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*REPORTS ON OECD CONFERENCE ON "BETTER TOWNS WITH LESS TRAFFIC" AND FIELD VISITS TO VARIOUS WESTERN EUROPEAN CITIES - APRIL 1975

INTRODUCTION

In April of 1975, a TRB Task Force attended an OECD Conference on "Better Towns With Less Traffic" and toured various Western European cities. This effort was supported by the U. S. Department of Transportation Office of International Programs and was primarily intended to allow for greater interchange of information among Transportation experts in the U.S. with their foreign counterparts in Western Europe. An important element of this effort was to establish a sound basis for continuing emphasis in the Transportation Research Board on transportation management and development as related to the problems of our urban communities.

Because of the current interest in the transportation community in current practice as respects urban transportation, both here and abroad, the field trip reports from the participants are receiving wider dissemination by publication in this Research Circular.

The members of the TRB Task Force included:

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Paul D. Foster, Deputy Commissioner, Boston Traffic and Parking Department, Boston, Mass.
Dr. William L. Garrison, Director, Institute of Transportation and Traffic Engineering, Berkeley, California
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*The Organisation for Economic Co-operation and Development

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REPORT ON OECD CONFERENCE AND TOUR
OF CASE STUDY CITIES IN EUROPE

Edward M. Hall, Executive Assistant to the City Manager
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INTRODUCTION

The opportunity to attend the OECD Conference on "Better Towns with Less Traffic" and the Conference "Public Transport and People" in Paris, and to tour the case study cities of Munich, Germany, Bern, Switzerland; and Besancon, France is sincerely appreciated. It was a great and broadening experience.

At the onset, it is fundamentally important that we recognize the basic differences in the form and density of development characteristics as well as the traditions and long history of the European cities in comparison to most American cities. These differing characteristics basically apply to all the case study cities presented at the conference.

The three case study cities that were visited were built in classic form of the old walled cities with very dense concentrated development in the core. With this history, culture, beauty, and ancient physical restraints, particularly in the core of these cities, they are taking innovative actions to preserve their heritage and, at the same time provide mobility for large numbers of people.

Thus the transport systems of all the case study cities are based on different constraints and values, and are designed to serve different types of cities particularly in the core characteristics when compared to most American cities. This is particularly graphic when compared to the modern western low-density cities. "It's a different world".

Europe has discovered the automobile. Vehicle ownership is rapidly rising. Although vehicle miles of travel are not rising nearly as rapidly at this time they too appear to be on an up trend. Europe has also discovered that, along with the freedom provided by the automobile, there are serious problems to providing for it, particularly in the central cores of the cities where highest priority is placed on the preservation of heritage as mentioned. As a result, a broad range of innovative actions are being taken by the case study European cities - Uppsala, Bologna, Munich, Bern, Besancon, Nottingham - as well as Nagoya and Singapore, to preserve their central cores in the face of ever-mounting automobile ownership. These actions concentrate on attracting people to transit, with incentives to move people from the automobile to transit. There was considerable emphasis that incentives rather than regulations should be used in this regard. Further, the cities are engaged in a number of traffic engineering approaches - many are quite bold. For example, the establishment of auto free zones. The use of one-way streets and other more standard traffic engineering practices are widespread and appear to be basically well done. The concepts of establishing traffic sectors and restricting through traffic, and the development of ring roads, appear to be growing in use. These concepts seem particularly applicable to the highly historic cores of the cities of Europe.

It appears worthy of note that in several of the case cities the auto free zones do

not necessarily result in the reduction of vehicle miles. In fact, the contrary is well illustrated in Besancon. There, the trade-offs appear to be well understood and the goals are increased transit usage and the substantial reduction of through auto trips in the core even though the remaining automobile use will frequently travel more vehicle miles per vehicle than required for the same trip prior to the establishment of the sector control plan.

OECD CONFERENCE

The OECD Conference "Better Towns with Less Traffic" was exceptionally well done. It was well organized, ably chaired, informative, the case study cities were well chosen, and the presentations well prepared.

It was an interesting experience to observe the solutions to the multiple language problems and the simultaneous translation procedures that were essential for the successful completion of the conference. The general planning, economic, and energy material presented at the conference was also good. As so often the case, the time available was a little short to cover such important and broad-ranging general subjects. The final summaries prepared by the panel chairmen were superior. I am most hopeful these will be reproduced promptly and distributed as they were really a highlight of the conference.

