburban sprawl.

Next, there has been a severe tightening of both capital and operating financial constraints. The Reagan administration, both as a matter of poli-

tical philosophy and in response to the federal funding crisis, ushered in a new era of fiscal austerity at the national level, affecting federal grants to state and local governments. For example, the new federalism will eliminate UMTA transit operating subsidies by 1986, and capital grants for transit are to be reduced by as much as 16.5% (32). Also, there has been a drop from $500 million to $322 million from 1979 to 1982 in Federal road funds (9) to Illinois. As a result of a 10% drop in fuel consumption, Illinois' own motor fuel tax fund lost $45 million in 1980. And while the Interstate transfer funds traded for the abandoned Crosstown Expressway are providing a one-time shot in the arm to the transportation system in the Chicago area, these long term trends are ominous. The Chicago Area Transportation Study recognized this in the financially constrained forecast in its 2000 plan update (5). However, the forecast is still optimistically based on zero real growth in capital funds. This would require an increase in dollar amounts which is extremely doubtful.

Finally, we are facing the concomitant deterioration of our transportation infrastructure. It is, quite simply, wearing out. At the state level 1,100 miles of state maintained roads and 3,900 miles of local roads fall into disrepair yearly. Illinois could fund only 800 miles of these repairs in 1982 and the gap is growing (9). Nor is Chicago immune to this trend. Maintenance has long been deferred on its 52 movable and 36 fixed waterway bridges. Now the cost of the new Columbus Drive Bridge alone amounts to $32 million (11). Also much of the approximately 1,000 blocks of vaulted sidewalks built after the Chicago fire need replacing with costs as high as $1 million per block (11). Indicative of the problem is the recent closing of the Dorchester Bridge on the CTA Jackson Park rapid transit line due to deterioration and deferred maintenance. The resulting shutdown of the Jackson Park line has

left the city in a position where a serious--though perhaps not untimely--investment/disinvestment decision must now be made. Most desirably such infrastructure change decisions should be made in a longer term framework, rather than being forced due to neglect.

The overall effect of these changes is a spatially shifted need for service, along with increasing maintenance costs and decreasing available funds. We have reached the zero-sum future where the opportunity costs of tradeoffs among investment options affect not only future system development, but also the viability of key components of our existing transportation system. This calls for a rethinking of the problem as MHPC suggested in its critique of the 2000 plan (20). Rationalization and the examination of investment, reinvestment, and disinvestment are now needed. Despite this, most planning continues to place maintenance and preservation of the existing system above all else. CATS does state, however, that:

> Should the present and expected near-term reductions in federal funding continue, a substantial reevaluation of the policy of funding all preservation before allocating funds to arterial improvements and new facilities will have to be made. If this evaluation indicates that insufficient improvement and expansion is possible, the 100 percent preservation policy may have to be changed to a new mix of preservation, improvement, and new facility accomplishments. (5, p. 3)

Incremental Transportation System Development

In the current planning/decision-making environment, major modifications to the transportation system should be aimed at producing the largest net social return, defined in broad terms, given constraints on available resources. This requires a realistic treatment of the travel demand and transport-related needs of the region: not all needs can be met; not all services must be retained; and future growth need not continue unrestrained. Both planners and decision makers must develop a shared concept of the desired, integrated

functioning of the regional transportation system. Major changes should then be chosen for their contribution to the performance and cost of the system, not as a collection of local solutions to local problems with potentially conflicting results.

The planning and choice strategy should shift from incremental system development to wholistic rationalization. Past planning has been dominated by the incremental approach, under which the present system is treated as fixed, only incremental investments are examined, and only one or two primary goals are used to define problem areas and generate solutions.

The incremental system development approach treats the present system as fixed. CATS 2000 Plan Policy I states "The region's transportation system, both now and in the future, must be maintained in good operating condition" (4). In periods of growth, this is not unreasonable, since need and demand grow rapidly in some areas and will not decrease significantly in others. Thus, no major additional inefficiencies will result from retaining the present system. In the current environment, however, relative need and demand are changing and fixing the present system, a priori, limits options and may lead to poor use of resources.

This incremental philosophy implicitly presumes that population and travel demand will and must grow without restraint. Future demand is projected based on favorable assumptions about the price of travel, resulting in potentially inflated estimates of congestion and capacity deficiencies. All of this supports continued expansion and extension of the existing transportation system.

Much of the long range planning conducted under this philosophy focuses on the 15 or 20 year future with insufficient concern for achieving the transition from present to future and for what environmental and policy changes may

take place in the meantime. Yet there may be transition strategies which can be used to shape the future system requirements and impacts. Transition is critically important because we are always on a transition path to somewhere, although occasionally we change the destination--or it is changed for us.

Congestion as a Rationale for Transportation Investment

Commonly, only one or two goals are used to define local problems and generate solutions. Projections are made, areas of concern isolated, and local solutions generated to meet them (under an increasingly unacceptable assumption of ceteris paribus); only then are total systems evaluated using the full complete goal set. This may create a fragmented collection of improvements, more a list than a plan, placing undo importance on meeting the primary rationale--sometimes with undesirable overall effects.

The two most common rationales for investment are relief of congestion, mainly used to identify highway improvements, and promotion of development, used primarily to define transit improvements.

The elimination of present and expected congestion is the dominant rationale for highway transportation investment in the nation and in Chicago: "The existance of congestion is taken as irrefutable evidence of the need for remedial action, which virtually always takes the form of providing extra capacity" (15). Congestion is a crude indicator of need, since it is associated with large short-term costs including frustration, time loss, accidents and lower mobility. However, this does not mean that all congestion is bad or that capacity expansion is always the best way to deal with it.

In the CATS 2000 process, one of the first steps was a "deficiency analysis". Congestion drives the search for a plan, which begins with a "deficiency analysis", the results of which were then "used to target those areas or corridors where major new facilities appear needed in the future" (3). This

can become self-defeating, since expansion of congested links may attract travel to them, recreating the congestion a short time later. More importantly, as the 2000 Plan points out, there are not enough funds available to remove all congestion-defined deficiencies in the region. This suggests that additional criteria other than congestion are needed to decide where to invest. Furthermore, system interconnections, within and between modes, may result in sequences of effects which move away from higher level goals. For example, expanding and straightening the Outer Drive could divert travel from the Edens Expressway and the rapid transit system, potentially shifting congestion or creating bottlenecks elsewhere, particularly into the Loop. Finally, setting congestion as a primary objective ignores the possibility of using it as a pricing tool. Since congestion increases the cost of travel, it can serve as an auto-disincentive to divert travel to transit or, in the long run, to encourage new development to shift to other places in the region. While we don't propose that all congestion is good, it's not all bad either, and trying to eliminate it is not only unproductive, it is probably impossible.

Development as a Rationale for Transportation Investment

Development benefits have been used as a primary rationalization for transportation (especially transit) investment. In theory, transportation investments can be used as catalysts for new development in both old and new areas. This is a "leading" policy which calls for investments to be made before the demand actually exists. However, while it cannot be denied that transportation improvements helped spur development in the past (e.g., suburbanization), it is not clear that they will have the same impact today. While

some past transportation improvements (e.g., radial freeways and transit lines) led to large relative increases in accessibility, achieving such increases today is more difficult.

Early transportation improvements brought major new areas of land within easy access of the central city. Such large changes in access, along with people's desire for low density living, spurred suburbanization. Today, however, most urban areas have a nearly ubiquitous highway system and any improvements, highway or transit, can produce only marginal increases in accessibility. This drastically limits the development impacts of new transport facilities (21, 1).

Furthermore, transportation only supports development, and a number of other factors must come into play before development actually occurs. Knight and Trygg list among those factors determining CBD development impacts of rapid rail transit: a strong demand for new office and retail space; the availability of land; the placement and access of the stations; and other public investments. For non-CBD development, they add neighborhood political support and social and physical characteristics of the area (16). Other factors that influence developers' decisions include tax and utility rates, financing, zoning, market analysis, competitor activities, personal preferences of top executives and the rate of return on private investment (38). Thus development very much depends on overall trends and conditions in an area, on which transportation has only limited impact. What transportation may be able to do is direct and control the development along the lines of existing trends. Thus transit access and availability of parking may become important to site selection once the decision has already been made to locate in an area.

For example, San Francisco's BART had no discernable impact on the share of the BART area's economic development once the growth already occuring had been accounted for (1). BART did seem to help redirect San Fransico's downtown office growth to the immediate vicinity of its Market Street line (1). Development did not occur around BART's suburban stations because of restrictive zoning, lack of support services, and lack of demand. Cleveland and Chicago both show weak development around transit in the absence of supporting factors. The development potential of rapid transit lines on highway rights of way is weaker still because transit improves accessibility very little in the corridor and station access is poor (17). Reviewing the Toronto, Montreal, San Francisco, and other systems, Knight and Trygg concluded:

> "...major (rail) transit investment is neither a guarantee of massive land use impacts nor a 'failure' in the generation of such effects. It is a powerful but incomplete force for land use change, one whose effectiveness can be great but depends on the presence of complementary forces." (16)

Bus systems have even less potential impact on development. Their dispersed nature and flexibility neither concentrate activities sufficiently nor provide the confidence needed for private investment: "Busway improvements have had no discernible impacts on land use to date"(16). However, the busways studied were not coordinated with land use and ran along highway rights of way, diluting their effects. Paaswell and Berechman, et al., also point out that relocation of bus stops or creation of express bus routes do not catalyze new development by themselves (31). However, when focused on transit centers and coordinated with other policies in growth areas they may have the ability to redirect and concentrate growth (38).

While radial investments may not produce large development impacts today, this may not be the case for circumferentials, which are particulary weak in the Chicago region. Beltways have been credited with a significant effect on the redistribution of suburban vs. CBD retail growth (24). A study of 6

cities (3 beltway, 3 non-beltway) found that in those without beltways, CBD retail sales grew 18% from 1963-1972, while beltway city CBD sales declined by 7% (24). A more recent study found that beltways "appeared to stimulate development in growth areas but to be incapable of inducing development in an area with a poor image"(33). Specifically, beltways can draw multifamily units; have a "one time" effect on the distribution of new office construction away from the CBD; have a small but statistically significant effect on CBD wholesale service and industrial employment; and, when the conditions are right, promote compact development in the surrounding area. While downtown redevelopment efforts may compensate for the short term effects of beltways on the CBD vitality, long term effects (e.g., location of major suburban shopping malls) are more questionable.

