

URBAN CORRIDOR MANAGEMENT AND
OPERATIONS WORKSHOPS

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Conducted By

The Public Works Training Division
Texas Engineering Extension Service
The Texas A&M University System

in cooperation with

The State Department of Highways
and Public Transportation

INTRODUCTION

The Urban Corridor Management Operations Workshops were held to permit personnel responsible for traffic operations in urban areas to explore the problems and advantages of establishing Corridor Management Teams within their jurisdictions. Because of the number of agencies responsible for various operations within an urban corridor, coordination, cooperation, and communications are essential to an efficient system.

The workshop format enabled participants to come together to discuss the concepts of corridor management, the advantages of establishing Corridor Management Teams, problems involved in corridor management, and available tools for corridor management. At the conclusion of each workshop, trends for the future in transportation were summarized.

Subjects under consideration at the various sessions often over-lapped in the wide-ranging discussions. Those who attended the workshops benefitted from the frank and open exchange of ideas and opinions.

Summary

Urban Corridor Management
and
Operations Workshop

C. J. Keese
MacDonald Professor of Transportation
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The following paper presents a summary of the items discussed at the two Urban Corridor Management Workshops. The summary was prepared by C. J. Keese, MacDonald Professor of Transportation, Texas Transportation Institute.

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PREFACE

The movement of persons, goods and services within an urban corridor are served by a network of major and minor traffic facilities. Rather well defined flow patterns can be identified as corridors of movement and these corridors can then be treated as subsystems of the entire network.

Since the various facilities, and traffic services involve a rather large number of jurisdictions and departments or units within each of these jurisdictions, the management of traffic operations within an urban corridor requires a great deal of cooperation and coordination among the responsible parties.

The Urban Corridor Management and Operations Workshops were conducted to bring together the responsible groups from the major metropolitan areas of Texas to compare notes and discuss problems, successful practices and other experiences of common interest, recognizing that each metropolitan area, and each corridor for that matter, has somewhat different characteristics.

The workshop format, although not producing formally prepared material that could serve as a report or record, did permit a free exchange of views on a very wide group of subjects, with liberal overlapping of subject matter as the discussions ensued.

The workshops were of great benefit to all who attended.

The day and a half workshops were started with a keynote discussion of the overall concept of corridor management. These comments touched briefly on each of the major subjects to be discussed throughout the workshop.

- o Corridor Designation
- o Corridor Development
- o Enforcement
- o Public Information
- o Agency Coordination
- o Corridor Management Teams
- o Problems
- o Tools
- o Trends in Transportation

Concepts

The comments on concepts of Corridor Management are included in Appendix (A).

Summary Highlights of Workshops Discussions

The workshop groups tended to agree that although there were no specific criteria for defining or describing a corridor, the responsible agencies within each urban area could identify the various corridors close enough for development and management purposes.

They were of the opinion that enforcement is critical to effective traffic management and that police traffic services has a very low priority with all urban police departments who face increasing crime problems. Traffic Services is declining in priority as other problems receive public attention and support. Elimination of much of the traffic time-loss and other inefficiencies from such things as accidents and stalled vehicles will require a substantial increase in police traffic services or major changes in

our laws and agency responsibilities.

The lack of adequate police traffic service was highlighted as a major weakness in corridor management.

Another area of weakness was Public Information. The reason for this weakness was that everyone was responsible therefore no single agency was doing the total job. Public information was highlighted as a major element in efficient corridor management and was highlighted as a major weakness.

As the groups identified all of the various jurisdictions, departments, divisions, units and individuals who had responsibility for involvement in, or positive or negative influence over traffic operation within an urban corridor, it became clear that coordination and cooperation between these groups would only occur if mandated by the heads of the involved agencies. The lack of executive direction or sanction to urban corridor management was seen as a major weakness and one that could be corrected by the involved parties. The problem of responsibility, authority, accountability and liability was also included under the discussion of the Corridor Management Team.

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CONCEPTS OF CORRIDOR MANAGEMENT

William R. McCasland
Research Engineer
Texas Transportation Institute

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To begin the workshop program, William R. McCasland, Research Engineer, Texas Transportation Institute, discussed "Concepts of Corridor Management." This paper presented the need for corridor management, designation of a corridor, and the development of the management team. Some guidelines for corridor management were presented, and finally tools available to increase capacity were outlined. A copy of his remarks follows.

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CONCEPTS OF CORRIDOR MANAGEMENT

by

William R. McCasland

Corridor Management - What is it? Is it important? How many of you have at one time or another encountered congestion on a freeway during what is commonly known as the off-peak period? You finally notice the orange signs on the side of the road that states that maintenance activities ahead have blocked one or two lanes. Do you say to yourself -- Why can't they do that at night or on weekends?

So, you get to the intersection, turn right on the cross street and finally get to the alternate route that parallels the freeway but it has a no left turn control. The city increased the capacity for the thru traffic by prohibiting the turns since there is no room for a left turn bay. So, you circle the block. Now you are heading in the right direction, but there is a delivery truck blocking one of the moving lanes and you wonder why they don't provide off street loading areas. Finally, you get passed the truck and proceed down the street, only to find that this is the day that the city (or county) scheduled street repairs on that bad section of potholes, that everyone has been complaining about, and there is the telephone company servicing one of their cables from a manhole in the street.

This story could be told and retold with infinite variations -- The critical railroad grade crossing that seems to be blocked during each peak period; the 18 wheeler that is either jack knived and blocking two lanes or has an overheight load that is stuck under a critical overpass; or it could be that slow moving bus that blocks the lane at each bus stop.

These are just a few of the "normal" events that are encountered daily in traveling in and around and thru the urban areas - both peak and off-peak. To these transportation problems now let us add some of the innovations being applied to solve our problems. To improve occupancy of vehicles we are taking a lane of freeway away from "normal" traffic and giving it to buses, van pools, and other HOV's. We are closing or metering entrance ramps to the freeway, requiring traffic to use alternate routes during the peak periods. We are rebuilding streets and freeways that have long since passed their design life; while maintaining traffic flows of 50 to 100,000 vehicles per day. We are enforcing the 55 MPH speed limit and other traffic laws that are equally unliked and ignored by the public, while trying to combat the rising crime rate in the cities -- a job made more difficult by having to ticket those "criminals" who are watering their lawns at times other than 1 to 5 in the morning.

Excuse me friends if I get carried away when speaking of the good life in the urban areas of today. Living in Houston is not easy these days, and I suspect that living in most urban areas is not easy. Why is this? One important reason -- the most important reason -- is that we are losing the big 'MO'. It is just slipping away and with it our life style and our ability to grow and prosper. Now you football fans know that in TV jargon, the big MO is "monentum." But in our business, it stands for Mobility. How bad have we slipped? I'm sure that each of you can express it in terms of your immediate surroundings -- in Houston, it is measured as follows:

In 1969, you could reach the CBD from a distance of 18.3 miles in 30 minutes;

In 1973, the distance had been reduced to 17.4 miles in 30 minutes;
In 1976, the distance had been reduced to only 12.3 miles in 30 minutes;
In 1979, the distance changed to 12.2 miles.

This says that during the peak period, the mobility has been reduced by 33% in ten years. Off-peak has not been as critical, with a 5% reduction, but the handwriting is on the wall. It won't take much more traffic to tip the balance and cause a large decrease during the off-peak, especially since most maintenance activities are conducted during this period.

