The reader is encouraged to obtain the complete report and to become familiar with the scope of the entire research effort in order to understand both the applicability of and limitations the reported travel characteristics data.

Based on the research results presented in the complete report, it is clear that there is a great deal of interaction between buildings located within large-scale suburban activity centers. However despite this high level of interaction, traffic congestion within the SAC and on its access routes is perceived to be a significant problem by virtually all tenants of the SAC (employers, workers, shoppers, visitors, and residents). A key factor in this perceived congestion problem is the dominating reliance in the SAC on the private automobile. In order to address this problem, the following actions are recommended:

- o Directly serve the SAC with radial bus transit service. Focus this service on a centralized transit center. Although the practical limit may only be a transit mode share of six percent overall, this mode share nevertheless represents a significant number of employees in the large-scale SAC's. With a six percent transit mode share, traffic congestion would be noticeably reduced in the majority of SAC's in which current transit patronage is nil.

- o Connect building sites with pathways whether they are pedestrian overpasses or underpasses across major highways or just simply sidewalks or striped pathways in parking lots. In order to minimize the reliance on the automobile for the midday trip by office employees, it will be necessary to provide continuous and direct pedestrian system.

- o Provide more mixed-use centers like the Galleria in Parkway Center. These centers generate a tremendous amount of intra-site trips which both serve the needs of the employees/shoppers and do not add to traffic volumes in the SAC.

PLANNING SOLUTIONS -- TDM AND BEYOND

by

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INTRODUCTION

Can we successfully utilize transportation planning to resolve and avoid suburban traffic congestion?

This question is addressed here in two parts. The first part is a probe into the efficacy of planning solutions, most specifically Travel Demand Management (TDM). The material started life as a presentation at the 1988 TRB Annual

Meeting and served as a background paper at the 1988 Stone Mountain Conference. The section on "Other Studies" has been amended to include new evidence.

The second part responds to the TDM limitations identified in the first part, and to the general lack of a vision in suburban and activity center planning, by looking beyond TDM. It was presented as a think piece at Stone Mountain and remains a think piece -- one tentative contribution to what hopefully will become the vision sorely needed to guide our suburban and activity center transportation development.

PART I -- DOES THE EMPEROR HAVE ANY CLOTHES?

This is an exploration of the magnitude of relief likely be attainable with traffic mitigation. It addresses activity center traffic problems and asks sticky questions about planning solutions, like:

- What is the viability of planning solutions?
- Can we achieve suburban traffic mitigation?
- Can we do it with travel demand management alone?
- Is it worthwhile, or just smoke and mirrors?

Before we can attempt an answer to these questions, by examining the effectiveness of suburban traffic mitigation, we must establish some definitions and guidelines about how and where to take measurements.

SUPPLY AND DEMAND MANAGEMENT

In establishing definitions it must be recognized that within suburban traffic mitigation, there are both supply management and demand management actions that can be taken.

There are alternative ways to make the split between supply management and demand management, but the delineation chosen here differentiates on the basis of public infrastructure requirements. Supply management becomes the planning and allocation of resources for providing or not providing public infrastructure for transportation, as follows:

Transportation Supply Management

- o Arterial street system
- o Freeway system
- o Public Parking
- o HOV facilities
- o Transit facilities

The last three items (public parking, HOV facilities, and transit facilities) are also essential parts of travel demand management, and when evaluating their effect on traffic conditions, are best addressed under demand management. They are major supply elements, however, and must be considered as such in long range planning.

Travel demand management is thus left to include:

- o Transit improvements (conventional, paratransit)
- o Ridesharing programs (carpooling, vanpooling, buspooling, on-site transportation coordinator)
- o Preferential HOV facilities (ramp bypass lanes, HOV ramps, HOV lanes)
- o Parking management (pricing, supply constraints)
- o Variable work hours
- o Mixed land use development
- o Associations, ordinances (TMA's, TMO's, TDM ordinances)

HOW AND WHERE TO MEASURE

For traffic mitigation and travel demand management effectiveness evaluation, units of measure are needed, along with an understanding of where to do the measuring. In the case of supply management, there is an established terminology. We normally measure effectiveness of transportation supply in terms of vehicle carrying capacity and Level of Service achieved (A, B, C, D, E or F). There are different calculation techniques, but they are keyed to commonly accepted definitions.

There are problems with the supply management measures (e.g., vehicle versus person carrying capacity), and care must be taken in choosing where to take the measurements, but the profession is fairly well trained in these limitations and how to deal with them.