In general, justification of major new transportation investments on the basis of development promise needs to be approached with considerable caution. Even where such impacts seem likely, a more critical issue is determining which development patterns are truly preferred. While a land use "plan" exists for the Chicago region, it is not at all apparent that this represents either a consensus or a commitment. The political and tax advantages to a local jurisdiction associated with new development offer powerful incentives for each community to compete for new development irrespective of the plan or the subsequent regional infrastructure requirements and environmental impacts.

Wholistic Transportation Planning and Decision Making

In this era of limited resources and limited new development, planning and decision making should be firmly based on wholistic rationalization, where a real choice is made regarding desired and affordable development patterns.

Such a choice should strongly influence not only transportation actions, but also decisions to provide water, sewer, and other essential services. The critical problem to be faced is: how can such a regional choice be made? To this there are no easy answers, but among the more promising options for facilitating such choice are:

1. Change real estate and sales tax collection and allocation processes to reduce the powerful incentive for independent community decision making regarding infrastructure investment and land use regulation;

2. Create strong intergovernmental councils to promote meaningful discussions of goals, options, and externalities associated with individual major actions; and

3. Establish a mechanism whereby proposed major actions with significant spillover effects on regional infrastructure are carefully, and publicly, scrutinized.

The time has come when it is increasingly clear that some degree of community autonomy of positive action must give way to a shared concern for the viability of regional economic and social systems.

Such a wholistic approach requires a cohesive vision of the area's transportation future, including generally desired future land use patterns and mix of auto and transit services. This should provide a stronger, systematic basis for evaluating changes in both land use and transportation. This is a much broader concept than used in the past, since it requires that explicit tradeoffs be considered to attain overall regional objectives.

Under this approach the present system is no longer presumed fixed. Population, employment, and age characteristics are shifting in the Chicago region, changing future transportation requirements. A future of limited resources requires that we evaluate the present transportation system to identify opportunities for shifting resources to meet new needs and produce a larger net-social return.

Both leading and lagging policies should be used to make the transition to the future system. Leading policies encourage or inhibit change, preceding the trends or changes that take place. For example, expanding transportation facilities to promote growth, or maintaining them to inhibit decline are leading policies. Leading policies require an active, causal role in planning and choice and demand a consensus on what we want the region or its parts to be like in the future.

Lagging policies respond to environmental changes. Thus, once growth or demand in an area reaches a certain level, it may be appropriate to meet it through transportation improvements, even if the development in question is inconsistent with the overall goals of the area. Lagging policies are particularly appropriate where the future is highly uncertain, or where it is impossible to achieve a consensus on what development patterns are most desired.

Leading and lagging policies recognize the supportive role that transportation plays in the region. While it cannot reverse large scale trends it can redirect them, speed them up or slow them down. This role should be used to its fullest advantage.

III. EMERGING TRADE-OFFS IN TRANSPORTATION CHOICE

General Issues

The new planning/decision making environment and the wholistic approach introduce several concerns and tradeoffs that the region must deal with in making its transportation decisions; these include: 1) financial flexibility; 2) transit vs. road expansion; 3) the effects of capital investment on operating costs; 4) implications of rationalizing the system, i.e., investment vs. reinvestment vs. disinvestment, regional vs. local perspectives, and distribu-

tional issues; and 5) long term impacts of investments for the 1992 World's Fair.

Flexible Resource Allocation

To apply the wholistic approach there must be flexibility in allocating the region's resources spatially and across modes. At present there are restrictions on resource allocation that make this impossible. First, each mode has its own funding mechanisms and operating agencies. Transit receives its funds through UMTA, the RTA sales tax, the state (capital funds), and local sources. Its operating agencies include the RTA, CTA, suburban bus companies and commuter railroads. The road system receives its funds from the federal highway trust fund, the state road fund, and again local sources. It is constructed and maintained by IDOT's Department of Highways, and other county, township, and municipal road departments and districts. The actors in each of these modal systems attempt to maximize attainment of their own goals and seem unwilling to compromise to other views. Typical is the RTA staff's response to NIPC's policy of only providing transit service to municipal service areas (areas with the ancillary services to support growth). They indicated "that until such time as a definite causal relationship can be established. . . . they will program as if bus service exerts no development impact" (14). Whether or not bus transit itself can trigger development, its presence may increase the pressure to provide the other essential services that do. NIPC's essential point is that this is a waste of resources that could be used elsewhere in the service areas.

There are restrictions on where the funds can be spent as well. The RTA is required to allocate funds yearly equal to 100% of RTA taxes raised in each area for facilities and services that benefit residents within that area

(12). Also, the motor fuel tax is distributed to political units by formula allocations; for example, to municipalities according to population; to counties according to the motor vehicle license fees collected; and to township road districts according to road miles (13).

The effect of these modal and spatial restrictions is to limit the tradeoffs that can be made in solving transportation problems. They divert concern from how to provide the best overall system to sub-issues such as the distribution of transit services irrespective of demand or road capacity. Structural changes are needed to achieve wider flexibility and a broader perspective.

Transit/Auto Trade-Offs

A key investment tradeoff involves determining the appropriate mix of transit and road investment for each area. One of the area's stated goals is to "provide cost effective alternatives to private auto travel in already developed areas, major activity centers, and areas designated for urban densities in municipal, county and regional plans" (5). This, plus the growing desire to make transit fares cover a significant part of operating expenses, require that the tradeoffs between transit and road investment be recognized. It is well known that the characteristics of each system effect one another and changing their relative cost will alter their market shares. Cross elasticities of transit share with respect to auto service changes have recently been found to be $\approx + .85$ for changes in auto costs and $\approx + .32$ for bus and $\approx + .86$ for rail due to changes in auto travel time (19). Thus, a 10% increase in auto travel time where rail exists as a feasible travel alternative has, on the average, been found to result in an 8.6% increase in rail passenger volume. This suggests the possibility of using increased congestion

on highways, perhaps achieved by not increasing capacity in response to demand growth, to divert riders to transit (if it is available and of reasonable quality). Therefore, in corridors where it is cost-effective to maintain and/or increase transit usage, competing roadway improvement projects should not be pursued with the erroneous assumption that transit will be unaffected. An example of potentially conflicting projects is the proposed southwest rapid transit line and the contemplated south loop distributor designed to improve auto access from the same direction. The economic interconnections between modes should not be ignored. Courageous decision makers concerned for cost-effectiveness should consider taking advantage of these relationships.

Furthermore, each mode has specific operating characteristics that make it better suited for different environments. In deep suburban areas a road system, carrying private autos, is the most cost-effective means of providing mobility. Here travel requirements are so diverse, dispersed, and infrequent that the externalities of auto use are low and provision of public transit ineffective. As population density and passenger travel demand in specific corridors increase, the spillover costs of the automobile increase, including air pollution, noise pollution, energy use and congestion. Transit technologies, however, become more efficient and cost competitive. The unit travel costs for different technologies change as a function of travel volume as shown in Figure 1 (41), suggesting that as demand density increases, the benefits of higher investment per capita go up for transit and down for roadways. This causes the optimal mix of investment to shift (indicated in Figure 2).

In a future of limited funding, the advantages of each mode should be used to provide the best overall system in terms of access, external consequences, and costs. This calls for systematic planning, decision making, and finance that recognizes the tradeoffs and advantages of each mode.

Figure 2 suggests that political concern for the distribution of investments and services of each mode separately may be counter-productive. The logic of economics demands that urban areas receive more transit service, and higher technology service, than rural areas to take advantage of transit's operating characteristics; rural and low density suburban areas should receive more road investments per capita. Also, within each mode, technology should be selected and adapted to meet the contextual requirements. Paratransit appears the most viable technology for the lowest density areas; as density increases, Jitneys, line haul bus, reserved lane bus, light rail transit and finally grade separated heavy rail become cost-effective.

It seems highly unlikely, given population and employment density patterns in existence and likely to develop in the region in the next 20 years, that it will be possible to justify major new fixed guideway transit facilities, at least on purely economic grounds. That is, unless a radically more efficient technology emerges, it is likely to be cheaper (in dollars per passenger trip) to provide any reasonable level of service on new transit with flexible, bus-like technologies than with fixed-rail-type systems. Support for such investments, if it is to come, must be based on other, more uncertain, benefits such as potential land development impacts and equity in quality of service distributions. Rather than searching for opportunities to expand (significantly) the fixed rail system, it appears more sensible for the region to husband scarce resources by maintaining required existing services and investing in only the most cost-effective new services.

In some cases, large fractions of the capital resources, such as rights of way or even guideways necessary to implement higher technologies, may become available at low cost. For example, the San Diego light rail line operates on a roadbed purchased at very low cost from an intercity railroad.

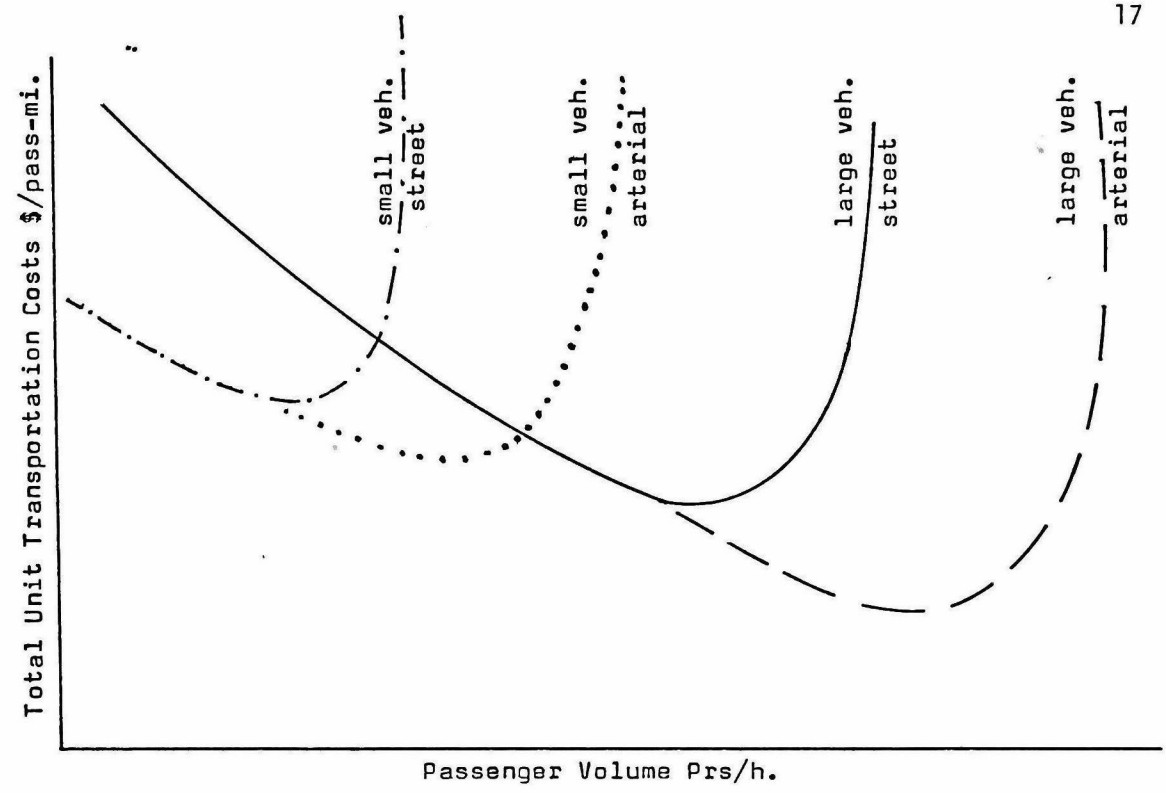

Figure 1. Unit Costs With Respect To Passenger Volume (from 41).