The conference conclusions were, of course, general. I think they are a credit to the drafting committee. However, they could have given more recognition to the positive features of the automobile and its potential of moving people and goods as part of the total transportation spectrum. The final conclusions were much more constructive than the first draft that we received on arrival. The point here is that we need to constantly strive to achieve a balance in the use of the various modes and technologies of transportation as part of the total. There is an unfortunate tendency in Europe as well as in America to down-play the importance of the contribution of the automobile in the total transportation scheme. We need to be sure to make full use of its many constructive and desirable applications. It was gratifying to observe that the movement of goods was carefully considered by the various case study cities and was widely recognized as an essential ingredient in the total scheme of transportation.

If the conclusions of the OECD Conference are to be distributed in America, I think it is of essential importance that the basic different characteristics of European and American cities be carefully described and even quantified where possible.

In other words, the point again is that the heritage, physical form, population densities and concentrations, etc., of European cities as compared to American cities must be clear so improper conclusions and applications will be minimized.

CASE STUDY CITIES - MUNICH, BERN, BESANCON

Overall Highlights

The tour of the case study cities of Munich, Bern, and Besancon, as well as my automobile trip and observations back through Switzerland to Zurich, was the highlight of this stimulating two-weeks experience. These case study cities are taking many bold

and, from our point of view, different approaches to transportation. They are doing this knowingly and with determination. Again, the transport systems are designed to serve and, in a real sense, preserve the dense centralized historic city centers that are hundreds of years old. The core population densities will probably be the range of 15-20-25,000 people per square mile when the data is obtained. There is universal major effort in the visited cities as well as the other case cities, to preserve the old buildings and monuments and the historic centers. This bears heavily on transportation planning.

It is clear that Europe has discovered the automobile and the freedom provided by it. The general concensus appeared to be that the cost of gasoline is not a major constraint. A week-end trip to the countryside is very important. The cities have also discovered the problems of providing for the automobile, particularly in the central core of cities. Therefore, the following concepts and techniques are being used in their major efforts to provide public transit of all types and encourage its use:

1. Establish auto free pedestrian zones and discourage the use of autos.
2. Provide remote parking.
3. Provide parking on the periphery of the core.
4. Establish sectors or compartmentalization and restrict through auto movements.
5. Provide good to excellent transit coverage and service and frequency and pay the very heavy subsidy that is required.
6. Use various types of transit service and equipment to best serve the public's needs.
7. Give bus and trolley movement precedence over autos by signals and separate lanes.
8. Apply modern traffic engineering techniques and signalization.
9. Control major street designs to preserve historic physical development in old central cores.
10. Construction of new major streets is widely evident in newer portions of Munich, Bern, and Besancon.
11. The use of vertical or three-dimensional design is prevalent. In other words, the vehicle underpass or transit subway or elevated or pedestrian underpass is well used. There are some excellent complex examples such as Porte Maillot where subway, airport bus, taxi, underground parking interconnect with each other and an underground center and the Paris International Center for conventions and a high-rise hotel. The Bern Railroad Station is another excellent multi-level multi-purpose example. We were told that $100 million had been invested in der neve Bahnhof Bern.

TRANSIT

Transit is heavily emphasized. The headways are short, service basically good, and coverage wide spread. All types of equipment are in use ranging from the commute-rail in Munich, Bern, and Paris, to the subway and elevated heavy-rail in Paris and Munich, to articulated trams, buses, trolley-buses, articulated trolley-buses, and mini-buses. Further, there is heavy use of the taxi in Paris and Munich, and modest use in Bern and Besancon. There appears to be a basically good ability to select the type of transit for a particular job and to be flexible in designing the public transit systems. The most surprising element to me, in my relatively limited observation, was the frequency of service even at night and weekends.

Of basic importance is the long noon period in Europe in relation to transit ridership. In France, the lunch hour is 3 hours; in Germany, 2 or 1 hours, and in Switzerland, 2 or 1 hours, thus it is common for people to ride the transit home for lunch and this creates four peaks. This is particularly noticeable in a small system such as Besancon.

Transit fares are modest. In Munich the fares are 40¢; Paris is 30¢ a ride on first class when bought in groups of ten rides; Bern charges 20¢ - 32¢; and in Besancon the fare is 25¢. These fares compare closely with American fares.

There is a strong feeling that the handicapped should be provided for in special separate vehicles by a specific call, rather than in the regular transit vehicles. The United States should learn from this. The Paris subway system was very easy to learn to ride. The Munich system, although newer and more attractive, was not nearly so clear for the neophite user.

One final introductory general overview relative to transit - the major emphasis, in addition to providing a high level of service, is to induce rather than regulate passengers from the automobile to transit. The deficits are large and growing rapidly. There is some federal financial support.