What is mobility -- mobility is transportation of people, goods and services. And corridor management is urban transportation management. The corridor designation is an attempt to divide and partition the problem into a more manageable size. The goal of urban transportation management is to serve the needs of the people within the constraints of time, space and available resources. And therein lies the importance of corridor management, because we are running out of time, of space and of many of our resources. In order that transportation management may be accomplished, it must be treated as a system - it is not sufficient to have independent systems attempting to satisfy the same objective.

In our example above - Freeway Maintenance
Signal Control
Left Turn Prohibition
Goods Distribution
Street Repair
Utilities Maintenance

are services that are needed by the public. But it is becoming more apparent each day that these activities, and the agencies involved, must

be drawn together in a single system with management toward common goals and objectives.

A "corridor" is a passage way for moving persons, goods and services in an urban area, and "management" of the corridor is making the best use of available resources to accomplish some established goal or objectives. This is a timely, important and popular subject. For example, I requested a recent literature search of this topic and received over 300 references of current work in corridor management.

This workshop will examine these terms in greater detail. The corridor and what it is. How can you define a corridor? What are its limits? Why define a corridor at all? Fortunately for me, I do not have to address these questions at this time, for in fact, corridors will mean different things to different people. For my discussion, a corridor is a sector of an urban area -- I will leave it to the workshop to develop more definitive descriptions.

Management -- The judicious use of means to accomplish an end.

What are the means that we have available to us? In this workshop, we will talk of the "tools" for effective corridor management. I do not care for the term "tools" to describe methods, procedures and hardware used in transportation engineering -- such as a park and ride program, or a computer simulation program or a traffic signal timing model. Tools sound too simple -- but advanced technology -- maybe too sophisticated.

What we want to do is apply good, current practices of several disciplines -- engineering, planning, enforcement, public information and others to solve current problems.

Means also applies to our resources. What are our resources?

Money

Personnel

Facilities to work with

and of course Time and Space.

We say that management is difficult because of the limitations that we have on our resources. And, the limitations are growing more severe.

Limitations of:

- 1) TIME - Off-peak is no longer off-peak. It takes too long to implement solutions.
- 2) MONEY - Inflation and a reduction in tax base has hurt transportation.
- 3) MAN POWER - Same as money. Skilled workers are hard to find, or to afford.
- 4) ORGANIZATIONAL CONSTRAINTS - More and more agencies are involved in transportation.
- 5) PUBLIC CONSIDERATIONS - We must remember that we serve the public and must be aware of their safety and travel needs.

Management of a transportation corridor is also difficult because it involves many different agencies -- and different departments within agencies.

Thus we come to one of the most critical concepts of corridor management -- Multijurisdictional Coordination.

I have a game that I carry with me wherever I go. It is a form of paddle ball. It is simple. There are two paddles and a rubber ball. The object is to keep the ball in the air by hitting it to the other player in

a way that he can hit it back to you. If you hit it too hard or in a direction that is difficult for him to hit then he either misses, or hits one back that is too difficult for you to hit. When one of the players drops the ball, the game is over.

Written on the paddle is an inscription -- "This is a game of cooperation." There is skill to be sure. But it is not the normal competition type game -- you are not trying to beat an opponent. You are trying to help the other player participate in the game to achieve a common goal.

I think of corridor management in those terms. However, it is not a game - but the exercise in management in it's most difficult form.

The institutional problems must be resolved. To quote a famous transportation engineer research innovator and fisherman:

"Cooperation without authority to act does little good."

So there must be an understanding -- an agreement on getting things done; how to make decisions.

The agreement should determine:

- 1) Who is involved
- 2) How is the authority assigned
- 3) Who has responsibility
- 4) Who is accountability to whom
- 5) How is the funding assigned

The agreement will vary from location to location and from program to program.

Development of the Management Team

One approach to this problem of exercising management to an urban

corridor is the formation of a corridor management team (CMT). The session this afternoon will discuss the CMT approach.

Communication

Whether a team is formed or not, the key to success lies in the ability of the agencies to communicate both within their own organizations and with other organizations on matters that effect corridor management.

Management Guidelines

The purpose of a CMT should be to implement improvements to transportation systems. To accomplish that, guidelines or steps to be followed could be:

- 1) Establishing community goals and objectives in transportation
- 2) Assessment of resources
- 3) Identification of transportation problems
- 4) Analyzing the problem and identifying alternative solutions
- 5) Selection of alternative solutions
- 6) Establishment of programs for implementation
- 7) Monitoring the effectiveness of the program

To sum up my remarks, I have tried to present some general concepts of corridor management. In the following sessions we plan to get down to specifics with the experience of corridor management teams -- their problems and solutions.

The basic requirement in effective management, regardless of the scope of management, is team work. You may call it coordination, cooperation and communication.

There are simply too many things that create traffic problems, too many agencies responsible for transportation related activities, to even think in terms of a one-agency approach.

TOOLS TO INCREASE CAPACITY
AND/OR REDUCE DEMAND

- A. Increase Vehicular Capacity
 - 1. Expansion of Facility
 - a. Add streets and freeways
 - b. Add lanes
 - c. Add turning roadways
 - d. Complete frontage road connections
 - 2. Eliminate Bottleneck
 - a. Geometric design improvements
 - b. Relocate or redesign ramps
 - c. Eliminate conflicting maneuvers
 - 3. Change or Modify Functions
 - a. Narrow lanes to increase number of lanes
 - b. Use shoulders for travel
 - c. Reversible lanes
 - d. Two way left turn lanes

- B. Manage Vehicular Demand
 - 1. Traffic Control Systems
 - 2. Diversion Systems - Traffic Assignment
 - 3. Special Usage Restrictions
 - 4. HOV - Programs (See Below)

- C. Increase Person Capacity
 - 1. Encourage Higher Vehicle Occupancies
 - a. Park and Ride - Transit

- b. Park and Pool - Car & Van Pools
 - c. Economic Incentives - Fares, Parking,
 - d. Ride Share Programs - Car & Van Pools
 - e. Better Transit Service
2. Priority Treatment of High Occupancy Vehicles
- a. Reserve Lane
 - (1) Concurrent Flow - Bypass & Thru
 - (2) Contraflow
 - (3) Separated
 - b. Traffic Control
 - (1) Bus Preemption
 - (2) Bus Only Streets
- D. Manage Person Demands - (Demand Management)
1. Shorter Work Week
- a. 4 - 10 hour days
 - b. 3 - 12 hour days
2. Variable Work Hours
- a. Staggered Hours
 - b. FlexTime
3. Reduce the Need or Desire for Travel
- a. Computer Technology
 - (1) Work at Home
 - (2) Bank and Shop at Home
 - (3) Etc.
 - b. Gas Rationing
 - c. Costs of Travel

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CORRIDOR MANAGEMENT WORKSHOP

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In the corridor management workshops, participants attempted to define an urban corridor and to discuss its development. They agreed that the best plan without enforcement is useless. The need for public education and information were discussed, and some methods of securing public support were outlined. The need for cooperation and coordination among responsible agencies was emphasized. Also, agencies who provide support to traffic operations were mentioned. A summary of the corridor management workshops follows.

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Corridor Management Workshop

TECHNOLOGY TRANSFER

Technology transfer refers to making efficient use of research and experience in the operating environment. Millions of dollars of research have been expended on corridor management research. Unfortunately, the results of the research tend to benefit only those agencies that actually participate in the original experimentation. The research is reported, but for some reason widespread implementation is rare.

Operating agency experience is possibly a broader source of new technology than controlled research. However, the results of experience are often even less publicized. Professionals involved in corridor management should strive to determine why some of the most valuable tools for improvement are not being used. Discussion of two narrower aspects of the problem may provide some insight.