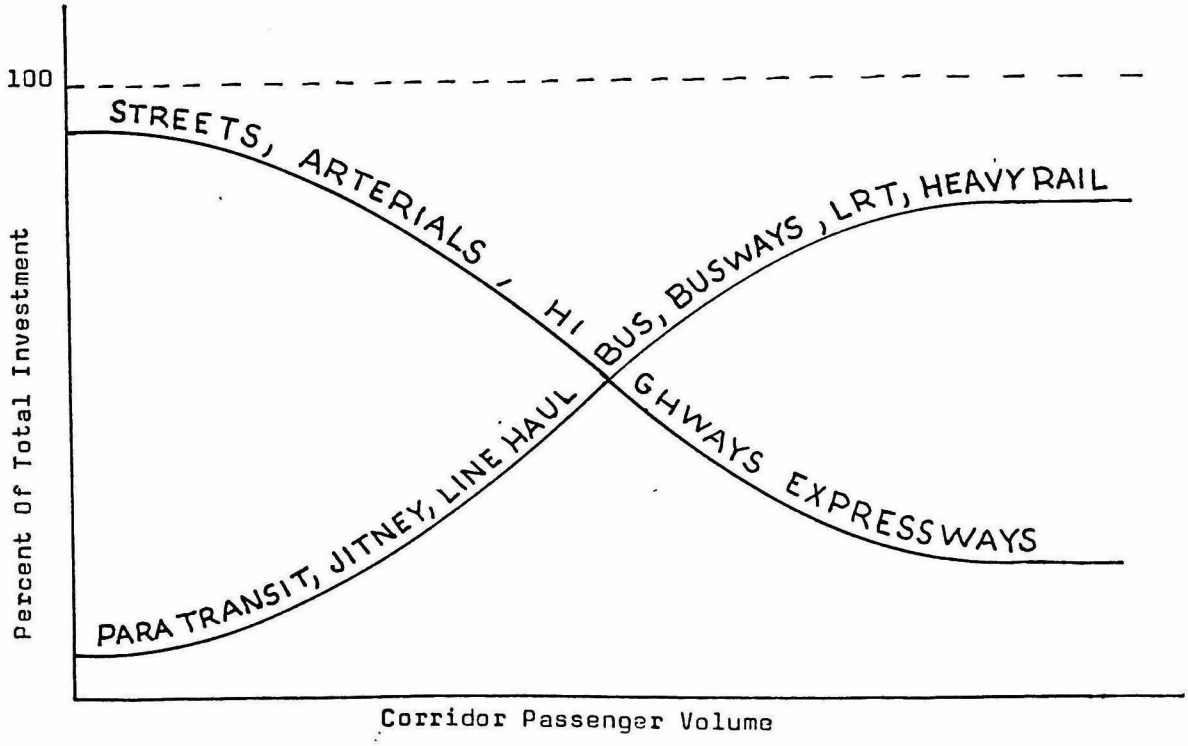

Figure 2. The Optimal Mix of Transportation Investment

Dallas is considering a light rail line to be built on right of way donated by private developers. The effect of such "discounted" capital costs is that they may move a high priced technology down the cost scale, making it cost-effective for relatively lower corridor volumes. Even in such cases, however, it is important to examine life cycle costs, including operating and maintenance costs. Higher technology systems, especially rail systems, tend to be quite costly to operate (37). Even with heavily subsidized capital costs, such technologies may not be justified by the suburban demand densities in the Chicago area.

Definition of Baseline Service

Tactics for allocating service units to parts of the region, commonly bogged down in the uncertain politics of an ill-defined concept of equity and short-sighted struggles over relationships between subsidies, taxes, and service, may be improved in the long run by developing the concept of baseline service. Baseline service would define, in general, preferably multi-modal terms, the minimum reasonable, feasible, and economically supportable transportation service for each subarea in the region. The baseline would likely be a function of demand density, or more simply population and employment density. It could be defined for fairly large, demand-homogeneous subareas (e.g., Chicago CBD, other Chicago, older suburbs, newer suburbs, hinterlands); clearly the baseline levels should be evaluated and adjusted periodically (e.g., every five years).

Such baselines might be defined in terms of service density (e.g., route miles/square mile) and/or quality (e.g., access time including time to boarding points and waiting time for service). Generic, non-modal definitions should permit selection of the most appropriate way to provide a given ser-

vice. While the political negotiations associated with establishing baseline service standards will not be simple, once defined, the design, delivery and management of service may become more systematic and more open to public accountability in the light of careful economic judgment.

Subareas and communities demanding more intensive (and expensive) service would, under this concept, be required to pay the incremental costs or to document the existence of a clear, manifest demand. The latter would require collection, on a regular basis, of more useful data on service utilization which documents who (i.e., residents of what community) is using what service. Such data, not now generally available, would be of considerable value in service management and allocation.

The baseline concept should be based firmly on the concept of multimodal service management, recognizing that, within limits, auto service and transit service are substitutes. Still, the need for minimum service levels on both modes is clear, though minima are a function of area type. Thus, some form of transit is desirable even in the hinterlands to deal with emergencies and meet the requirements of the elderly, young, poor, and autoless population. Even in auto-dominated suburbs 7.5% of the households (19.6% of black households) do not have cars (26). A greater intensity of transit service can be justified in some of these suburbs: probably demand responsive service in the far suburbs; and fixed route/schedule service in near suburbs, many of which are experiencing population aging and already exhibit demand densities calling for such service.

Generally, service allocation should be founded on cost-effectiveness, and a recognition of 1) the opportunity costs associated with committing resources in a given way and 2) the aggregate, long term costs of operating the entire transportation system of the region.

Capital vs. Operating Costs

Any consideration of major capital investments should explicitly address life cycle operating and maintenance costs. MHPC has pointed out that "there is no discussion in the (CATS) Year 2000 Plan of the future maintenance implications of the different kinds of projects proposed" (20). This short-sighted, incremental approach ignores the total cost of delivery of regional transportation services, making it easy for election-minded officials to justify large, high visibility investments. By separating capital and operating cost decisions, investments are made with little or no consideration of how we will sustain them. In part this philosophy has helped put public transit finances in their current state, and has permitted the development of a highway system we are unable to maintain.

The implications of any (major) new transportation investment for operating deficits (and thus fare increases, subsidy increases, or competing service cut backs) should be considered publicly and explicitly. A recent example of the current problem is the analysis done for the O'Hare CTA rail extension. In the final Environmental Impact Statement, the annual transit operating deficit added by the O'Hare extension was estimated at $3.115 million in 1977 dollars (40). This has since been updated to an estimated $4 million in current dollars (8). In the document the statement is made that "the operating deficit will need to be met by subsidies from the regional Transportation Authority" (40). The implicit assumption behind this is that the decision makers will recognize the added benefits of the O'Hare extension and grant the additional subsidy requirement. However, this assumption seems no longer valid. First, the RTA does not have direct control over its revenue sources for subsidies; second, there are restrictions on what the CTA can receive. The

more likely result, given the scarcity of future funds, is the necessity of reduction of services elsewhere in the system. As an indication of the magnitude of the implied reductions, the added deficit is equal to approximately 1.2% of CTA's 1980 subsidy, all of Nortran's subsidy, or the subsidies of Westmont, Geneva, Bensenville, Glynellyn, Niles, Highland Park, Wilmette, Aurora and Elgin combined (34).

By ignoring the capital investment-operating cost trade-off in the analysis, the planners have ignored the competition between old and new service in a zero-sum environment. In the future, the operating subsidy estimates must be tied to the investment decisions to avoid this conflict. Alternatively, the necessary reductions in old service as a result of new investment should be included in the investment analysis. Then the true interactions will be presented.

Investment/Reinvestment/Disinvestment Trade-Offs

Trade-offs between existing and new facilities and services are likely to become more common in the next two decades and should be treated explicitly. We might consider these trade-offs as a form of rationing transportation resources, where rationing is the "reallocation of resources away from unproductive activities to areas which yield higher private and social returns" (18). It calls not just for isolated decisions on investment/disinvestment but for direct and systematic comparison of investment, reinvestment (maintenance) and disinvestment to produce the most socially beneficial transportation system.

In examining investment/reinvestment/disinvestment trade-offs, clearly it is easiest politically to maintain the system, followed by investment and then disinvestment. The vested interests of individuals and institutions are

commonly built around existing systems and services. Thus maintenance of those systems and services tends to be a popular option. New investment is more controversial because it implies new resources and new negative impacts as well as new benefits. Disinvestment is the most difficult politically, following the bureaucratic commandment that "once something is given it shall not be taken away" (29). Cost saving benefits of disinvestment, when not tied specifically to alternative investments, are ephemeral and thus attract no constituency. When alternative projects are defined, the benefits to one group are played off against the costs of another, making the political risk more explicit.

Still, in the face of resource scarcity, new transportation investment should be compared with maintaining or contracting the present system. The maintenance/capital trade-offs have already been discussed. For the future, where existing and projected demand supports it, priority should go to rehabilitation to reasonable and justifiable standards. This is especially true since deferring maintenance often increases the long run costs of repair. Minimum road repair and resurfacing costs ≈$150,000 a mile. If the road is allowed to deteriorate to where major work is needed, this jumps to $250,000 a mile (9). New construction or replacement jumps astronomically ($3 million for a rural road, $7-9 million for a suburban road and over $100 million for urban freeways) (9). A serious study of the economics associated with timely rehabilitation of the present system is certainly appropriate before expansion is considered. System/service expansion should stand on its own based on hard evidence of existing or near term demand. Resource constraints make it increasingly unwise to engage in large, new image-building or pork-barrel projects at best based on long term (and thus highly uncertain) demand projections.