STREETS AND FREEWAYS

Freeways or high-type roadways have been built and more are under construction in all the cities. These consist of the inner-city autobahn-type freeways as well as ring roads with penetration routes such as have been highly developed in Munich. The ring-road concept appears to be in widespread use as well as the establishment of auto-free areas and the segmentation or compartmentmentalization of areas within the dense inner-core within the inner-ring. In the newer areas of all the cities, it was clear that a lower density with increasing emphasis of freeways and streets and automobilies was occurring, even though conscious efforts were being made to develop high-rise clusters and other intense housing areas in all of the cities to encourage transit use and make it more economically viable. The German urban and rural autobahns as well as rural highways were excellent. Switzerland is making substantial progress on high-type freeway-type roadway systems. It is interesting that they appear to have lower standards for their freeways so as to make it possible to build them in the topography and alongside the beautiful villages, towns, and cities that scatter over Switzerland. They are building urban freeways and penetration roads in Switzerland as well as, of course, in Munich, where very high standards of design were observed, particularly near the Olympic area.

The continuity of road design was poor in France and Switzerland but good in Germany. In other words, the change in road cross-sections was very frequent and dramatic in France and Switzerland.

TRAFFIC ENGINEERING

Traffic Engineering, although not up to the current level of U.S. practice in the West, is certainly on the move. Traffic Engineers are using modern signals, one-way streets, turn prohibitions, auto-free pedestrian zones, parking regulations, etc. Design standards generally appear to be lower, sometimes significantly lower, but they

are building facilities. Directional signing generally was good and I am able to report that I did not become lost once in my 314 miles of driving through France and Switzerland. This was aided by good pavement markings and some excellent directional pavement markings in Swiss cities and towns.

Some of the more innovative traffic engineering is to design signals and signal systems to favor the bus and tram, vs. the automobile. Bern is very innovative in signalization and in preemption for transit. There is a different attitude prevelant which emphasizes the movement of persons ahead of vehicles.

RECREATION TRAVEL

Recreation travel is important. The heavy use of automobiles on the weekends for recreation has already been referred to. There is also heavy use of trains and buses. Sightseeing buses are in widespread use. There is considerable effort to emphasize transit use to recreational areas. This was particularly evident in Luzerne, Munich, and Paris. It is worth noting that particularly in Switzerland, highly specialized equipment is used for recreation. This includes the cog railroads, the aerial trams of various designs, and boats of various types. There appears to be an increasing use of campers and trailers, and camp grounds jammed with trailers were observed in Switzerland. As in America, many specialized racks and trailers have been developed for skis, Kayaks, motorcycles, etc. Recreational hiking, walking, and bide riding, of course, are very prevalent.

It is worth an observation (perhaps, on too limited a basis to be meaningful) that there is much less use of bikes in those areas visited than I had anticipated. Paths are provided widely and they appear to be excellent and used. It was observed that bike safety is a real problem, particularly on narrow city streets and mountain roads.

PROGRAMMING

All three cities are programming for six to ten years and deemphasizing long-range plans. This is an important recognition of funding limitations and the difficulties of implementing long-range plans that are similar to those we are experiencing in this country.

HIGHLIGHTS OF CASE STUDY CITIES

The above overall highlights generally pertain to the case study cities visited. Therefore, I will not repeat them but will only briefly summarize specific individual highlights of the case study cities visited.

MUNICH

The present modal-split is 40% transit and 60% auto. The auto registration is holding at one auto per 3.5. people. The average daily traffic has decreased since 1972 at some key stations where it is parallel to transit, however, middle-ring traffic is up 8%.

Munich is concentrating on 10-year programming approach to transportation. Although it has a long-range master plan, the emphasis is on solving problems in a programmed period. The basic concept is concentric ring-roads with penetration routes. The penetration routes appear congested.

The large auto-free zone provides a pleasant shopping and walking area, and is attractive. Large numbers of people used this area and peripheral traffic volumes are very high.

BERN

The concept of an outer freeway ring with major street penetration and connector routes is well along in its development. This is coupled with extensive park-and-ride and an excellent transit system. During the decade 1960 to 1970, the population went up 5% and motor vehicle registration 187%. Officials feel that "Bern has the worst traffic situation to be imagined". As a result, they are endeavoring to limit the individual freedom of the motorist and to provide an attractive alternative of transit.