For demand management, we lack an established terminology. Vehicle trip reduction is the measure commonly used, but reduction relative to what? Two alternatives have been employed, leading to these disparate trip reduction definitions:

Worst Case Definition:
(Example: Pleasanton ordinance)
Reduction in the peak hour vehicular traffic of employees relative to the worst possible condition (all employees drive, alone, and all arrive in the peak hour).

Base Case Definition:
Example: Twin Cities I-494 study)
Reduction in peak hour vehicular traffic relative to existing ambient conditions (existing ridesharing, transit and peak spreading), or conditions forecasted for a base case (preexisting policy expectations for the future).

Both definitions have their disadvantages, but the real problem is when worst case definition data, projections or requirements are misinterpreted as being the vehicular traffic reduction that can be achieved relative to ambient conditions.

Let us assume some ambient conditions to help illustrate the problem:

Auto occupancy 1.10
Transit share 3%
Walk, bicycle 1%

These conditions are already equivalent to a 13 percent trip reduction according to the worst case definition, and employee work trips that occur outside of the peak hour have not yet been accounted for. It is a little difficult to choose a percentage of employee trips in the peak hour for a typical development, but assume the following:

Percentage of employee work trips in the peak hour 80%

Now this ambient, do-nothing condition is equivalent to a 31 percent rip reduction according to the worst case definition. It of course represents a zero percent rip reduction according to the base case definition. The balance of this discussion will utilize the base case definition; measuring against ambient conditions.

With respect to the question of where and what to measure, options include:

- Participating office employers (work trips only)
- All area employers (work trips only)
- Area streets (all traffic)
- Major facilities (all traffic)

The measurement location question becomes relevant because of the importance of dissipation of travel demand management effectiveness as one works from participating employers in the office land use category down to area streets and major facilities, or as one moves from HOV facilities over to area streets.

Dissipation will be illustrated in the case example study presented next.

EFFECTIVENESS OF STRATEGIES

In the supply management and demand management equation, the part with which we are the least experienced is demand management. This exploration of strategy effectiveness will thus focus on demand management. It will use as a primary case example the demand management effectiveness estimates prepared for the I-494 Corridor Study in Minneapolis (1). A major purpose of these particular demand management estimates was to decide how to manage supply in the reconstruction of I-494.

One may ask, why use a case example study? Why not use a real case example? The response must be that comprehensive area wide travel demand management involving public-private partnership, TMA's and ordinances has not progressed to the point where we have anywhere near a matured program to examine. Moreover, scientific before and after analysis does not seem to be a strength of most programs established so far.

I-494 STUDY

The I-494 study turned to the Transportation System Management literature for the fairly extensive vehicle trip reduction experience that exists for individual strategies at the individual employer level. It also gleaned whatever could be learned about strategy interaction and about the behavior of employers in area wide programs.

The unique aspect of the study was its systematic approach to dealing with the dissipation of trip reduction as one turns from individual employers to the broader perspective of area wide and major facility impacts. Strategy-specific rates were developed for mode shifts at the individual employer level, and for employer participation in voluntary and mandated area wide programs, for each of several categories of employment:

Category	Percent of Total
New Office	
1-49 employees	8
50-99	2
100-499	4
500+	2
Old Office	
1-49 employees	14
50-99	4
100-499	7
500+	3
New Non-Office	
1-49 employees	10
50-99	3
100-499	5
500+	2
Old Non-Office	
1-49 employees	18
50-99	5
100-499	9
500+	4

Size is important as an indicator of both the mode shifts attainable at the individual employer level and the employer participation rates that can be expected or enforced. The differentiation between "New" and "Old" is critical once one considers an ordinance, because preexisting firms are often exempted from certain requirements. Office and non-office (retail and industrial) are differentiated because certain types of measures are less effective, or not effective at all, in non-office environments.

Here we see the stage being set for consideration of travel demand management effectiveness dissipation relative to effectiveness as measured in terms of the work trips generated by participating employers in the office land use category. The dissipation elements are:

Inclusion of small employers along with large ones. (50 percent of all employees typically work for firms of under 50 people).

Inclusion of non-office employers along with office employers.

Inclusion of non-participating employers.

Inclusion of non-work travel, unaffected by most demand management measures.

Inclusion of travel not generated by travel demand management area employment (residence based travel if not included in the program; external travel).

The employer categorization and participation rates address the first three elements; the last two are addressed by traffic assignment investigations.

There is a second category of travel demand management effectiveness dissipation, and that pertains to facility-specific demand management measures, such as HOV lanes. This dissipation has one element; the mix with traffic which does not have the potential to use the HOV facility, either because it is local traffic or because it comes from a different corridor. This dissipation effect is addressed by traffic assignment investigations.