Maintenance of facilities where demand is low and/or decreasing is more problematic. At what level should these systems be maintained? The danger of decreasing their maintenance lies in creation of a downward spiral of lower utilization, lower maintenance, etc., which may encourage the decline of communities. In the absence of strong evidence of declining demand, and/or excess service density, preventive maintenance should be the general policy.

Yet we should not shy away from considering disinvestment when it can serve to free resources for new, more productive investments or to eliminate clearly excess capacity. Disinvestment should be planned to assure that sufficient alternative service is available, and to allow individuals and institutions sufficient time to switch to such services. "Crisis disinvestment" is not desirable and can be avoided through careful monitoring and maintenance planning. The case of the Jackson Park elevated seems to suggest that crisis disinvestment can be feasible and acceptable to the community. In retrospect, however, one may argue that the closure was not a surprise, and that a combination of declining demand and excess capacity made it easier for the community to adapt to the change. It is encouraging to observe the serious, systematic studies of Jackson Park rehabilitation options underway at this time, perhaps a bit late but apparently not too late.

Generally, in an era when we cannot afford to do everything, disinvestment is a potentially valid option demanding consideration. Disinvestment itself is not new: conscious and explicit disinvestment based on systematic studies is new and is appropriate.

Disinvestment opportunities should be investigated where 1) substantial cost savings will result; 2) sufficient alternative service exists or can be easily provided; and 3) utilization trends are downward and expected to continue declining. For example, the Illinois Central South Chicago Branch

corridor may be an appropriate candidate for organized service cutback studies. The ICG operates in partial competition with the CTA's Lakeshore Express and #6 Jefferson express route. In February, 1982, before a fare cut experiment was put into effect on the ICG line, it was estimated that between $2.5 and 3 million a year would be freed up by its closing (42). Conceivably, a thorough analysis of all services in this part of the Chicago region might suggest important ways to reduce the volume of service offered, and the costs, without a major degradation in overall service quality.

Any studies of disinvestment options should consider the implications for marginal changes in social benefits as well as for changes in costs and revenues. Trends in population, employment, and development patterns in candidate corridors should also be monitored. While the ability of new transport investments to spur major new developments seems rather limited, at some level, changes in transportation are likely to accelerate established trends, whether positive or negative. Whether or not such impacts are desirable and acceptable needs to be considered on a case by case basis.

Distributional Issues

As the transportation budget becomes more restrictive, the intercommunity competition for resources will become more intense. Serious efforts to rationalize existing and emerging facilities and services is thus likely to heighten the conflicts between regional and local perspectives. Typical of this is the desire of some regional agencies (e.g., NIPC) for controlling growth by directing new services only to designated areas, which competes against the efforts of other agencies to spread resources more widely to build political support (e.g., RTA) and against the self-interests of individual communities. This is heightened when there may only be enough resources to

provide adequate services to some areas; if services are spread uniformly no area may be adequately supported. An emphasis on return on investment is desirable but will be difficult to implement because of competing political interests. The concept of baseline services, with additional increments funded locally (as in the case of the pre-RTA transit subsidies in Evanston, Wilmette, and elsewhere) is attractive. However, it seems essential for the various jurisdictions in the region to come together to explore improved, joint resource allocation decision mechanisms if transportation rationalization is to occur in the future.

Recent efforts to reorganize the RTA speak to part of the issue. There is a growing need to expand this debate beyond transit alone, to include highways, and to explore options which go beyond "balkanization" toward integrated choices about what is, de facto, an integrated system. A fundamental concern is the trade-off between local autonomy and regional, social good. This is a long term concern, to which today's elected officials may not be able to respond. Promising approaches may involve structuring responsibilities in a more explicit, hierarchical way, so that choices (and resources) are allocated among levels of control in relation to a more systematic understanding of the functional role of components of the transportation system in the region.

As the size of the funding pie remains constant, or decreases, distributional trade-offs among communities may increase in importance. Realizing scarcity, communities may no longer be appeased by promises of a larger share the next time (30). This may become acute as rationalization takes place and some areas lose service while others gain. How they are resolved depends on the definition of equity and the recognition of overall goals. Again, at a minimum, a wholistic comparison based on the total mix of transportation services should be attempted.

The 1992 World's Fair

Chicago is a city whose infrastructure has been radically (and permanently) affected by unique events, both positive and negative. The Chicago fire of 1871, the Columbian Exposition of 1892, and the 1934 Exposition are important examples. It is evident that the planned 1992 World's Fair could be a similarly important event. Currently proposed transportation improvements for the Fair will require a significant share of the area's infrastructure resources and many of their effects will last long after the Fair is over. Transportation improvements associated with this rare opportunity for Chicago must be carefully analyzed with respect to the area's long term objectives; the short term concerns of the fair should not be allowed to override the needs of the future.

Among the improvements suggested but not yet programmed are: 1) realignment of northbound Lakeshore Drive to west of Soldier Field at $34 million; 2) widening of the Dan Ryan Expressway between the Stevenson and the Eisenhower at $80 million; 3) extension of the South Loop Connector to 18th Street at $10-20 million; 4) parking spaces and pedestrian improvements at an unknown cost and 5) possible lakefront access options from a $400,000 minimum improvement to a $180 million lakefront subway. This adds up to a major investment about which the preliminary plan states "The issue of how these various improvements are to be funded has not been addressed" (7). Funds may come from Fair fees and federal, state and local sources, most of it non-fair generated. The opportunity costs of this money are high and we should be sure it is being put to the best possible use.

Much of the improvements are highway-oriented, increasing loop access from the south and west; 34,000 planned new parking spaces may create a resid-

ual glut of parking in the downtown area. The alignment of planned transit improvements is to be changed to accomodate the Fair, but the long term implications of such shifts are unclear. Hard questions must be answered as to whether the changes are warranted and worth the cost. The World's Fair is a chance to show the world what Chicago is. Chicago must make sure that its persistent impacts are benefits not costs.

Pragmatic System Development Paths

Pragmatic transportation development strategies require particularly careful consideration of major new capital investment options. Financial, political, and planning resources should not be wasted on alternatives which are not clearly feasible, justified in terms of probable demand, and cost-effective relative to other modes.

Feasibility concerns both the physical and financial possibility of project implementation. Many long range planning efforts have been conducted in the past without regard to realistic budget expectations. That the CATS 2000 plan update (5) finally addressed budget limitations is especially impressive because of the rarity of considering such constraints in previous work. While in past decades it has been reasonable to direct planning toward free exploration of options and their efficiency, today economic and physical feasibility represent priority questions which require early and serious treatment.

Justification for major new investments should be based on realistic estimates of market size, total costs of providing service, and unit (per daily passenger or per daily trip) costs. In the 1950's, CATS pioneered in the generic evaluation of alternative (highway) technologies, deriving guidelines for selecting the most efficient facility type as a function of demand

volumes (6). A number of subsequent studies have extended this work to transit technologies (2, 10, 22, 39).

As shown in Table 1, costs and service characteristics vary widely because of the flexibility of application of technologies, and because of differences in initial situations. Still, generic studies have produced highly consistent results. In general, it is difficult to justify, on economic terms, conventional fixed rail transit unless projected peak period corridor transit volumes are on the order of 10,000 persons per hour or greater, a large volume even by Chicago standards. Commuter rail and light rail transit service can be delivered more cheaply than conventional rapid transit if right of way and roadbeds are available at very low cost. Opportunities to consider such options exist in the region, but it is not apparent that 1) these locations correspond to high demand corridors and 2) consequent disruptions to existing (freight) rail service are acceptable.

Buses are the cheapest transit option by far, even up to peak period corridor volumes of 20,000 persons per hour if buses operate on their own lanes. While bus service is not as attractive politically, the relatively high cost of any fixed rail options must place bus service in serious contention for any major extension of regional transit. At least three major objections arise in response to the idea of providing "rapid" transit with buses. These are 1) the requirement for transfers when bus passengers connect with rail lines; 2) the notion that rail service can be automated and thus can be isolated from labor cost impacts; and 3) that rail service can better respond to, and create, growth in transit travel demand.

Yet buses can reduce the transfers required of travelers by providing their own collection and distribution services, which rail cannot do. Success at automating rail systems in the U.S. has not been impressive, and high labor

Table 1: Typical Cost and Performance Ranges of Typical Line Haul Transportation Technologies (37,39)

	Auto on Highway		Buses		Light Rail		Rail	
	6-Lane Arterial	6-Lane Freeway	on Arterial	on Busway	At-Grade	Separated	Rapid Transit	Commuter Railroad
Assumptions	New road 1.2 pax/ car	New road 1.2 pax/ car	50 pax/veh on existing street, mixed traffic	50 pax/ veh off-line stations	70 pax/veh 4 veh/train existing R.O.W.	70 pax/veh 6 cars/ train	100 pax/ veh, 6 veh/train	100 pax/car 6 veh/train existing RR line
Nominal cap. of guideway veh/ lane/hr.	800	1800	100-200	< 400	< 40	> 40	40+	12+
Running speed mph	20	35	10	25	15+	25-	25+	45+
Pax cap. pax/hour	2800	6480 (10800@2.0 pax/car)	5000-6000	<20000	<11200	>16800	>24000	7200+
Costs capital vehicles	$8000+	$8000+	$125,000+	$125,000+	$400,000+	$400,000+	$450,000+	$650,000 - $1,000,000
Guideways $ million/ mile	$20M+ +parking	$40-100M+ + parking	none	$6 -10M at grade	$2M+ at grade	$17M+ at grade	at grade: $20M; elev: $25M tunnel: $50M+	$2M+ given ROW, roadbed
Operating & Maintenance per veh mile	$0.15 - 0.20	$0.15	$1.50 - 3.00	$1.50 - 3.00	$3.00+	$3.00+	$4.00+	$5.00+
10 mile, 2 way system: Total capital cost ($M)	$200 - 300 million		$1 - 100 million		$150 - 225 million		$250 M ++	$75.275 M
Total cost per trip (200,000 trips/day)	Higher	$2.73	$0.50	$1.10 →	Higher	Lower? ←	$2.64 →	Higher

cost still plagues rail services because of the intensive requirements for skilled maintenance personnel for vehicles, guideways, and control systems. Finally, although trains can be lengthened to carry more people, buses can be re-routed to respond to changing demands. The evidence that fixed rail systems can be used (better than other technologies) to create and direct growth is, unfortunately, contra-indicative. Making a large investment in rail for this purpose (alone) is thus likely to be quite risky.

All of this suggests the desirability of looking toward "low" technology options (i.e., buses) as initial candidates for new service investments. Steps "up" the technology scale are worthwhile when 1) demand growth will support it; 2) resources (e.g., rights of way) are available at no or low costs for rail systems; or 3) other levels of government are willing to risk substantial sums of their capital to achieve a step up in technology.