Research: Not Reaching the Man in the Field

Oftentimes research reports (or more likely their abstracts) are read by an administrator. He marks them "useless" and throws them away, or "helpful" and puts them on his shelf. They are used only if a problem gets particularly difficult, and he remembers that once upon a time he read something about the subject.

It could be that little fault lies with the administrator, and that the research is not presented in the right manner to suit the needs of the crew chief. If so, users should indicate the need for a change in format. For example, reports could contain a two or three page section on actual field implementation with illustrations, as appropriate.

Comments often heard relate to statements indicating that "additional research is needed." It should be recognized that few subjects need no additional investigation, as perfection is never attained. Implementers should not let the absence of a perfect solution deter them from making use of important findings.

Evaluation: Not Worth the Effort

Experience gained in dealing with corridor problems is often clouded because there "is not enough time or money to evaluate" the effectiveness of the remedy or treatment. In other words, it is cheaper to continue implementing an ineffective treatment than it is to evaluate how well it works and where it might work in the future.

More often than not, well-planned improvements are effective. The user as well as all other counterparts in the state will be much better served if a little time is taken to document: a) the problem, b) the proposed solution, c) the measures of effectiveness (MOEs) considered, d) estimated effectiveness, and e) other potential applications. Short articles for the *TexITE Newsletter* or for D-18 or TTI will provide for considerable distribution and comment.

Evaluation by an outside agency should be considered if there is not enough local manpower available. At the least an outside agency could be consulted in the development of an efficient evaluation plan.

Resource Agencies

Only rarely does an operating problem occur that has not been encountered by another agency. Even in situations where no solution was found, agencies often report those treatments that failed to work. Corridor management teams should consider developing a relationship with resource agencies to assist in library searches to identify solutions to problems that have been encountered and remedied by other agencies.

Resource agencies such as the Center for Highway Research at the University of Texas at Austin and the Texas Transportation Institute can often assist operating agencies for nominal costs. It may even be appropriate to establish a Transportation Resource Center similar to the Public Works Resource Center operated by the Texas Engineering Extension Service. Details on providing such a service can be obtained from Milton Radke. Regardless of the individual mechanisms chosen, all persons involved in corridor management should actively seek avenues through which they can put to use the tremendous advances in technology presently available.

THE TEAM

Bob Hodge
Supervising Traffic Engineer
District 2
Ft. Worth

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One series of afternoon sessions were devoted to the formation and operation of Corridor Management Teams. Bob Hodge, Supervising Traffic Engineer, District 2, Ft. Worth, emphasized the importance of forming a corridor management team to coordinate the operations within an urban corridor. He cautioned that the best teams may take a long time to mature, and that a corridor management team is always evolving. It is important to agree on goals and objectives, and to provide balanced representation on the teams. A team should not be engineers with support personnel. A summary of Mr. Hodge's remarks follows.

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C.M.T. WORKSHOP

"The Team"

September 16, 1980
(Bob G. Hodge)

In my estimation, Corridor Management and Operation is one of the most important tasks facing us today, and one that has been a long time in developing. It's not new; we have been trying to improve the operation of our facilities for years - the concept of sharing this task with a group of professionals organized for that purpose is relatively new. I hesitate to say this is the answer to all our problems, but I do believe it goes a long way toward it.

The selection of team members is a very important first step. I won't dwell on that selection process because Gary has already covered that. What I would like to stress is that the best of teams takes a long time in maturing and hitting its stride. The C.M.T. is an evolving entity. It's a learning process and it must grow and develop into a united effort. It will grow to fit the needs of a particular area. This growth and development should not be rushed or forced into preconceived ideas. It's important, even necessary, that a confidence in the potential be built, and understanding of its purpose be established, and a respect for each member and his own problems and abilities be common knowledge before this team can function.

In the beginning, we spent a lot of meeting time discussing goals and objectives. I think this is important and should be the initial effort of any team. However, don't expect this group of people to immediately accept and appreciate all the concepts of traffic management and operations that you as a traffic engineer have been studying and planning for years. You'll find yourself with a room full of uncomfortable people, doing a lot of twisting in their chairs and looking at the ceiling. Here again, this is a growing process and if its to be a team effort, the process can't be pushed.

You look around you at the many traffic operational problems you have and you think there should never be any problems of putting together an agenda for the team meeting. But it's not all that easy. Your agenda needs to be balanced with subjects of particular interest to all members.

- An overdose of signal problems leaves half the team cold and might not be a good agenda item.
- A steady diet of plan reviews becomes only a briefing session.
- Overwhelming the team with control strategies and system analysis sends several members to the men's room or home.

Until the members become accustomed to working and thinking as a team, topic selection is very important. Until they realize that each have different viewpoints, yet all have the same objectives.

Remember that this is a group of professionals, not politicians, and avoid falling into a method of C.M.T. operation which does not facilitate the three C's, by involving non-operational people such as city councils, general public, and big business. The C.M.T. should not become a clearinghouse for all kinds of problems. Most problems are in some way related to management or operations, but may be outside of our realm of authority or responsibilities.

One last thing, a pit-fall that can easily happen, even here in this workshop. Like the balanced agendas, we need to balance our organizational support requirements and involve all members of the organization in the support activities. Each organization represented on the team needs to share the support workload, and special care should be taken not to concentrate on just one part of the team's needs in our research and development efforts. In addition to traffic engineering interest; public work, enforcement, maintenance, and design elements are involved.

CORRIDOR MANAGEMENT PROBLEMS

Herman E. Haene1
Supervising Traffic Engineer
State Department of Highways
and Public Transportation

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Other afternoon sessions concerned themselves with corridor management problems. To begin the program Herman E. Haenel, Program Moderator, reviewed the corridor management problems to be discussed by the panel. Major problem areas include available enforcement personnel, lack of public support, unrealistic enforcement expectations, and coordination with transit companies. An outline of Mr. Haenel's remarks follows.

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CORRIDOR MANAGEMENT PROBLEMS

Herman E. Haene1

A number of corridor management problems exist which need to be considered and if possible need to be resolved. The following papers provide a review of these problems as seen by city and state traffic engineers, the city police personnel, and the research engineer.

In addition to the problems discussed in the attached papers, the following items were mentioned by police officers in the Fort Worth meeting and by transit personnel in the San Antonio meeting.

1. There are problems in regard to enforcement personnel available to carry out police traffic services. Although the number of personnel appear to be substantial, special assignments, illness, and vacations reduce the number of officers to a nominal amount.

In one city, city agencies give the Police Department telephone number as a reference for emergencies between 5:00 p.m. and 8:00 a.m. The Department spends much of its time in carrying out the other agencies' duties during these hours.

2. Further there is a lack of understanding and support on the part of the public as to the importance of police traffic services. For instance, one city law enforcement officer reported that there were more traffic-related fatalities than homicides.

3. The enforcement expectations need to be realistic. At times the police officer is asked to enforce engineering design problems. An officer's point of view prior to construction of a facility, installation of a traffic control device or development of a detour might alleviate or eliminate enforcement problems in the future.

4. Public transit problems include the closure or reconstruction of a street prior to notification of the transit department. Even if the street is open during reconstruction, the passenger ride is uncomfortable. The transit authority must make rapid changes in these instances and inform their riders. Advance planning, coordination, and communication (such as that provided through a CMT) can (and does) solve these problems.

CORRIDOR MANAGEMENT PROBLEMS

Jerry Biggs
Traffic Engineer
District 11
Lufkin

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In his discussion of corridor management problems, Jerry Biggs, Traffic Engineer, District 11, Lufkin, listed the major problems as personnel, time element, and authority. Most Districts do not have personnel available to assign to corridor management. Too much time is required to implement improvements. All those who hold veto power should have a place on the team. Finally, someone on the team should have final authority as well as the responsibility to carry out decisions. An outline of Mr. Bigg's remarks follows.