Tables 1 and 2, which give summaries of results for the I-494 Study, help show how this works and what it means. Table 1 presents the Low Scenario, employing quite modest travel demand management measures. Note the participating workplace trip reduction, measure coverage/participation rate, and average workplace trip reduction; and the differences for trip reduction as measured at the site of demand management measure application, at the average area workplace, and on the highway facility under study.

Table 2 presents the High Scenario results. (The I-494 study also examined Medium Low and Medium High Scenarios.) Note the importance of tough strategies, especially parking pricing and management, and the inclusion of an HOV lane on I-494. After all effectiveness dissipation factors have been taken into account, the estimated result is a 9 percent trip reduction estimate as measured for I-494 itself.

TABLE 1

ESTIMATION OF LIKELY TDM IMPACT -- LOW SCENARIO
I-494 Corridor Study -- 2010 Regional Forecast A

WORKPLACE BASED TRIP REDUCTION MEASURES		
Participating workplace trip reduction:	Ridesharing	1 to 5%
	Land Use	5
	Transit	1
Measure coverage/participation rate:	Ridesharing	16%
	Land Use	18
	Transit	1
Net average workplace trip reduction:	Ridesharing	#
	Land Use	1%
	Transit	1
Total average workplace trip reduction:		2%
VARIABLE HOURS PEAK TRAFFIC REDUCTION		
Participating workplace peak hour traffic reduction		22%
Measure coverage/participation rate		7
Net total average workplace peak traffic reduction		2%
FACILITY BASED TRIP REDUCTION MEASURES		
Ramp metering/bypass		1%
Total facility based trip reduction		1%

TOTAL PACKAGE SUMMARY

	Trip Reduction as Measured at:		
	The Site of the Measures	The Average Workplace	I-494 Study Area Segment
Workplace Bases Trip Reduction	2%	2%	1% *
Workplace Based Variable Hours	2	2	# *
Facility Based Trip Reduction	1	# *	1
TOTAL	5%	4%	1%

Estimate of 0.5 or less
* Reflects dissipation effect of other traffic
Note: Columns may not add to totals shown due to rounding

TABLE 2

ESTIMATION OF LIKELY TDM IMPACT -- HIGH SCENARIO
I-494 Corridor Study -- 2010 Regional Forecast A

WORKPLACE BASED TRIP REDUCTION MEASURES		
Participating workplace trip reduction: (including parking management impact on ridesharing/transit	Ridesharing	2 to 18%
	Land Use	5
	Transit	1 to 4%
Measure coverage/participation rate:	Parking	42%
	Ridesharing	42
	Land Use	21
	Transit	100
Net average workplace trip reduction	Ridesharing	3%
	Land Use	1
	Transit	2
Total average workplace trip reduction		6%
VARIABLE HOURS PEAK TRAFFIC REDUCTION		
Participating workplace peak hour traffic reduction		22%
Measure coverage/participation rate		18%
Net total average workplace peak traffic reduction		4%
FACILITY BASED TRIP REDUCTION MEASURES		
Ramp metering/bypass		1%
Total facility based trip reduction		4%
HOV-only ramps (I-494 to employment area)		1%

TOTAL PACKAGE SUMMARY

Trip Reduction as Measured at:

	The Site of the Measures	The Average Workplace	I-494 Study Area Segment
Workplace Based Trip Reduction	6%	6%	2% *
Workplace Based Variable Hours	4	4	1 *
Facility Based Trip Reduction	6	2 *	6
TOTAL	16%	12%	9%

* Reflects dissipation effect of other traffic

OTHER STUDIES

Another study that has helped expand our knowledge is the North Bethesda Travel Demand Management Study, done for Montgomery County, Maryland (2). In the North Bethesda study a subarea adaptation of regional travel demand models was applied to estimate the work trip reduction attainable for participating employers. Set up to work interactively, the demand model proved especially effective as an illustrative, educational tool.

Certain findings were different from those obtained in the I-494 study. In particular, viable work hours were found to hold little potential for North Bethesda. The hour next to the peak is already handling about 48 percent of the peak 2-hour traffic, leaving little leeway for further peak spreading. However, most of the North Bethesda results, in the aggregate, seem to parallel those of the I-494 study. Trip reduction achievement was estimated to be minimal until a $3.00 parking charge was introduced as assumption.

For North Bethesda, area wide travel demand management effectiveness was measured in terms of the additional 1995 employment that could be supported without change in overall highway Level of Service. The most intensive set of travel demand strategies tested would allow an estimated 13 percent increase, but only with the unlikely scenario of 100 percent employer participation in all measures, including parking pricing.