Service expansion should be evaluated, and where appropriate, implemented, through sequential treatment of technologies, beginning with lower cost, lower risk actions and advancing up the scale where and when manifest demand justifies further investment. The most appropriate development depends upon both the nature of the existing and projected market and the availability of right of way. A typical transit analysis/development sequence is shown in Figure 3.

The principal concept illustrated here is that every corridor does not represent a candidate for fixed guideway transit, or for a full-scale freeway. Logical intermediate technologies should be carefully explored, for they are likely to meet existing and projected needs in a more cost-effective way than high technology options.

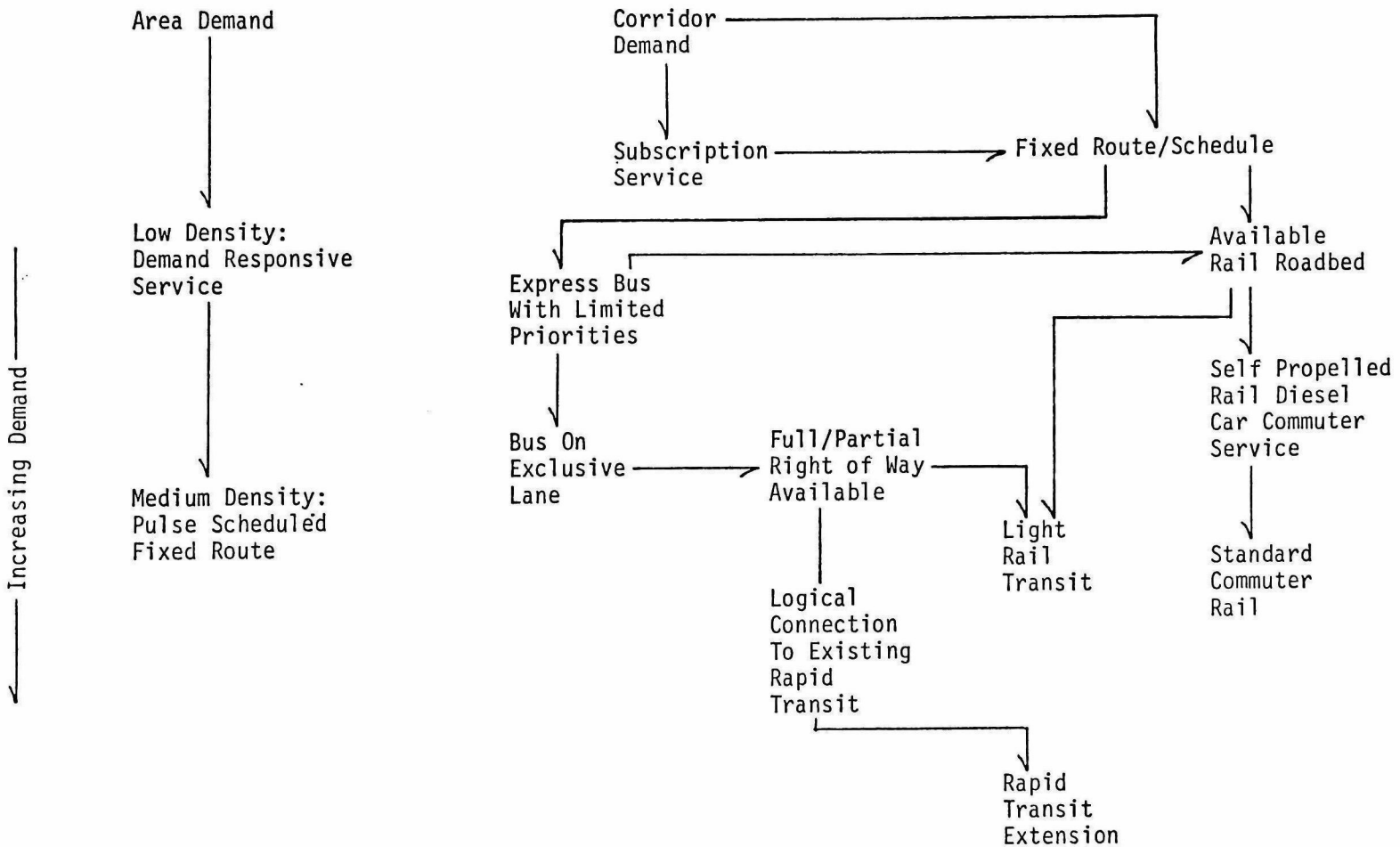

Figure 3: SEQUENTIAL TRANSIT DEVELOPMENT CONCEPTS

IV. STRUCTURAL OPTIONS UNDER THE MAP 2000 SCENARIOS

Introduction

This section explores some structural options for the passenger transport system under the MAP 2000 scenarios, taking into account some of the key issues outlined above. Given the long history of innovative analytic transportation planning in Chicago, it would be presumptuous to propose that these ideas are all new, or that they are worthy of immediate action. They should, instead, be viewed as constituting a menu for further, more sophisticated analysis by transportation planners in the region. The three MAP 2000 scenarios are: (I) modest industrial decline based upon a continuation of present trends; (II) rapid industrial decline associated with a worsening economic climate and increased migration of population to the sun belt; and (III) a high technology economy along with modest economic recovery (23). The first step in the wholistic rationalization approach is to develop the overall aims of the system. Accordingly, these are examined briefly before the individual scenarios and structural options are outlined.

General Goals

Several goals for the transportation system are revealed by the area's planning documents, setting the bench mark against which major alternatives can be judged. First, development should be encouraged and preserved in mature urban areas, or in designated adjacent corridors (28). This discourages costly urban sprawl and "leap frogging". Second, the high accessibility of the Chicago central business district should be maintained (5). This focuses on Chicago as the premier economic and employment center of the region and recognizes the large capital investment and significant accessibility

advantage that exists there. Third, there is a commitment to the continued provision of public transportation throughout the area or at least to "provide cost-effective alternatives to private auto travel" (5). This recognizes that public transportation meets the needs of many who do not drive and provides a safety net in times of emergency. The NIPC comprehensive land use plan states in its action recommendations that techniques and strategies should be considered to "maximize the use of public transportation" (28).

An implicit goal for transportation is to meet the shifting travel demands and needs of the region. This requires trading off old claims and demands for service with new ones and becomes increasingly difficult as resources dwindle. Some of the shifts common to all the scenarios include the aging of the population especially in the suburbs, changing household structure to smaller, multiple worker units, and dispersal. Each increases the demand for off-peak travel and non-conventional forms of public transportation. For example, suburban elderly, because of their dispersed origins and destinations and need for door-to-door service, may require an increase in demand responsive or other paratransit services. How these new demands are to be met promises to become an important issue in the future.

Generic Structural Options

There are three major generic network structures that might serve to meet the goals and objectives mentioned above. They are (1) continued ubiquitous development of the transportation system; this is similar to the 2000 Plan; (2) focus of service on the finger plan developed by NIPC (25); or (3) development of a polycentric transport network (38). These are shown in Figures 4, 5, and 6, respectively. In order each one requires a larger reallocation of the region's resources. Each one, however, may also require successively less total resources in the long run.