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URBAN CORRIDOR MANAGEMENT AND OPERATIONS
WORKSHOP
FT. WORTH, TEXAS
SEPTEMBER 3 - 4, 1980

CORRIDOR MANAGEMENT PROBLEMS

1. PERSONNEL

First of all is the commitment of personnel to the task of corridor management.

In this era of trying to do more with less it has been extremely difficult for District's to gear up to needs. In Houston there were four people assigned to the task of freeway traffic management. This group handled the following work tasks.

1. Freeway traffic studies
2. Study and evaluation reports
3. P. S. & E
4. Public Transportation Coordination
5. Operation of 50 ramp controllers
6. Traffic control plans for freeway maintenance activities
7. Coordination with City Office of Traffic and Transportation

In contrast is the California Department of Transportation with its personnel compliment of 107 in the Los Angeles Freeway Operations Unit. In addition to performing functions as above they also have the additional responsibility of incident management.

This is quite a difference and as you might imagine the Los Angeles Unit is much more responsive to operational needs.

I'm not suggesting that each District commit that much manpower to corridor management but rather to study what its objectives should include and to gear to that.

At least the teams objectives and goals should be determined and broken down by agencies. Then each agency should realistically gear to meet those objectives.

2. TIME ELEMENT

One of the most frustrating things in the area of Corridor Management has been the time it takes to get things done.

Historially, it has taken for too long to receive approval on operational improvements that are justified. Also, FHWA is a partner in this with us where freeways are involved and as such their approval is necessary. Often after preparing detailed studies operational improvements are not approved at the Federal Level. Those at whatever level, who hold veto power on management techniques should have a place on the team. Ideally, these people need to be local people who can perceive the needs that may exist. Efforts must be made to reduce the time it takes to implement operational improvement.

3. AUTHORITY

In Corridor Management we are talking about the timely implementation of operational improvements. To be timely means to have the responsibility and authority to act in the best interest of the State, City or whatever agency.

Too often good stratigies go down the tube because those in authority do not agree. The members of a Corridor Management Team need to have not just the responsibility but the authority to commit their resourses to an

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action. The Los Angeles Freeway Operations Unit is headed by a Deputy District Engineer and is funded in such a way that they do not compete for funds from maintenance or construction.

All this sounds ideal, but with the demands placed on the Department and in particular for people, it seems even more important to me that some reorganization be considered. The duties of Corridor Management cannot always be added to the duties of the Traffic Engineering Section as then it becomes just one more chore in an already busy schedule and as such new personnel need be considered.

In Houston a management team approach has been attempted in the past but failed, primarily, because none of the actors were provided with the authority to make it work.

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CORRIDOR MANAGEMENT PROBLEMS

Carl Braunig
City of San Antonio

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In his discussion of corridor management problems, Carl Braunig listed seven problem areas encountered by the City of San Antonio in managing a traffic corridor. These problem areas included time commitment, financing, incident management, enforcement of restrictions, coordination and communication, political problems, and responsibility. A short discussion of each of these problem areas follows.

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CORRIDOR MANAGEMENT PROBLEMS

Carl Braunig

Corridor management has provided some problems but these problems have been reduced through the Corridor Management Team. The problems encountered by the City of San Antonio include the following:

1. Time Commitment. There are always pulls from many directions in regard to time commitments and this has been somewhat of a problem. In addition there is a lack of personnel which puts further demands on the traffic engineering personnel's time.

The time required to go to meetings further reduces "production" time and there is a need to make the meetings worthwhile. The CMT meetings have been time well spent and problems have been solved in a more rapid manner through team coordination.

2. Financing. As with time, there is a serious competition for finances. There are several avenues for funds available for corridor management (Urban, Traffic Safety, Interstate). Funding has been provided for the Corridor Management Team by the MPO through the use of 112 planning funds.

3. Incident Management. Incidents present problems also. Other than accidents and vehicle breakdowns, incidents include:

- a. Ice on streets and freeways
- b. Hurricane "Allen"
- c. Transportation of dangerous cargo through an area
- d. Special events (Stock Show, Texas Open).

Although ice does not occur very often on the streets and freeways in San Antonio, an ice plan has been developed and is reviewed by the CMT each year. Anticipated incidents (Stock Show, Texas Open) are prepared for ahead by the CMT. Communications developed by the CMT were also of value during Hurricane "Allen." The hurricane required handling heavy number of vehicles due to the large number of people leaving

the cost prior to the hurricane.

4. Enforcement of Restrictions. The Police Department spends considerable time in the enforcement of restrictions. An attempt is made to minimize the number of restrictions and solve enforcement problems that exist due to motorist confusion and restrictive traffic controls. The police officer points out problems that could be resolved by means other than enforcement and these are responded to.

5. Coordination and Communication. There are many areas where problems exist in regard to coordination and communication. These include:

a. City and State. As an example, two-way center left-turn standards differ between the City and the State and the type design installed depends on whether City or State funds are utilized.

b. Within City Departments. There are a number of agencies within a city and communication with each is difficult.

There is a need for liason persons to maintain close coordination and the CMT has been of help in this area.

6. Political Problems. Pressure groups ask for improvements that have a low priority or are not warranted and these requests require time for study and response to the groups and to the Council. The CMT has provided input in looking at these problems.

7. Responsibility. There is a need at times to determine who is responsible for a problem when the area of responsibility is not clear cut. It may be the City, State, Police, Traffic, Public Works, or a combination of these.

Corridor Management Problems

- A. Time Commitment
 - 1. Includes lack of personnel
- B. Financing
 - 1. Mention possible sources
- C. Incident Management
 - 1. Examples
 - a. San Antonio Ice Plan
 - b. Hurricane "Allen"
 - c. Transportation of dangerous cargo thru an area
 - d. Special Events (Stock Show; Texas Open)
- D. Enforcement of Restrictions
 - 1. Manpower
 - 2. Police Attitude
- E. Coordination and Communication
 - 1. City and State
 - a. Two-way center left-turn standards
 - 2. Within Departments
 - a. Traffic and Public Works
 - 3. Need for liasion persons
- F. Political Problems
 - 1. Pressure groups
- G. Responsibility
 - 1. Who? City? State? Police?

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C.M.T. PROBLEMS OR ADVANTAGES

Bob G. Hodge
Supervising Traffic Engineer
District 2
Ft. Worth

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In his discussion, "C.M.T., Problems or Advantages?", Bob Hodge emphasized that personnel responsible for traffic are involved in corridor management whether they want to be or not. He related corridor management problems to the following areas: time-commitment; authority, responsibility and accountability; and resources. He preferred to see these areas as approaches to management rather than as problems. An outline of Mr. Hodge's remarks follows.

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C.M.T. PROBLEMS OR ADVANTAGES ??

San Antonio Workshop

(Bob G. Hodge)

IF any of you have considered the question, "Can I afford to become involved in this additional effort of C.M.T.???" I would have to say to you that "You are involved whether you elect to be or not. AND, you can not afford not to become even more involved." You're involved day by day in coordinating, cooperating and communicating - and that is the backbone of corridor management and operations.

I admit to you that I have had a very difficult time with this simple concept - so, I guess it is fitting that Herman would ask me to address some of the problems with C.M.T.'s. The problems are related to:

- 1) Time - commitment,
- 2) Authority & responsibility,
- 3) Resources,
- 4) Personnel, and
- 5) Finances.

I will combine Personnel and Financing under Resources.