A "TDM" Analysis Spreadsheet has been recently developed for the Regional Transit Board of Minneapolis-St. Paul (3). This analysis tool combines travel demand models formulated for pivot point application with parametric employer participation rate analysis. Use in I-35W travel demand management planning is giving results that are similar to the earlier I-494 work for suburban destined traffic. Findings indicate that the potential for reducing single occupant auto commuting with travel demand management focused on suburban employment markets is about half what it is for central business district employment. Conversely, the CBD market offers about twice the potential for TDM effectiveness as the suburban market, even though the base estimate for drive alone mode share to the CBD is already a low 36%.

A just published Crain & Associates study for the Metropolitan Transportation Commission of the San Francisco Bay Area has taken a different approach to analysis by examining multiple examples of actual applications, mostly individual employers, and extrapolating to area wide effectiveness. The study looked not only at response rates but also contingencies, costs and project sustainability. The primary findings are qualitative. A key finding with respect to demand management effectiveness is: "In most circumstances, it's realistic to expect no more than modest results from [TDM elements of] traffic mitigation."

CONCLUSIONS

In offering conclusions, it seems useful to draw not just from the case example studies just presented, but from the broader body of information about supply and demand. The purpose of looking at the I-494 case study in particular was to illustrate, from a technical perspective, the forces at work when demand management is applied on area-wide basis.

What We Know

Before addressing the questions posed at the outset of this discussion, one might well ask how much we really know about activity center demand management effectiveness. Here is a brief assessment

	Ability to Model	Documented Experience
Participating workplace trip reduction in response to time and cost incentives/discincentives	good	fair
Participating workplace trip reduction in response to information and organization assistance, and variable work hours	poor	fair
Employer participation in area-wide program only	parametric	poor
Corridor trip reduction in response to facility-specific strategies	fair	poor
Effectiveness dissipation related to traffic not addressed by the demand management program	good	poor
Program stability overtime	none	poor

Analysis of travel demand management plan effectiveness needs to make use of all the analytical tools and information available, both modeling and experience based. Even so, there are very weak links in the analytical chain.

The weakest analytical links relate not to employee behavior but to employer behavior; not to travel behavior but to institutional behavior. We as professionals are in fact still developing the institutional mechanisms of employer involvement, and learning how best to work with them. Better understanding of their effectiveness is a further step removed.

DOES THE EMPEROR HAVE ANY CLOTHES?

- What is the viability of planning solutions?

Planning solutions are certainly more viable than attempting unplanned solutions. Transportation Management Associations, for example, have proved very unlikely to adopt tough measures without the planning that demonstrates their essential role.

In the words of Richard Kuzmyak, "A TMA without a plan is a hat without a rabbit."

- Can we achieve suburban traffic mitigation?

This question will be answered when suburban development is history. It should be understood that the answer is as much dependent on land use actions as transportation actions.

The answer is also very site-specific. Consider supply management; the provision and availability of infrastructure. In at least one example of new town planning for mixed land use and density (Flower Mound, Texas), multilane highway spacings of 2/3 of a mile on average were specified (5). Similarly, most of the I-494 and I-35W study areas in the Twin Cities have one mile grid or better of arterials.

In contrast, Montgomery County, Maryland's North Bethesda study area has a 1 1/4 mile spacing of radial multi-lane facilities, and only a 2 mile spacing of continuous multi-lane circumferential facilities. Simple logic argues that traffic mitigation is going to be more difficult in that context. After analysis of intermediate year results, the North Bethesda Traffic Mitigation Study did not even attempt to analyze conditions under full buildout of the present land use Master Plan.

- Can we do it with travel demand management alone?

Successful traffic mitigation with travel demand management alone is not likely, if the traffic reduction attainable with comprehensive programs, including tough measures, is going to be in the 10 percent order of magnitude. A 10 percent reduction can be eaten up within three years in fast growing areas.

In the I-494 study, it was decided that travel demand management would not allow dropping a lane from the rebuilding plan. On the other hand, it was decided that there were enough benefits to justify provision of certain HOV facilities. Moreover, area employers and developers have become very interested in travel demand management as a means to get by until I-494 is improved.

There is no replacement for an adequate infrastructure. Moreover, we should be thinking in terms of providing infrastructure specifically designed to be manageable. Travel demand management cannot operate effectively without appropriate infrastructure as a partner.

- Is it worthwhile, or just smoke and mirrors?

A traffic reduction on the order of 10 percent, if we accept that figure for discussion purposes, is not even in the save-a-lane category when you realize that highway lane capacity typically comes in increments of 20 to 50 percent.