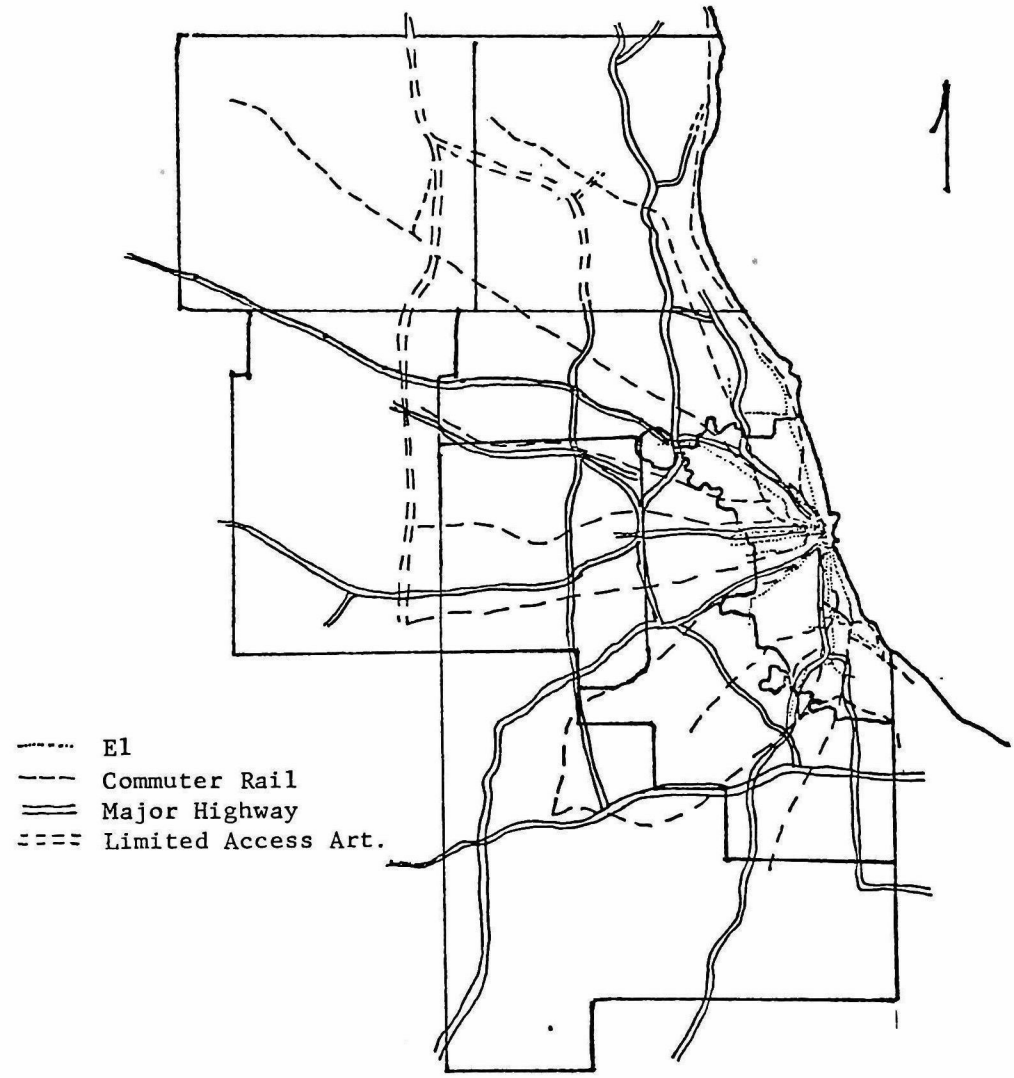

Figure 4. 2000 Plan Ubiquitous Network

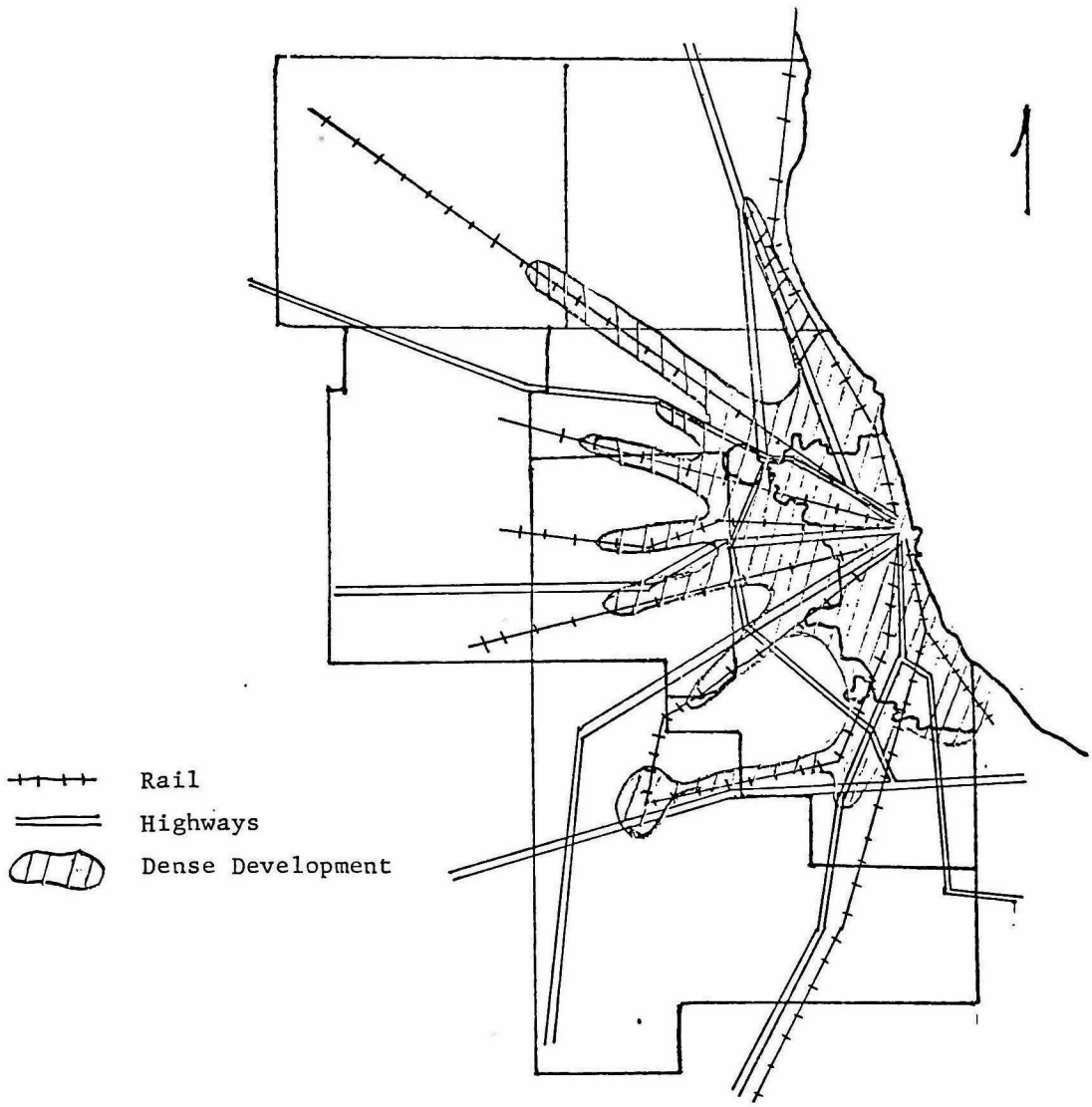

Figure 5. Conceptual Finger Plan

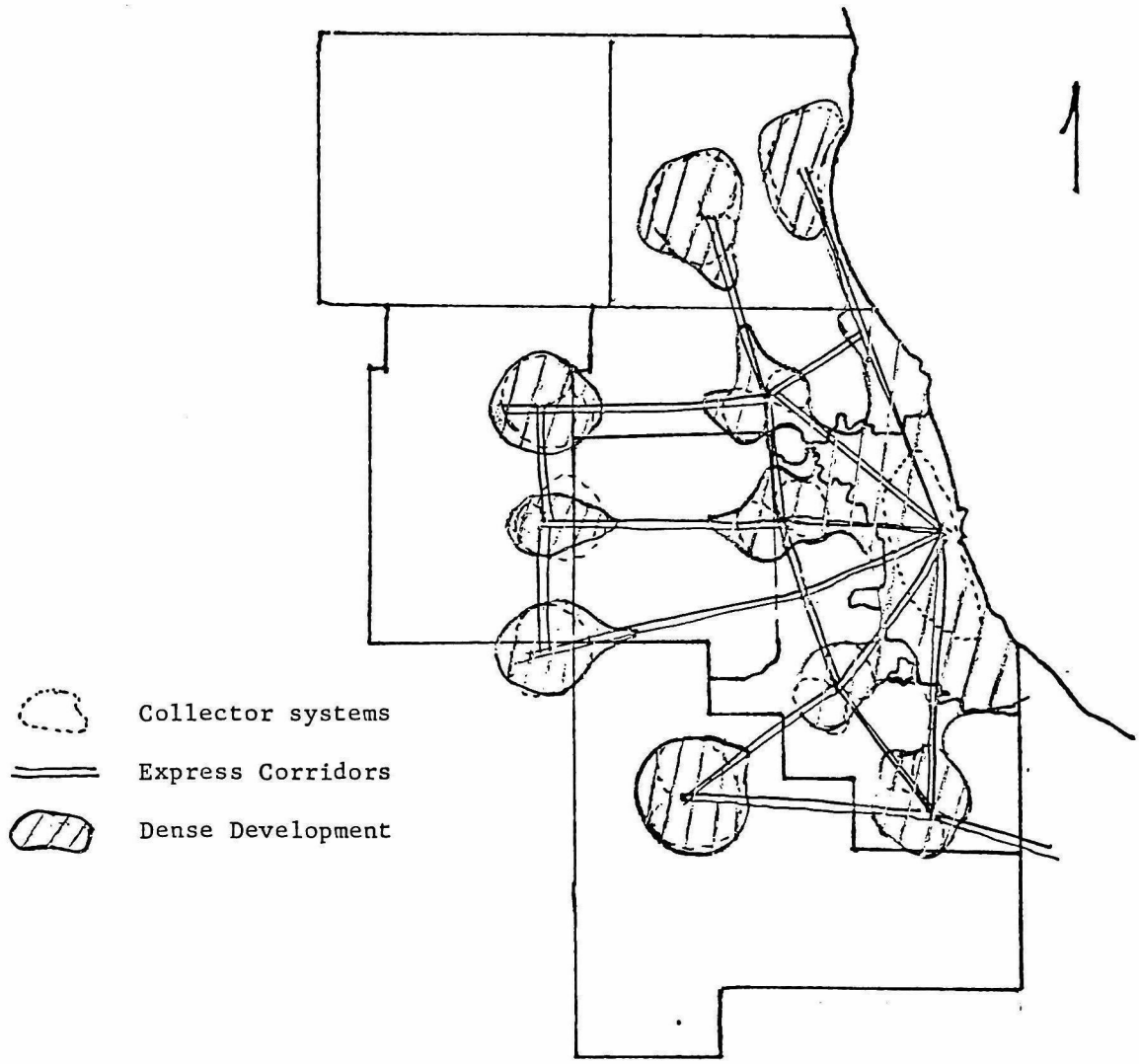

Figure 6. Conceptual Polycentric Network

The continued ubiquitous development of the system is based upon meeting projected demand and deficiency estimates. As stated, this is similar to the 2000 Plan philosophy. It is supported by a grid-like bus system based on continued expansion by the RTA. Under this option, the relative distribution of service would not change drastically and, if cutbacks occurred, they would be based primarily on ridership levels or equal service loss. This option is probably least effective in meeting the overall goals of the region, since it does not change the relative advantage of areas or the relation between highway and transit modes.

The second generic option responds to the finger plan, which in 1967 was judged to be the most effective plan for the region. It orients expansion along radial corridors extending from the Chicago CBD along which high density development exists and would expand. It minimizes demand for and service to circumferential travel outside of the central area. By concentrating growth along the radials, it encourages transit usage and supports the vitality of the central area. As resources grow scarce it may simplify rationing their use to focus more strictly on the finger pattern. It has been apparent in the last 15 years that restriction of inter-finger circumferential service is difficult politically, as well as functionally, and this may be the reason why the finger plan has had little influence on the pattern of development.

The final generic option to be considered here is the development of a polycentric development/transportation system. This pattern may be more effective in meeting demand than the finger plan due to the dispersal of development since 1967. It is different than the finger plan in that it calls for the establishment of a hierarchy of transportation centers around which growth occurs. Each center would be served by a collection/distribution system and connected to the other centers by express services, both radial and

circumferential. This option would be the most difficult to implement since it requires identifying specific areas for service and denying others. At the same time, it fits well with the development strategy outlined above, since service can be built up as demand increases. It may also be the best way to meet the emerging demands of the region.

With these major structural options as background, each individual scenario is explored below and recommendations are made based upon the overall goals and the expected, scenario-specific demographic shifts.

Scenario I Options

Scenario I assumes continued slow decline of the industrial base in the region, similar to the present trends (3). Population would grow at less than 1.3% annually, accompanied by a small decrease in household size (from 2.7 in 1980 to 2.5 in the year 2000). There would also be little change in technology and a continued weakening of the public finance base.

While the aggregate characteristics of the region will be relatively stable, important changes in the relative distribution of people and jobs will affect travel demand. Year 2000 household size would vary from a 2.3 Cook County average (much lower in the central city) to a 3.0 average in Dupage. Growth in the number of households would be substantial in the central area but only .6% annually for all of Cook and 2.0% for all the other counties combined (from 1.0% in Dupage to 3.1 in Will). The end result would be a continued shift of households to the suburbs and an evening out of densities in the inner city (3).