- 1) TIME-COMMITMENT: The commitment is yours, you as District Traffic Engineer, or City Traffic Engineer, or maybe Chief of Police Traffic Division, it really doesn't matter. A commitment to do a better job of coordinating, cooperating, and communicating with the people that are concerned with the same things you are . . . traffic operations. An EXCELLENT way of accomplishing this is through a C.M.T. Either way, it will place a demand on your time, call it additional time if you like.

If you are the District Traffic Engineer, and you desire to form a C.M.T., you are obligated to discuss this decision with your District Engineer. IF you present your desires in the spirit that is being set forth in these workshops, not one of the 26 would object. However, if you go to him with a bunch of grande ideas of reorganizing and surrendering the department TO the C.M.T. - forget it.

I had intended to give you some idea as to the number of man-hours and dollars my organization spent on C.M.T. work last year. However, I soon found that I could not easily separate C.M.T. work from usual traffic engineering work. That's either proof of the day by day simple involvement or, I didn't do any C.M.T. work, or bad record keeping. Again, the commitment is your's, and as a team, the commitment is simply an agreement between professionals to participate and do whatever they can to provide for better traffic operations.

- 2) AUTHORITY, RESPONSIBILITY & ACCOUNTABILITY: A District Traffic Engineer's authority and responsibility, when that authority and responsibility is used wisely and contributes to the goals and objectives of the District, is usually limited ONLY by his own initiative and ability. I am convinced that holds true for city directors and enforcement heads also.

I have the authority to commit members of my organization to developing traffic control strategies, to apply traffic engineering technology to design concepts, in working with construction and maintenance organizations and in implementing necessary changes in traffic control devices. Other District members of the team, have the authority to commit their resources for worthwhile operational needs.

Gary Santerre has the authority to make the same commitments and in many cases, an even wider range of financial commitments.

The Public Works Director for the City of Fort Worth likewise has authorities similar to Gary's.

Deputy Chief Clark has the authority to commit personnel and equipment, and to make decisions related to operational matters.

About the only thing left is to recognize C.M.T. in the Department's goals & objectives; otherwise, the authority AND responsibility is already yours.

- 3) RESOURCES: Here's where the word "MANAGEMENT" comes from in C.M.T. It may have a lot of other meanings, but here's where it all starts:

Speaking strictly from the department's viewpoint, there is a need for a traffic engineering budget line item that will fund operational activities not directly related to a particular project. This is a minor funding need and I believe District 15 may have a good approach to this in its 112 funding through M.P.O.

Otherwise, the traditional funding sources such as:

- 1) Interstate,
- 2) Safety (D-18TS),
- 3) Traffic Safety Budget (D-18T),
- 4) Regular Maintenance,
- 5) Special Maintenance,
- 6) Urban etc.

All are eligible sources, even though the competition is fierce and each position is deep in experience.

Personnel is another matter - this day and time, we are all short, some shorter than others. Most of the things we have traditionally done, still have to be done;

- Citizens and governors are demanding more for less,
- Greater demands are being placed on our organization by design, construction, and maintenance,

- New technology keep us hopping to stay up,

- Energy conservation efforts are forcing us to look at ways to optimize operations,

and, we are doing all these things with fewer people and less money.

So, what are our problems with Corridor Management?? Aren't the problems with time and commitment, authority and responsibility, and resources the same problems we have been facing for years?

I realize this is a slightly different look at Corridor Management & Operation than we have been discussing in Fort Worth and here in San Antonio; but, isn't C.M.T. really part of the solution and not part of the problem?

I believe in the total activity of management and operations through a team effort and I intend to exercise my authorities and responsibilities and ask Gary Santerre and others to join me.

I also realize that the purpose of my presence on this panel is to give you the benefits of my experience with C.M.T. problems - not to create new ones. However, my closing remark turns out to be a question, not an answer:

PROBLEMS OR ADVANTAGES ??
PAGE 5

MY QUESTION, to you Herman, to you Jack and Milton, and to those of you participating in the workshop:

"Is CORRIDOR MANAGEMENT AND OPERATIONS really an additional activity requiring additional authority and responsibility, additional time - commitment, and additional resources???? Or, is it something we should have been doing all along, with C.M.T. as the catalyst???"

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POLICE TRAFFIC SERVICES PROBLEMS

George Davis
Detective, Traffic Division
City of San Antonio

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George Davis, Detective, Traffic Division, City of San Antonio, discussed the Traffic Division's involvement in corridor management problems and their solutions. The Traffic Division's areas of responsibility includes incident management and investigation, speed control research and enforcement, construction problems, courtesy patrol, and ice and disaster plans. As in all corridor management operations, coordination with other agencies is essential. A brief discussion of each of these areas of responsibility follows.

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POLICE TRAFFIC SERVICES PROBLEMS

George Davis, Detective, Traffic Division
City of San Antonio

There are a number of areas of work in which the Traffic Division is involved in regard to corridor management problems. These are:

1. Incident Management and Investigation. A considerable amount of manpower is required in incident management and investigation. Allocation of personnel to this in competition with other responsibilities is a problem. The following have been helpful in overcoming a portion of this manpower problem:

- a. Accident Investigation Sites. Accident Investigation Sites (AIS) have been of assistance in that they reduce time involved in incident management and investigation (by rapidly clearing the freeway of congestion) and providing a safer location than the freeway for the investigation of accidents. To be effective, the AIS need to be out of sight of the freeway mainlane motorists.
- b. Freeway Fatalities. Each freeway fatality is investigated. The investigation includes a study of the accident location, a review of accident reports, and interviews with witnesses, the police officer, and the medical examiner. A report is transmitted to Milton Dietert, the District traffic engineer for the Department of Highways and Public Transportation (SDHPT). The SDHPT studies the report to determine if engineering improvements are needed and a reply is returned to the Traffic Division.
- c. Dynamic Changeable Message Signs. Two changeable message signs located on the south approach of IH 35 to the Central Business District have been of assistance in warning motorists of an accident ahead and on advising of an alternate route for traffic to take.

2. TCS - Speed Control Research. Speed control is a problem with the Department. Texas Transportation Institute, as part of a research project, selected six locations on the city freeways for spot enforcement over a two month program. Officers were assigned to each site on a random basis which made it difficult for the motorist to predict when enforcement was to be carried out in an area.
3. Construction Problems. Handling traffic in construction zones is a problem to all involved. The Traffic Division sends one or two field supervisors to each preconstruction meeting. Suggestions made by the police officer are listened to and implemented. It has been of considerable value to the Police Department to have the field supervisors at these meetings.
4. Courtesy Patrol. The SDHPT Courtesy Patrol provides considerable assistance to the Police Department and to maintenance personnel by assisting stranded motorists, assisting the Police Department in handling traffic during accidents and other incidents, and assisting maintenance by removing debris (i.e., mattresses and plywood) and reporting damaged guardrails, signs, and burned out sign lights.
5. Ice Plan and Disaster Plan. Ice on freeways and streets and disasters create problems. Each year the CME reviews the ice plan and checks to see if sufficient supplies, equipment and personnel will be available when needed. In addition, the ice plan is reviewed to assure that all personnel are familiar with their duties. During hurricane Allen, all agencies worked together in directing evacuees to schools. The SDHPT, for instance, manned its sign trailers which provided information on schools and routes.
6. Coordination - City, State, Police, Bus. Coordination of agencies and communications between agencies can provide problems. The CME has provided an atmosphere in which close coordination exists between the agencies. Personnel from two or

three agencies can have a meeting to solve a problem and look at the problem on the scene. For instance, public transit problems have been solved jointly by meetings between the city traffic and police personnel and the VIA transit personnel.