However, looked at from the perspective of Level of Service, a 10 percent change can alter conditions from service Level F to Level E, or E to D.
In private enterprise, a 10 percent profit is worthwhile. A 10 percent improvement in efficiency should mean as much to the public sector and to the community as a whole.

Traffic reduction on the offer of 10 percent requires tough measures. Programs which include only easy measures, particularly if the public sector is asked to pay for them, are likely to fail the test of being worthwhile.

- Does the Emperor have any clothes?

It depends on what one thinks he's wearing.

If travel demand management is perceived a knight in shining armor that is going to solve all our activity center traffic problems, the Emperor might as well be naked.

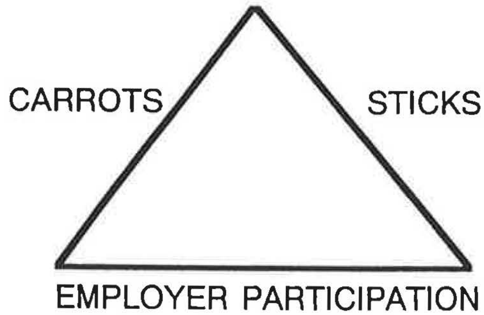
If we are simply looking for a viable partner in the total kit of tools with which to achieve suburban traffic mitigation, particularly as an interim solution and as long term protection of infrastructure investment, it's a good guess that the Emperor will be found to be adequately clothed.

PART II -- BEYOND TRAVEL DEMAND MANAGEMENT

The discussion in Part I has identified travel demand management as being a useful component of traffic mitigation, but too limited to be a solution in its own right. To summarize, the conclusions as to TDM effectiveness are:

- For success, TDM must include carrots, sticks and employer participation Figure 1
- Traffic reduction for tough TDM programs in the suburbs may be around 10 percent
- Successful traffic mitigation with travel demand management alone is unlikely
- A 10 percent improvement in efficiency is worthwhile
- TDM won't solve all our problems
- It is a viable partner in the overall traffic mitigation tool kit.

Figure 1.
Demand Management Triangle



TRAFFIC MITIGATION NEEDS IN ADDITION TO TDM

If TDM won't solve all our suburban congestion problems, even though it is a viable partner in the overall approach to a solution, what are the other traffic mitigation needs? Three major categories are:

- o Transportation Infrastructure
- o Manageable Infrastructure
- o Land Use Innovation

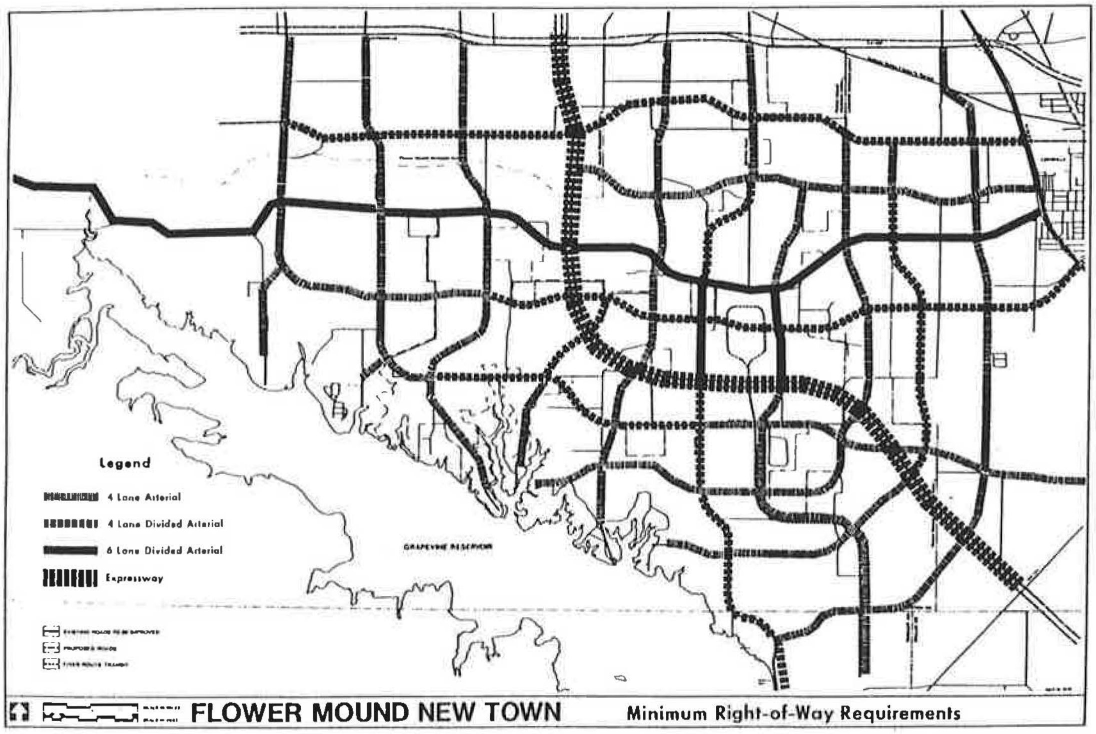
Let us look beyond commonplace perception and traditional approaches, and explore the meaning of these elements of traffic mitigation and what forms they might take.