Employment would be expected to decline or remain stable in the heavily industrialized areas including south Chicago and the areas south and west of the city. It would grow, however in the central area due to the continued

increase in service jobs. Dupage and northwest Cook county, centering around the airport, especially Schaumberg, would increase greatly in employment (30,35). The suburban area around the southwest border of Chicago should hold its own or increase slightly due to increases in piggyback and other transportation activities. The net effects would be a continued decrease of jobs in Chicago, with possibly large decreases in the south, coupled with growth in the suburban ring particularly to the northwest.

Because it continues present trends, this scenario should result in relatively modest changes in overall travel patterns. Travel to the central area would continue to dominate and thus peaking would continue to be a problem. There would however, be a relative increase in travel in the suburbs, particularly in corridors along the Northeast edge of Cook county and along the Tri-State Tollway from Northlake to Hinsdale. Also, travel demand would probably decrease in the heavy industrial areas of south Chicago and in the outer areas of the rest of the city, though to a smaller degree.

The continuation of the major travel patterns and financial constraints can be expected to make it difficult to institute major changes to the system under this scenario. The political problems associated with the reallocation of resources would be significant. Therefore, rationalization of the existing system without major restructuring is probably the best option. In line with the overall goals, the best approach to rationalization may be to initiate the transition to a polycentric network.

In general, the demand changes will not be large enough to warrant major changes in the infrastructure. Thus, much of the existing system should be maintained. Major rail extensions in the region will be hard to justify. The rationalization should be aimed at trimming duplication and providing rail improvements to increase efficiency. Leading and lagging policies should

focus on supporting the already established population and growth centers. These include an outer ring of Joliet, Aurora, Elgin, the Fox Lake area, and Waukegan and an inner ring of Oakbrook, Downers Grove, Northlake, DesPlaines, and Schaumberg.

Specific recommendations are:

- Trim duplication in transit service on the south and southwest sides of the city, including the ICG south Chicago and Blue Island lines; rationalize suburban bus service in response to manifest demand; substitute paratransit for fixed route service where appropriate.
- Make capital improvements aimed at boosting the efficiency of the present transit system, specifically:
  --Connect the Dan Ryan and Howard rapid transit lines;
  --Examine and respond to the need for more maintenance and storage facilities for buses and rail cars.
- Minimize rail rapid transit extensions except where strongly justified; additional proposed central city lines merit severe scrutiny; pursue bus priority options instead.
- Consider development of express bus services built around transit centers in the form of a polycentric design in the Tri-State Tollway corridor; begin with integrated bus service and provide bus priority treatments where demand and congestion so warrant.
- Do not build highways that encourage suburban expansion unless based on manifest demand extending beyond peak periods; minimize highway-transit competition in commuting corridors; of particular concern are the proposed circumferential Lake Will South (FAP 431), the upgrading of U.S. 12, and the proposed Elgin-O'Hare freeway (FAP 420).
- Explore and develop options for defining priority arterials to carry non-radial suburban travel to and from identified growth nodes.
- Increase the efficiency of central area arterial street operations through traffic management, including parking control, improved signal coordination, etc.; avoid major service improvements which compete with transit.

Response to this scenario calls for a rebalancing of the transportation system designed to encourage transit usage and to foster growth in specific areas. Its success, of course, depends on the integrated application of all public policies, not just transportation.

Scenario II Options

Scenario II presumes a more rapid decline in the manufacturing and industrial base of the region. The Chicago region would begin a real decline in population and employment without replacement. Areas that did not fare well in scenario I would decline even more in scenario II, including south Chicago and the city edge in general. The older suburbs would also begin to be noticeably affected. Only the most robust areas in scenario I may hold their own. These include the central area and the previously mentioned northwest Cook and eastern Dupage counties. Because of the lack of capital, rehabilitation and redevelopment may become important, which could support a slight trend toward densification and centralization. The most ominous effect would be a concomitant decline in public finance, especially operating subsidy funds, calling for retrenchment and cutbacks to be made.

As the decline continues the overall level of travel would drop, though the peaking would remain a problem due to the continued dominance of employment in the CBD. This would result in a lower overall utilization of transportation facilities as load factors drop and the ratio of peak to off-peak travel grows. The ultimate effect would be a lowering of operating funds both for transit and highways. This may strain the radial system as its high usage continues combined with little money for capital reinvestment. The danger is that this could cause a cyclical pattern of decline, utilization loss, and decline which must be avoided. Again the areas that experienced decline in scenario I would be affected the most and those that grew may experience a fairly constant travel demand.

In this scenario the overriding factor in providing transportation services would be the lack of funds. In this atmosphere of scarcity very obvious trade-offs would have to be made on where to expand, preserve, and contract;

the political consequences of such trade-offs would be significant. Emphasis should be placed on cost-effective service, protecting key areas and facilities from extreme congestion, and redefining baseline service levels to be sure they are realistic and affordable.

Because of the continued importance of radial peak demand under this scenario, emphasis should probably focus on a simple finger plan, maintaining the quality of service on the radial highway and rail links. This may help redirect the decline to a more cost-effective configuration.

Some specific recommendations are:

- Trim duplication in transit service on the south and southwest sides and in the suburbs. A "down grading" to different modes may be necessary, i.e., rail to bus, or rail to self-propelled rail diesel cars.
- Implement capital improvements in transit which will clearly improve the efficiency of the system--e.g., Howard/Dan Ryan connection, expanded maintenance capabilities, etc.
- Question all further proposed rail extensions.
- Promote privatization of peak hour travel, through deregulation and provision of downtown roadway space, to encourage subscription bus service, to transfer some costs of transit more directly to users, to increase the economic efficiency of transit, and to make service more market-responsive.
- Aging of the population may call for alternate transit service, in both city and suburbs, including paratransit or expanded baseline bus service. To the maximum extent feasible this should be in the form of contracted service from private operators with user side subsidies. This, and other transit options under this scenario, should be designed to minimize public sector employment in order to control costs.
- The major concerns for the highway system should be meeting critical maintenance needs and pursuing central area traffic management without major capital investments.

It is quite apparent that this scenario is unattractive in all respects. Indication that it is emerging should lead to careful, experimental efforts to implement integrated public/private investment efforts to preclude it, or to soften its effects. The critical economic and social interrelation-

ships between city and suburbs must not be forgotten in the event of the emergence of scenario II. This will be a time to share resources and power to turn the region around.

Special concern should be focused on attracting redevelopment in areas where it would be most feasible and economical. These are most likely to be in the central area of Chicago, and possibly in the first suburban ring. Integrated approaches call for sensible infrastructure reinvestment, including utilities, water and sewer services, and transportation. The latter may include establishing high accessibilty nodes within the city, focusing improved arterials and express transit on modest, functional transportation centers which include space for venture capital and service industries. Special attention will be required to provide a secure, aesthetically pleasing environment, appropriately scaled industrial space, and reasonable financing.

Transportation alone will not do the job, but a comprehensive approach would be worthy of consideration.

Scenario III Options

Under scenario III the region would begin to shift its industrial employment to an information and high technology based economy, linked to a slowly growing population, lower household size, and an increase in multiworker families. Given this trend there would be a stronger tendency toward higher density multi-family dwellings, both in Chicago and in suburban nuclei. The improved economy should enhance the outlook for public finance.

This scenario includes the largest shift in demographic and employment patterns. New industries, because of their low infrastructure needs, will be flexible in their location. As a result they will probably be spread out throughout the region in identifiable nuclei according to specific locational

advantages and incentives. Population will follow--and be followed--due to the low externalities of these clean industries.

While the precise location of these nuclei is difficult to predict, some likely tendencies can be identified. First, the loop area is likely to remain strong, especially with the information transfer industries, but its percentage of total employment is likely to decline. Second, the industries would tend to center in areas with high education levels to meet their labor needs. Many would also be attracted to the vicinity of airports due to their intercity travel requirements. These tendencies may place and south and west sides of Chicago at a disadvantage. The southwest side fares better and northwest Cook along with Dupage and Lake counties would continue to be major employment and population magnets. Because of the footloose nature of these industries, their location may be influenced by localized public policy, tax incentives, infrastructure, and transportation investments, as long as each area does not produce its own set of competing policies. This calls for a high degree of regional cooperation to make this scenario work.

Major changes in the overall travel patterns of the region can be expected under scenario III. First, though there would still be a large amount of peak period travel to the CBD, it would decrease greatly as percentage of overall travel. Second, as the origins and destinations become dispersed (to the nuclei) travel in major corridors will be dispersed. Third, commuting distances, and even the willingness to commute, may decrease as heavy industry is replaced by light "clean" industry and people begin to live closer to work. Finally, the ratio of peak to base passenger travel would decline in general due to the increasing ability to take advantage of flexible working hours. These changes would make it exceedingly difficult for the present network and traditional fixed guideway, capital intensive

transportation services to meet travel demands. While some services benefit by the evening out of travel, the dispersal and reduction of movement in major corridors hurts fixed systems which require large volumes of people going the same way to be productive.

Because of the large changes in demand and the improved financial picture under this scenario it should be possible to reorient the transportation system. Furthermore, there would be a political constituency for change. Accordingly, a polycentric network should be emphasized that focuses service on selected development nodes. To be effective, this requires a coordinated policy package, of which transportation is only one component. Specific recommendations are:

- Define and support a node oriented service to the CBD, other Chicago nodes and suburbs. At each node a transit center, or transfer point should be developed, bringing together rail, bus, and auto parking facilities. In the suburbs possible centers include Joliet, Aurora, Elgin, the Fox Lake area, Waukegan; and, closer in, Argonne National Laboratory, Oak Brook, Downers Grove, Northlake, DesPlaines, Schaumberg, Evanston, and areas around large shopping centers including Golf Mill in Morton Grove, and Old Orchard in Skokie.

- In Chicago, special efforts will have to be made to gather land and overcome disamenities, especially in the south and west sides. There the additional problem of removing or converting old heavy industry infrastructure exists. Possible nodes include those around the universities in the city including Circle Campus, University of Chicago, I.I.T., shopping areas such as the Ford City and Scottsdale shopping centers, the Brickyard, Midway Airport, and along existing transit lines.

- The Loop-focused rail system merits continued support, but with no expansion, since demand will be decreasing. Rationalization may again be necessary particularly on the south and west sides and along the Ravenswood, Lake and Douglas lines. Growth nodes may be encouraged along these lines to increase ridership.

- Circumferential routes should be enhanced to support non-Loop flows between nodes. This would include suburban circumferentials such as the expansion of Golf or Lake Street on the north and Route 83 on the west, as well as inner circumferentials within the city such as Cicero Avenue on the west side. It may be necessary to reexamine and reclassify the street network to support this nodal growth.

- Transit should be developed to play a stronger role in collection and distribution around the key growth nodes. The system would have to be synchronized to facilitate transfers to the express bus system between nodes. Because of its decentralized nature, this scenario opens up new realms for paratransit and privatization of the collector systems.