These then are some of the corridor management problems in which the Police Department is involved and methods applied to solve these problems.

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TOOLS TO EVALUATE ALTERNATIVES

Gene P. Ritch
Systems Analyst
Texas Transportation Institute

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On the second day of the workshops, participants discussed the tools available for effective corridor management. Gene P. Ritch, Systems Analyst, Texas Transportation Institute, examined three effective tools used to evaluate alternatives - simulation, analytical tools, and studies and surveys. An outline of Mr. Ritch's presentation follows.

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TOOLS TO EVALUATE ALTERNATIVES

I. Simulation

A. Freeway

- FREQ3CP, FREFLO, FREQ6PE

B. Arterials

- PASSER II, PASSER III

C. Networks

- NETSIM, SIGOPII, TRANYST

Program results only as good as input

II. Analytical Tools

A. Benefits/Cost - Basic Approach

B. Incremental Benefits/Costs - Stepwise evaluation for add-on systems

C. Utility/Cost - Weighing procedures to determine how well a tentative solution is to projected costs. (To be used when tangible benefits may not be available.)

III. Studies & Surveys

Most of traffic data utilized by existing simulation programs are -

- Volume data in 5 to 15 minute time slices or
- Origin-destination data in similar time slices
- Speed or density data

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AVAILABLE TOOLS FOR EFFECTIVE
CORRIDOR MANAGEMENT

Herman E. HaeneI
Supervising Traffic Engineer
State Department of Highways
and Public Transportation

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In his discussion of available tools for effective corridor management, Herman E. Haenel, Supervising Traffic Engineer, State Department of Highways and Public Transportation, concentrated on tools, or methods, which can be used to locate, analyze and solve problems. These tools include observations by personnel; radio reports, public communication, data collection, and planning studies. A brief discussion of each of these methods follows.

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AVAILABLE TOOLS FOR EFFECTIVE CORRIDOR MANAGEMENT

Herman E. Haene I

Operational Problems and Tools for Locating and Analyzing Problems

There are a number of operational corridor problems which need to be solved.

These are:

1. Accidents - An accident is the result of inefficient operation.
2. Congestion - There are two types:
 - a. Recurring - peak period, weekend (shopping center traffic)
 - b. Non-recurring - incidents, maintenance operations, vehicle breakdown
3. Routing problems - Trucks with hazardous materials, maintenance and construction routing.
4. Motorist confusion - Signing problems, geometrics, maintenance operations.
5. People and Goods Movement - High occupancy vehicle preferential operations, movement of business people and goods during off peak periods.

Many of these problems are 24-hour a day problems which require solutions and/or effective management during both peak and off-peak periods, and/or Saturdays.

A problem can be an existing problem and/or a future problem. In corridor management we look primarily at solving problems which are with us today but we must also study potential problems which could exist in the near future (within the next five years). There is also a need to coordinate operational problem solving with the long range planning carried out by the planning engineers so that the funds used in solving current problems are consistent with the longer range solutions.

There are a number of tools available for locating and analyzing problems.

These include:

1. Observations by Personnel - Each San Antonio Traffic Division police officer has a printed form available on which he can describe a problem (and its solution if it is apparent). The form is sent to Captain Pat Nichols of the Traffic

Division who in turn sends it to the responsible agency. The problem is studied and corrected by the responsible agency (i.e., city or state traffic engineer) and a reply sent back to the officer. This procedure could also be carried out by traffic engineers, maintenance, courtesy patrol, and transit personnel.

2. Telephone calls, letters, and newspapers.
3. Radio reports - Monitor CB channels 9 and 19 and the traffic reports on radio.
4. Data Collection:
 - a. Accident reports - summations (i.e., high accidents, high accident rates, night time accidents, rainy weather accidents) and individual intersection reports.
 - b. Tachograph - existing graphic type equipment is available and new electronic microprocessor type equipment is being investigated.
 - c. Travel time trends - check current travel times and develop a travel time map over a period of years to locate reduced areas of mobility.
 - d. Portable traffic counters - microprocessor based counters are available which obtain volume, speed, occupancy, vehicle classification.
 - e. Television - use of television recording equipment from helicopters and high buildings.
 - f. Special studies - route diversion, before and after evaluation to determine if a problem is solved in a satisfactory manner.
5. Surveillance - Surveillance centers receive loop detector and television information which permits the engineer to rapidly solve a problem and improve management of incidents. Such centers exist in Los Angeles, Chicago, Dallas, Milwaukee, Minneapolis, Baltimore, and Detroit.
6. Planning Related Studies:
 - a. O & D studies
 - b. Street planning

- c. Land use zoning
- d. Traffic trends

These tools (methods) can be combined to locate, analyze and resolve problems that exist today and/or may exist within the next five years. These methods can also be used to determine which of the tools available for improvements can be applied and which type improvement could provide the best solution for a given situation.

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TRENDS IN TRANSPORTATION

Dr. C. V. Wootan
Director
Texas Transportation Institute

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In discussing trends in transportation, Dr. C. V. Wootan, Director, Texas Transportation Institute, emphasized that in the next ten years we will continue to have more vehicles being driven more miles, and, most important, the vehicle mix will be different. Our highways will have to accommodate larger trucks with a higher weight-to-horsepower ratio. As trucks become larger, the average size of passenger automobiles will become smaller. The implications of this mix on safety and efficiency of our roadways are obvious. Sight distance will be reduced for the automobile operator as the passing distance increases. Designers of new highways as well as those responsible for safe operations on present highways must consider these changes in design criteria. Roadside hardware must be designed with the safety of both large and small vehicles in mind. The text of Dr. Wootan's remarks follows.

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TRENDS IN TRANSPORTATION

by

Dr. C. V. Wootan, Director
Texas Transportation Institute
Texas A&M University

Urban Corridor Management Workshop

September 3-4, 1980

It's no secret that the transportation industry is in a state of change. Those of you who have been in the field for several years recognize that change has always been with us and that we have had to continually react to changes in vehicle numbers, design, performance and uses. The only difference now is that our changes are threatening to become revolutionary rather than evolutionary. The rate of change that we are facing over the next 10 years will be substantially different from that we have experienced during any like period in the past. We are going to continue to have more vehicles to accommodate on a relatively limited set of facilities. People are going to be driving these vehicles more and, most importantly, the mix of vehicles you will have to accommodate will be changing as well. There are a number of implications to these changes that we must be aware of and be prepared to deal with.

Let's look first at the vehicle fleet we are dealing with on a nationwide basis. I have chosen 1963 as a starting point because the data recording system was kept differently prior to that time. As you can see, we have had a continuous increase in the number of vehicles in our national fleet for the past 15 years.

This growth is projected to continue through 1990 so that we look for a total vehicle fleet in excess of 190 million compared to the 147 million we had at the end of 1978.

That is a lot of cars. Just to show you that the problem is not being spread around uniformly throughout the world, let me quote one comparison. There were more vehicles stolen in the State of Texas last year than there are total automobiles registered in Red China.

But back to our problems. As you can see from this slide, the number of trucks and buses have grown at a more rapid rate than the number of passenger cars. In 1963, trucks made up less than 16 percent of the total vehicle fleet. By 1978, this percentage was increased to just over 20 percent. We expect this trend to continue with the continual need for goods distribution and delivery vehicles to serve the ever-growing needs of our urban population centers. It is reasonable to expect that by 1990 fully 25% of our fleet will consist of vehicles on the large end of the size spectrum--trucks and buses.