TRANSPORTATION INFRASTRUCTURE

The concept of transportation infrastructure as an essential element of suburban traffic mitigation is not new, but needs to be rediscovered. Post World War II research on arterial highway spacing was extensive, and culminated in dissemination of guidelines (6), but some of our more troubled suburban areas did not benefit. Transportation infrastructure includes capital facilities for all modes, but most fundamentally covers the highway infrastructure needed for not just single occupant vehicles (SOV's), but also for high occupancy vehicles (HOV's), bus transit, rail transit access, and goods and service vehicles.

Figure 2 illustrates a scientifically developed highway infrastructure plan using the Flower Mound, Texas example, already mentioned in Part I (5). The grid configuration and 2/3 mile average spacing was developed using the mainframe computer transportation planning systems of the '60's and 70's, a task that would be facilitated by the microcomputer packages of today.

Figure 2.
Infrastructure



Systems evaluations of the same period concluded that grid systems for major highways could avoid serious traffic concentrations and excess vehicle miles of travel engendered by loop and radial (beltway) configurations, a finding too late to avoid some of today's outstanding problem areas, but still timely with reference to exurban area planning. Among worthy concepts put forth was the approach of placing central business district (activity center) focused reserved right-of-way transit on diagonals within such a grid, giving an inherent transit time advantage based on distance alone.

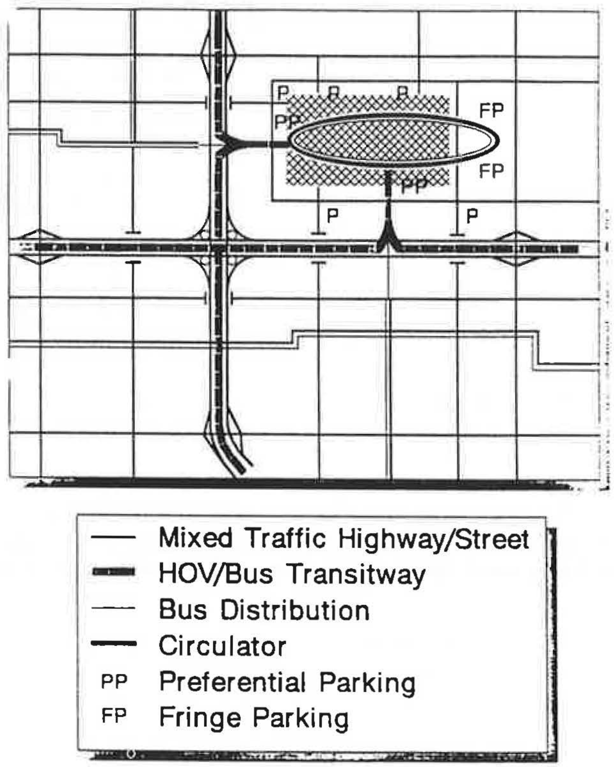
MANAGEABLE INFRASTRUCTURE

"Manageable Infrastructure" is transportation infrastructure offering built in emphasis on HOV, transit and pedestrian mobility. With manageable infrastructure, TDM and other programs of single occupant auto de-emphasis can build upon inherent advantages not present in conventional suburban traffic plans.

Figure 3 illustrates a one purely conceptual example of manageable infrastructure for an activity center. The activity center itself is the crosshatched area. It is a pedestrian precinct. Through traffic is taken around the activity center on limited access highways and through arterials.

The closest-in circulation road for mixed traffic is the rectangle around the activity center proper. General purpose mixed traffic is allowed to penetrate no further than the unrestricted use parking garages indicated by the letter "P". These garages would charge substantial rates for long term parking. Within the pedestrian precinct of this example, internal circulation is enhanced by a "circulator", shown as an ellipse for illustrative purposes. This "circulator" can be any form of pedestrian movement enhancement, including Minneapolis-St. Paul type skyways. There is no magic in the loop configuration of the circulator shown. Parker (7) states that "shuttles and mini-loops operating at close headways are more likely to find application than grand loops."