- The potential for busways in existing heavy flow corridors such as the Outer Drive should be explored. Busways and express buses seem more appropriate under this scenario due to the reduced flows in corridors and their ability to provide their own collection service.

- Finally, where transit, especially rail, exists, examine auto disincentives such as parking fees, congestion, and pricing to help preserve transit mode share. The danger with this is it may encourage non-nodal development.

Under scenario III, it will be important to recognize that the amount of new growth will be finite. It will be counter-productive for each local jurisdiction to attempt to implement policies which compete for this limited growth. Shared choices must be made to coordinate actions for the benefit of the region as a whole. It is this spirit of cooperation that seems essential for maintaining the viability of the region, under this scenario and the others as well.

V. CLOSURE

This paper has described the emerging environment for transportation planning and decision making in the Chicago region, characterised by aging facilities, shifting needs, increasing costs, and increasingly restrictive resource limitations. Traditional investment strategies, which have adopted a narrow, incremental philosophy focusing on only a few goals and ignoring long term regional requirements and constraints, have been described. A general, wholistic approach to transportation development and management has been proposed.

Some of the key issues and trade-offs associated with future transportation choices have been cited, including the need for more flexible rules for resource allocation; the need to consider interactions between transit and the auto more directly; the advantages of defining generic, baseline services for the region; the importance of recognizing the long term implications of operating costs; the need to consider disinvestment as well as reinvestment and new investment; the difficulties posed by distributional questions; and the logic of evaluating and implementing new services in a sequential, evolutionary pattern.

Finally, a menu of structural options, generic and specific, is proposed and linked to specific future scenarios for the region. These options help to illustrate the general principles presented in the paper and may be useful in guiding future policy analyses.

Times are changing; what we can do, and what we should do with the region's transportation system are changing as well. The processes of planning, decision, and system management must be adapted to respond to new needs, constraints, and opportunities. This requires both caution and boldness. Caution is needed when we consider continued application of old,

and perhaps outdated principles and ideas, including incremental analysis of the transportation system, treatment of each mode, each jurisdiction, and each source of funds as functionally and economically independent. We must be cautious about retaining inefficient components of the existing transportation system and about making investments which are not justified in terms of either economics or realistic and feasible policies. We must be wary of the implicit, long term costs of today's actions in the face of tomorrow's trends.

At the same time, we must be bold in facing up to hard choices about the allocation of transportation resources in support of the future of the region as a whole. Boldness is needed in choices about disinvestment in inefficient facilities, and in decisions to invest in new services which support shared policy choices. Courage is required to adopt the necessarily integrated political perspective on our future needs, recognizing that there is not an unlimited amount of money, petroleum, trips, and development, for each jurisdiction to have its wish list totally fulfilled. New mechanisms are needed to share a limited tax base, through wholistic analysis and choice processes, whether formal or informal. At the very least, new, more powerful, and more public forums are needed to facilitate meaningful communications between decision makers in the region.

The life breathed into the CATS Council of Mayors when it took an active and aggressive role in the recent transit finance crisis is an example to be nurtured and developed. An organization with little apparent power and even less visibility, the Council took an active part in the investigation of options for solving this problem, and through this made manifest the implicit influence residing in a gathering of elected officials.

Stronger forums for interjurisdictional communications and decision must be supported by stronger and more responsive policy analysis capabilities in

revised institutions which can provide quick, even-handed advice to a broad constituency, without being dominated by any single bureaucratic actor or agency. Transportation planning and policy analysis today is the responsibility of too many agencies each concerned to a large extent with its own, relatively narrow, self-interest and survival. Ways must be found, without destroying the powerful potential for good analysis which now exists in the region, to rationalize and integrate the activities of these agencies. This must not eliminate the diversity of viewpoints and ideas which now abounds, but direct that diversity toward a common regional purpose.

REFERENCES

1. Altshuler, A., J. Womack, and J. Pucher. The Urban Transportation System: Politics and Policy Formation. Massachusetts Institute of Technology Press: Cambridge, Massachusetts, 1979.

2. Boyd, J.H., Ashford, N., and E.S. Wetzler. "Evaluation of Rail Rapid Transit and Express Bus Service in the Urban Commuter Market," prepared for the U.S. Department of Transportation by the Institute for Defense Analysis. Arlington, Virginia, 1973.

3. Chicago Area Transportation Study. "Year 2000 Planning Process: Draft." Chicago, Illinois, 1982.

4. Chicago Area Transportation Study. "Year 2000 Transportation System Development Plan." Chicago, Illinois, September 1980.

5. Chicago Area Transportation Study. "Year 2000 Transportation System Development Plan 1981 Update." NIPC. Chicago, Illinois, December 1981.

6. Chicago Area Transportation Study, Vol. III. "Transportation Plan, Final Report." Chicago, Illinois, 1962.

7. Chicago, City of. "1992 Chicago World's Fair Transportation Report," Bureau of International Expositions, unpublished report. May 1982.

8. Chicago Tribune. "Milwaukee Line to be City's Busiest." Sunday, February 15, 1981, s.1, p. 12.

9. Davis, S. "Illinois Roads--Between a Rock and a Pothole," Illinois Issues. October, 1981.

10. Deen, T.B. and D.H. James. "Relative Costs of Bus and Rail Transit Systems," Highway Research Record 293. Highway Research Board, Washington, 1969.

11. Haider, D. "Make No Small Plans--But Make Some: Chicago's Need for a Capital Budget and Planning Process," Metropolitan Housing and Planning Council Planning Reporter, Vol. VII, #3. Chicago, Illinois, September 1980.

12. Illinois, State of. "Regional Transportation Authority Act," Illinois Revised Statutes, Chapter 111 2/3, Section 704.01. Springfield, Illinois.

13. Illinois, State of. Illinois Revised Statutes, Chapter 120, Section 424.8.

14. Jarzab, J. "TARD Technical Memorandum 80-1: Land Use and Commercial Impacts of Bus Service Investigation Parameters," NIPC, unpublished paper. January 1980.

15. Kain, John F. "How to Improve Urban Transportation at Practically No Cost," Public Policy. Summer, 1972.

16. Knight, R. and L. Trygg. "Land Use Impacts of Rapid Transit: Implications of Recent Experience, Final Report," U.S. Department of Transportation. Washington, D.C., August 1977.

17. Libicki, M.C. "Land Use Impacts of Major Transit Improvements," U.S. Department of Transportation, unpublished paper. March 1975.

18. Mason, G. "The Rationalization of Urban Transit: Toward a Benefit Incidence Analysis," Transportation Research Forum Proceedings. 1980.

19. Mayworm, P., A. Lago, and J. McHenroe. "Patronage Impacts of Changes in Transit Fares and Services," U.S. Department of Transportation. Washington, D.C., September 1980.

20. Metropolitan Housing and Planning Council. "Year 2000 Transportation System Development Plan," written statement submitted to NIPC. May 1980.

21. Meyer, J.R. and J. A. Gomez-Ibanez. Autos, Transit and Cities. Harvard University Press: Cambridge, Massachusetts, 1981.

22. Meyer, J., J. Kain, and M. Wohl. The Urban Transportation Problem. Harvard University Press: Cambridge, Massachusetts, 1965.

23. Michaels, R.M. and J.L. Schofer. "A Scenario Based Approach to Defining MAP 2000 Transportation Requirements," unpublished paper prepared for Metropolitan Housing and Planning Council. February, 1982.

24. Muller, T., et al. "Economic Impact of I-295 on Richmond Central Business District," Urban Institute Paper. Washington, D.C., 1977.

25. Northeastern Illinois Planning Commission. "Diversity Within Order: Coordinated Development for a Better Environment." Chicago, Illinois, 1967.

26. Northeastern Illinois Planning Commission. "Equity Assessment of Suburban Northeastern Illinois Existing Transit Bus System, Phase I, Final Report," NIPC. 1979.

27. Northeastern Illinois Planning Commission. "Regional Growth Trends: Implications for Mature Urban Areas," NIPC. Chicago, Illinois, June 30, 1979.

28. Northeastern Illinois Planning Commission. "Regional Land Use Policy Plan." Chicago, Illinois, 1978.

29. Okun, A. Equality and Efficiency: The Big Tradeoff. The Brookings Institute: Washington, D.C., 1975.

30. Ophuls, W. Ecology and the Politics of Scarcity. W.H. Freeman and Company: San Fransico, California, 1977.

31. Paaswell, R. and J. Berechman, et al. "An Analysis of Rapid Transit Investment," Department of Environmental Design and Planning, State University at Buffalo, unpublished paper. July 1981.

32. Passenger Transport. "Budget Sets 16.5% Transit Reductions," #7, p. 1. February 12, 1982.

33. Payne Maxie Consultants and Blayney-Dyeti Urban and Regional Planners. "The Land Use and Urban Development Impacts of Beltways," U.S. Department of Transportation. Washington, D.C., October 1980.

34. Price Waterhouse and Company. "Regional Transportation Authority: Financial Statements Performed as Special Assistant Auditors for the Auditor General--State of Illinois, Fifteen Months Ended September 30, 1980," Illinois Auditor General. Springfield, Illinois, 1981.

35. Regional Transportation Authority and Northeastern Illinois Planning Commission. "Regional Transit Needs Assessment." Chicago, Illinois, April 1982.

36. Ryan, E. "The Year 2000 Transportation System Development Plan," CATS Research News, Vol. 21, #1. Chicago, Illinois, February 1981.

37. Sanders, D.B., et al. "Characteristics of Urban Transportation Systems--A Handbook for Transportation Planners," U.S. Department of Transportation, Urban Mass Transportation Administration. Washington, D.C. 1979.

38. Schneider, J. "Transit and the Polycentric City: Final Report," U.S. Department of Transportation. Washington, D.C., September 1981.

39. Skinner, L.E. "Comparative Evaluation of Urban Transportation Systems," U.S. Department of Transportation, Federal Highway Administration. Washington, D.C., 1978.

40. Urban Mass Transit Administration. "Final Environmental Impact Statement: Rail Rapid Transit Extension to Chicago O'Hare Airport," U.S. Department of Transportation. Washington, D.C., August 1978.

41. Vuchic, V. Urban Public Transportation Systems and Technology. Prentice Hall: Englewood Cliffs, New Jersey, 1981.

42. Young, D. "Cheaper to Close Rail Line than Alter Fare Study Links," Chicago Tribune. Section 1, page 11, Febuary 3, 1982.

43. Zorn, P. and E. Steele. "Demographic Trends in the Chicago Metropolitan Region," unpublished paper for Metropolitan Housing and Planning Council. Chicago, Illinois, August 1980.