There has been quite a bit of work done in estimating the composition of this truck fleet by vehicle type and weight group. Other than the effect of the switch from gasoline to diesel power and the greater attention to reducing engine size to gain fuel economies, I will not dwell on these anticipated changes. It is important, however, to recognize that as the trucking industry reacts to increased fuel costs, they will be expected to reduce engine size in order to improve fuel economy. This will result in higher weight-to-horsepower ratios and lower acceleration rates.

I think that it is also reasonable to assume that pressure will continue to be placed on both state and federal legislatures for increased size and weight limits. As a result, more large vehicles and longer vehicles, perhaps with double and even triple bottoms can be expected. I will discuss some of the implications of this a little later.

Before I do that, however, let's look at our automobile fleet. What is the composition of the fleet today? What are the major forces that will be bringing about changes? And, what can we expect the fleet to look like in ten more years?

For convenience, I have selected six weight categories to describe the automobile fleet and labeled them to suit myself. I will refer to these as:

Mini-compact	(less than 2000#)
Ford Fiesta	
Sub-compact	(2000 - 3000#)
Chevrolet Chevette	
Compact	(3000 - 3500#)
Chevrolet Malibu	
Mid-size	(3500 - 4000#)
Chevrolet Impala	
Full-size	(4000 - 4500#)
Ford LTD	
Luxury (Cadillac El Dorado)	- (over 4500#)

As you can see, in our present fleet, which has already undergone a considerable amount of shrinking since the Energy Policy and Conservation Act of 1975 established fuel economy standards, the mid and full-size vehicles are the dominant weight groups. You

will recall that these are the automobiles weighing between 3,500 and 4,500 pounds.

I am also sure that you are all familiar with the fuel economy standards that were established by the 1975 act. It requires a progressive improvement in fuel economy for the entire fleet of passenger cars sold by each manufacturer beginning with the 1978 model year. The last specific requirement is set for 1985 when a 27.5 MPG fleet average is required. The law permits the raising of these standards after 1985; however, our projections assume that they will not be raised above 27.5 before 1990.

At the time these standards were set, it was assumed that improved efficiencies would come from a combination of improved engine efficiency and weight reduction. During 1975-77, fuel efficiencies were obtained through engine efficiency--primarily through lowering horsepower and operating with higher weight-to-horsepower ratios.

More recently, however, other factors, such as additional pollution requirements and increased safety measures have worked counter to the fuel efficiency goals. Between the 1977 and 1978 model years, fuel efficiency in eight of these ten weight classes actually declined. Only one improved while the other stayed the same. At the same time, the efficiency of the entire 1978 fleet increased by over 5 percent.

From these data it appears quite obvious that recent gains have come solely through shifting production to the smaller vehicles. It appears equally obvious that since emission requirements are programmed to become even more stringent in

the future and safety requirements are not expected to lessen, future fuel economy gains will continue to come very largely through reductions in vehicle sizes.

Consequently, by 1990 we anticipate a vehicle population distribution like this. The sub-compacts--those weighing between 2,000 and 3,000 pounds--will now be the dominant group. The largest reduction will come in the full-size category. As you will note, this group will drop from its current 26 percent to only two percent of the fleet. At the same time, we will retain a relatively large number of luxury vehicles--those weighing over 4,500 pounds. This points out that while the automobile makers must respond to the dictates of the Federal Government, they are still sensitive to the demands of the market place. There is still a sizable segment of the driving population that is willing to pay the price--both in vehicle cost and added fuel costs even at the inflated prices of gasoline--in order to maintain the comfort, luxury or status associated with larger automobiles.

Let's take a quick look at the projected amounts of travel for both the automobile fleet and the truck fleet to 1990. This first chart shows the automobile travel divided into urban local, rural local and intercity beginning in 1975 and projected through 1990. As you can see, we are anticipating a continued growth in vehicle miles traveled in each of these categories.

We are also expecting substantial increases in truck travel in the urban areas as our demands for goods and services continue to increase and we continue to demand a wider diversity of goods.

Trucks will also continue to maintain a large share of rural goods movement throughout this period with a steady increase from 1980 forward.

In my opinion, there are four things we should keep in mind when we think about dealing with our 1990 problems.

- a. We will have a much larger total vehicle fleet (+30%).
- b. There will be a continued heavy use of this fleet in terms of miles traveled per vehicle.
- c. There will be a higher percentage of trucks and buses in the fleet.
- d. There will be a great increase in the number of small cars.

Ideally, we would like to have a vehicle fleet composed of identical vehicles with uniform performance characteristics and operated by a consistent population of drivers. In addition, this ideal fleet would remain constant over time so that a roadway designed today would continue to be adequate throughout its design life.

We have never had such an idealized system, but we were closer to it in the past than we will be in the future.

Why should this concern us as transportation engineers? There are a number of reasons, but I will confine my comments to two broad areas: 1) design and operation of the system, and 2) safety.

In the preface to the 1965 edition of the AASHTO Blue Book is this statement"

"To design highways for the future is not the province of the maker of guides and standards but rather that of the designer himself, who, in the planning and design stages, must choose values for those elements which are basic to highway design from the data available to him and the trends which reveal those values. What will the likely volume of traffic be? What kind of traffic should be designed for? In relation to the terrain, the traffic and the funds available, what type of highway should be planned, and what should be the common denominator of assumed design speed?...."

To me, the key phrases here are "what will the likely volume of traffic be?" and "what kind of traffic should be designed for?" Hopefully, our projections have considered both these questions.

At the risk of repeating what may be obvious to most of you, let's go a step further and ask why? Why are we concerned from a design/operation standpoint with the prospect of more small cars and more large trucks? Without attempting to cover them all, let me just mention a few concerns.

The first area of concern would fall into the broad category of vehicle performance. Included are such operating characteristics as acceleration rates, cornering ability and stopping distances.

In a recent TTI study by Don Woods and Graeme Weaver, the acceleration rates of the current fleet were evaluated in a study of passing sight distance requirements. They compared the passing distance requirements of full-sized, 1977 vehicles to compacts and sub-compacts as a group. In general, they found

that while the smaller vehicles accelerated adequately at low speeds, their acceleration capability at highway speed was substantially lower than the full-size cars.

This chart indicates that at 50 mph, more than 200 additional feet were required for the small cars to pass another automobile.

It appears that as the fleet continues to be squeezed down to meet fuel efficiency goals, there will be a continued degradation in acceleration capabilities at highway speeds. The growing trend toward higher gear ratios for highway cruise speeds and continued horsepower reductions to achieve fuel efficiency, promises continued lower performance by the smaller cars.

Cornering ability and stopping distance appear to present many of the same type of problems as far as the smaller vehicles are concerned. And then, when trucks are considered--and particularly the prospect for increasing weights, lengths and widths on trucks; both these concerns as well as the passing distance requirements become even more important.

In the truck size and weight study currently being conducted by TTI and the Center for Highway Research, it is pointed out that the distance required for a car to pass a 95-foot triple bottom truck is about 330 feet more than to pass a 65-foot double bottom. There are also corresponding increases in stopping distances for longer trucks as well as the more obvious turning radius requirements.

As fuel prices continue to increase, it appears reasonable that weight-to-horsepower ratios of trucks will be increased at least moderately. This will obviously further limit acceleration capabilities at highway speeds.

This brings us to the operational problems to be expected from the changed vehicle mix. Chief among these is the problem of visibility. Even if the driver fully understands the capabilities of his vehicle, he must have adequate vision in order to perform his maneuvers successfully.

Current engineering practice assumes the average eye height of automobile drivers to be 3.75 feet. Recent studies have shown that the current smaller cars have driver eye heights closer to 3.5 feet and the average may be reduced even further, with many vehicles providing no more than 3.25 feet in the future. The implications of these lower eye heights are well recognized by designers--particularly in determining crest vertical curves and passing sight distances on rural two-lane roads.