Figure 3.
Manageable Infrastructure



Carpools and vans are allowed to penetrate into preferential parking facilities located directly on the circulator, indicated by the letters "PP" in Figure 3. Low occupancy vehicles may use garages directly on the circulator if they drive to the fringe parking facilities located outside of the activity center, at the locations indicated by the letters "FP". The fringe parking is located on major arterials with freeway interchanges, but not offering as direct access as is provided carpools, vanpools and transit.

Carpools, vanpools and transit are afforded direct access into the activity center, and into the preferential parking, via HOV/bus transitways. These transitways provide exclusive facilities approaching from each compass direction. Although shown as being in freeway medians, they could follow their own rights-of-way independent of freeway alignment constraints.

An option too complex to show in Figure 3, but possible, would be to provide for "through" HOV/bus movements bypassing the activity center and headed for other destinations. By this means the mainline transitways would serve as an HOV network, and not just as radial facilities serving the one activity center.

In the example, buses accessing the activity center via the transitways circulate within the activity center along the circulator. The feasibility of this would depend on the circulator technology. One present day means of accomplishing this would be through application of the O'Bahn, or guided bus, technology. Alternatively, independent transitway stops or stations could be provided at advantageous locations.

Direct access is provided local buses from surrounding areas by connecting local streets with the final leg of the transitways. This connection is by exclusive facility not open to low occupancy vehicles. Local buses may circulate through the activity center following the same route as vehicles from the mainline transitways. Although not shown, there is no reason why carpools and vanpools from the local area could not be allowed to use the exclusive bus access routes in as far as the preferential parking facilities.

There are design objectives implicit in this purely conceptual example, and there are additional aspects of manageable infrastructure that should be included. Here for consideration, is a set of design objectives for manageable infrastructure:

Transportation Design Objectives for Manageable Infrastructure

FOR TRANSIT:	Preferential line haul travel, access and prime stop locations
FOR HOV's:	Preferential line haul travel, access, drop-off areas and parking location/pricing
FOR LOV's:	Adequate circulation, access and parking with preferential location and pricing for short duration, non-commuter travel
FOR DELIVERY:	Economically viable goods and services circulation, access and terminal facilities
FOR ALL:	Internal activity center pedestrianization and passenger circulation/distribution systems
FOR EMPLOYEES:	Frequently needed goods and services (banks, child care, etc.) near terminal and parking facilities or on the circulation system

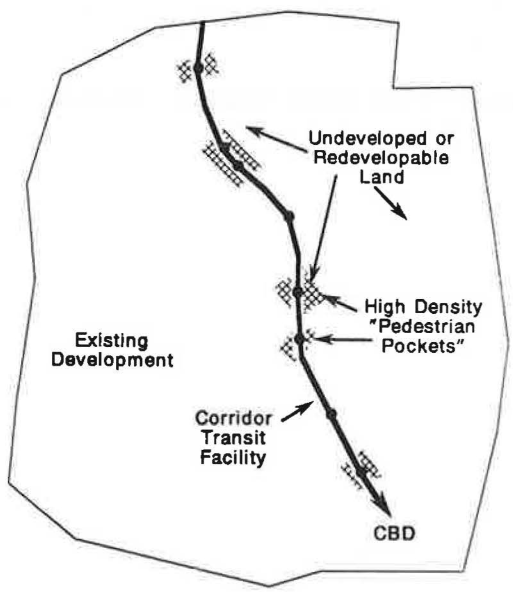
LAND USE INNOVATION

Development of land use configurations less demanding of the transportation system must go hand in hand with purely transportation measures to achieve traffic mitigation. Among "conventional" approaches, placement of housing in juxtaposition with employment has proved no panacea. Nevertheless, resolution of macro scale jobs/housing imbalances that enforce long distance commuting to transit inhospitable destinations should help. Development ceilings need to be adjusted to what the transportation system can handle.

Conventional land use approaches need land use innovation as a partner. Land use innovation can take many forms. One, already alluded to, is providing land use mixes within activity centers that eliminate the need for side trips and attendant single occupant auto use.

Another possible land use innovation is illustrated in Figure 4. This innovation comes from a proposal titled "Pedestrian Pockets" (8). It envisions concurrent development of fixed guideway transit and station area urbanization friendly to transit. The published design details flout a number of valid traffic engineering lessons learned in this century, but in broad concept it is a very constructive innovation. The concept was proposed for retrofitting into existing development with pockets of unused or redevelopable land.

Figure 4.
ARZ Applied to Fixed Route
Transit with Stations



The "pedestrian pocket" urbanization of Figure 4 could be any size or type of high density land use organized with emphasis on pedestrian movement, from pedestrian scale developments to full size activity centers built along manageable infrastructure guidelines. The activity center illustrated in Figure 3 could, with appropriate transit service modifications, be placed in one or more of the "high density pedestrian pockets" of Figure 4.

EVALUATING TRAFFIC MITIGATION ACHIEVEMENT

Today's criteria for satisfactory transportation service rely on traffic flow "Level of Service" measures such as intersection Level of Service or area wide average Level of Service, using the familiar alphabetical scale that identifies congestion with levels "E" and "F". Such criteria are used for adequate public facilities ordinances and other zoning related tests.

These criteria can obscure congestion. One jurisdiction, for example, specifies Level of Service D for midday. Peak congestion is thus assumed. Another specifies C or D in the peak as an area wide average Level of Service. Implicit in this approach, although perhaps unintended, is allowance of congestion wherever it is balanced by underutilized capacity in the same area or even in the opposing direction of traffic flow.

More importantly, these criteria do not distinguish between single occupant auto travel and high occupancy vehicle travel, and do not address other mobility options such as reserved right-of-way transit or pedestrianization. They are incapable of measuring many benefits of traffic mitigation approaches such as manageable infrastructure or land use innovation.

For discussion purposes, here is a partially developed set of alternative criteria for satisfactory transportation service:

Alternative Criteria for Satisfactory Transportation Service

- o Congestion does not degrade environmentally sensitive areas/neighborhoods

  - Volume - Backups

  Police, fire, goods, services can get through

- o Alternatives to congested SOV driving exist

  - Pedestrian access to goods/services

  - Transit, HOV

- o Travel items are acceptable

  - Transit travel time not exceeding

  - HOV travel time not exceeding

  - SOV travel time not exceeding

- o Travel times are predictable/reliable

These alternative measures have a controversial element, in that they, too, accept a degree of congestion. However, the measures test the acceptability of that congestion which does accrue, including its impact on travel time. The travel time measures could be for work trips and also for a representative non-work travel purpose. They could address average trip time or, for example, 90th percentile trip time.

RESEARCH AND DEVELOPMENT NEEDS

Travel demand management deserves further development and further research into its effectiveness. It offers useful transportation efficiencies, but misunderstanding or overselling its effectiveness can harm the urban environment by encouraging inadequate transportation infrastructure and discouraging right-of-way reservation.

Manageable infrastructure and land use innovation have components that have been tested and evaluated, but we currently cannot say much about their overall effectiveness potential. Recent estimates done for the I-35W corridor in Minneapolis indicate that in that city the potential for TDM as a traffic mitigation tool for central business district destined commuter traffic is twice the potential for suburbs destined commuting (3). Could a suburban activity center with manageable infrastructure and land use innovation turn in a comparable performance? Answers to this type of question are vital in our quest for traffic mitigation.

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SUBURBAN CONGESTION: THE NATURE OF THE BEAST

by

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The Committee asked me to offer some measure and scale on the problem of suburban congestions. In doing this I would like to do three things: (1) offer some comments on Elizabeth Deakin's paper, (2) toss out a few numbers on the scale of urban activity centers and observations about some of the travel characteristics, and then, (3) sum up the results of some of the initial findings from work that the Urban Land Institute has been doing.

We have just started a suburban mobility study that is looking at six centers around the country. We had a meeting of our Steering Committee in October. We used Elizabeth's paper to get people thinking about the question. The group consisted of five developers, three public officials and two consultants, people with some experience with transportation and transportation issues related to growth centers, but by and large not professions. The following are some summary notes of their reactions to in the profession, it probed some of the difficult questions and for those outside, who don't regularly deal with some of these things, I think it opened their eyes to some of the options.

First, is suburban congestion a problem? That was dispensed with fairly quickly. Perception is all, particularly in the suburbs. If the public thinks it is a problem, it is a problem, and the misery solution (that congestion has always been present in cities, and we should learn to live with it) probably is not going to work.

INSTITUTIONAL CONCERNS:

There is a feeling that there is a mismatch between the structure of governments in the suburbs and the scale of the problem. The movement of residents and jobs and commuting patters in the suburbs has flooded over the existing governmental structure. In many cases, both on the East Coast and West Coast, there probably are too many governments. Dealing with congestion requires a concerted regional approach. There are just too many cities, municipalities, townships, to get them all together. At the other extreme, for some of these major centers, there is no local government. Sometimes, special districts and transportation management associations recognize the unique needs for intense public services in these areas.