I'm not sure, however, that we have fully recognized some of the other problems associated with visibility when we mix large and small vehicles. The problems of seeing around the vehicle in front are accentuated with the small car. This is true not only on the rural two-lane sections during passing maneuvers, but also in urban areas when the need to see shoulder mounted signs, overhead traffic signals or even overhead guide signing is required.

I'm sure that we have all been in the position of following a closed van through an unfamiliar urban freeway section during heavy traffic and finding that we had already passed our exit before we were able to see the signs. And have you ever run a red light because you couldn't see the traffic signal until you were already entering the intersection?

The problems of the full-size automobile following a truck are not greatly different from a sub-compact following a regular passenger van or a pick-up truck with a camper. In each case, visibility is substantially restricted, particularly during heavy traffic conditions when it really is needed most.

Let's now turn to the other major concern--safety. Here, I think we can begin with a general truth. The smaller the automobile, the greater the hazards associated with its operation. Dr. Bunch, safety researcher at the University of Michigan, put it quite clearly when he said--"The principle that a lighter car stops more quickly in a collision holds regardless of the weight of the vehicle it collides with. But when a lighter car collides with a heavier car or a truck, it stops very abruptly; consequently, it experiences a much greater change in impact velocity."

To illustrate the magnitude of the difference in energy developed by various-sized vehicles, this is a comparison of kinetic energy generated by four types of vehicles at 40 miles per hour. The competitive disadvantage of the compact automobile is quite evident.

Recent personal injury analysis by the Institute for Highway Safety shows the relative injury rates on a normalized experience basis by make and model of automobile. For 1978 model year vehicles, the three best vehicles, from a safety standpoint, were from the heavier end of the spectrum while the three worst were among the lighter vehicles. In this particular example, the driver of this Honda is approximately three times as likely to be injured or killed as the driver of this Oldsmobile.

Since we are not vehicle designers and have to accept the vehicle fleet that is in operation, there is little we can do to improve the survivability from vehicle to vehicle accidents once they occur. Since we are responsible for the design and operation of the facilities over which they move, however, we must recognize the severity of the problem and, to the best of our ability, provide designs that will minimize their occurrences. This has always been our goal and we have done an excellent job in the past. Now we must recognize the changed conditions and assure that after they do occur we are still there as well.

The last item I want to discuss only briefly is the problem of roadside appurtenances as they relate to the new mix. In the past several years we have made tremendous strides in roadside safety. Sign supports and luminaire supports have been made break-away, median barriers have been developed to restrain and redirect errant vehicles, crash cushions developed and guard rails are being improved to contain a broader range of vehicles.

Again, however, we have been largely working with the existing vehicle population, and rightly so, since its characteristics were not changing rapidly. With the rapidly changing vehicle population, we must now give increased attention to the future fleet in the establishment and revisions of our roadway design standards. We must determine if the systems designed for 2,250 to 4,500 pound automobiles will still be effective for those weighing less than 2,000 pounds. Even small sign supports that

can be easily knocked down by full-size vehicles, may be deadly when struck by mini-compacts. And what will we do with the larger trucks and buses that will make up an ever-increasing portion of our fleet. Can we afford not to include them in our routine design considerations of roadside safety systems?

Obviously, we are not going to be able to go out and rebuild our entire highway network to a new set of standards. As we build new highways we can incorporate our knowledge of the vehicle mix and its operating characteristics into our new designs. We can, at some incremental cost, accommodate the problems of driver eye height, acceleration rates and differing vehicle sizes. It may require some new concepts in both design and operation. We may even find it necessary in some instances to consider building separate roadways to provide for total separation of cars and trucks.

But what about our existing system? In particular, what do we do with the thousands of miles of two-lane roadway where the problem will be most severe? It appears obvious that we cannot afford to make all the changes in vertical and horizontal alignment that would be needed to make them operate efficiently under the new mix. There are, however, things that we can emphasize in our normal rehabilitation programs.

I am thinking specifically of things such as the provision of climbing lanes and the construction of more structurally adequate paved shoulders that can serve as "pull-over" lanes for slower traffic. In addition, the provision of advanced signing to inform the drivers of passing opportunities ahead

should prevent many of the dangerous "frustration" passing maneuvers associated with long stretches of no-passing zones.

In the urban areas where impeded vision is a major problem, we need to look at new and different ways of displaying information. Again, advanced signing may be one possible solution. We probably also need to examine our overall display systems for traffic control devices to insure that the messages we think we are sending are actually being received by the driver. We may also need to look at separating our truck and automobile traffic through specific sections of our urban freeways and arterials.

And finally, in the area of roadside safety, we still have a lot of work to do to develop systems that will perform for both the small vehicle and the large one. We must continue to develop guard rails that will restrain heavier vehicles in special sensitive areas. We must continue to develop criteria for the design and placement of all our roadside hardware. We have made excellent progress in this area, but we still have a long way to go.

In conclusion, I feel that as transportation professionals, the future offers us a real challenge. We must begin now to examine our policies and practices to determine the changes that will be needed to assure that we continue to provide a safe, efficient and economical system of transportation to meet the growing needs of our State.

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-- CTR Library Digitization Team

WORKSHOP WRAPUP

Herman E. Haenel
Supervising Traffic Engineer
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In his workshop wrapup, Herman E. Haenel reiterated the purposes of the Urban Corridor Management and Operations Workshop. Participants investigated the need for urban corridor management, the means for carrying out this management, and the benefits, problems, and results of the work of corridor management teams. He also outlined several schools and research opportunities concerned with urban corridor management. Highlights of Mr. Haenel's workshop wrapup follow.

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WORKSHOP WRAPUP

Herman E. Haenel

The purpose of the workshop has been to look at the need for urban corridor management, to investigate means for doing this, and to share the benefits, problems and results of work carried out through corridor management teams.

In the process we:

- A. Defined a corridor as a principal arterial with supporting streets.
- B. Looked at urban transportation management (management of traffic in the entire urban area) and the relationship of corridors to the urban area.
- C. Looked at the need for improving operations of our corridors. Corridor management is a way of getting hold of the overall urban transportation management problem.
- D. Looked at the need for multi-agency communication, coordination, and cooperation.
- E. Looked at a means of achieving efficient corridor (and urban) management-- the Corridor Management Team.
- F. Looked at problems and tools available for use in solving these problems.
- G. Learned that traffic can be expected to be 30% greater in 1990 than it was in 1978. This will require more efficient operation on a limited facility.
- H. Helped the cities with CMT's to share with each other and hopefully improve their work.

Corridor management will pay both the public and the agencies involved in management multiple benefits through the effective use of time, talent, personnel and funds and this can be effectively carried out through the Corridor Management Teams.

In looking ahead there are several schools and developments in the making.

- A. A school on "Evaluation of Freeway Guide Signing" will be held at Texas A&M University on October 20, 1980.

- B. Two schools on analyzing problems and timing traffic signals through use of the computer are anticipated.
- C. A followup school on the tools available for solving operation problems is being considered.
- D. A research project (PASSER IV) is underway to provide a computer approach for analyzing corridor problems and improving operations -- a corridor management tool.
- E. A monthly Corridor Management Report is being sent to the five existing Corridor Management Teams and the remaining seven high population urban districts. The reports from each of the 12 areas is needed to make the (problem sharing and problem solving) report a success.

Other suggestions for the future are welcome from all of the workshop participants. Learning what those in the cities and Department's Districts need will hopefully help the Departments' Austin office to provide a better service to all.