The traffic engineer has evolved an extensive signal system in a short period of time. Twenty-eight signals are on a central control computer. The most innovative signalization techniques have been applied for the use of transit preemption in a major effort to maximum existing facilities for the use of transit with secondary priority given to the automobile. There has been good public response from the total traffic signal effort as well as from the transit preemption to achieve the optimum capacity of people. As a further assist to maximize transit efficiency, there are special signals for the buses and trams with a different headway design.

Their philosophy pertaining to transit is that it must be an attractive alternative in order to attract the motorist. The current deficit is 7.6 million Swiss Francs per year for the transit system.

As an interesting observation on the Swiss-type government, they are planning two votes on capital outlay for transit in the near future. Further conversations revealed that to change zoning required a vote of the people. This, of course, makes the long-range planning more stable.

We were shown several interesting experiments in housing developments. One of the newest used family income level to determine which floor level of the high-rise apartments was to be occupied by the renter. Of unusual interest in urban Switzerland was the existence, in parcels of say 20 to 40 acres, of a number of garden plots. These garden plots generally had a small garden shack or building and a place where the individual could grow flowers or vegetables. This seemed an indication of the people's desire to have some land even though they had to live in dense, old urban areas, or even in the new modern high-rise housing development centers.

Bern has developed an excellent commuter-rail system which is attracting ridership away from the automobiles. Further, Bern has extensive tramway and trolley-bus systems with frequent headways and very good coverage.

It was reported to us that Swiss cities generally have two times as many transit riders per capita as German cities and three times as many transit riders per capita as French cities. The car ownership was reported to us to be about the same. The

conclusion by the Swiss officials, from these statistics, was that it is harder to get around in Swiss cities and the parking problems are greater than in the German and French cities. It would be my opinion that they were referring to the historic old core of their cities because, in the outer more modern sections, my experience in driving was that it was easy to get around. Conversely, one had best avoid driving in the historic core of Swiss cities. However, I was able to navigate easily through Lucerne and, although with some difficulty, to drive through the downtown core of Zurich during a Sunday festival situation which I was able to find through no advance planning.

BESANCON

The hospitality in Besancon was absolutely superior. The Mayor and his staff extended outstanding hospitality and were most cordial. The Mayor provided us with his car and with a most able translator who helped make our stay enjoyable and productive.

Besancon is doing things. Under strong leadership they established a 6-year program and have it largely implemented. Their transit fleet of 110 buses, which includes 10 mini-buses, is monitored by a computer system which identifies the location of the bus. Further, this system displays on command the relationship of the actual bus location to the schedule. They reported that their scheduling is sophisticated to include the time of the day, the day of the week, as well as the driver's characteristics. They have radio-voice communication with the entire fleet. They have just completed two new garage maintenance facilities at a cost of 5.5 million French Francs. The transit control center display map and computer, as well as radio equipment, was installed at 2.0 million French Francs. They are presently carrying 47,000 transit trips per day out of a total of approximately 250,000 person trips. Their goal is a modal split of 30%. Further, their goal is that 85% of the people will be within a quarter-mile of the transit service.

Besancon has nearly completed a ring road. They have plans to utilize an old barge-canal under The Citadel, which is on a large hill, to complete the ring. They have established sector control in the old city so that vehicles cannot pass from one sector to another without special permit. They further established two large parking lots and an extensive one-way street system which is designed to limit or prohibit the movement of vehicles from one sector to another without the proper pass. This system appears to increase vehicle miles of travel but also appears to be essential to preserve the very ancient and beautiful historic and cultural center of the old city.

The philosophy again is to provide a high level of transit service which includes six to 10-minute headways all day with headways as close as three minutes during the peak. This is designed to provide an attractive transit alternate to the use of the automobile. It was apparent, however, that large numbers of people still did use the automobile even though there was adverse distance and increased vehicle miles involved in some situations.

Perhaps most impressive was the bold decisive action program that had been adopted by the city and was being implemented by its political leadership. The officials were obviously proud of what they had accomplished and justifiably so.

Besancon is one of the fastest growing cities in France and the problem of providing new housing is acute. Topography limits choice to a considerable degree. As a result, they have developed high-rise clusters and are building more. There is a certain amount of experimentation going into these developments. The first provided no opportunity for children to play whereas in the second they have learned that this is a necessary ingredient. A further difficult problem is that they have a large number of foreign workers who must be quartered. They have evolved a system of nearly total integration, having started out on a national segregation basis which they found did not work too well.

CONCLUSIONS

1. European cities are doing many bold and innovative things to provide transportation for people and goods. In a real sense, they are being forced to many of these actions by the pressures on the old historic cores of its cities brought about by the use of the automobile by the people.
2. Many concepts and techniques being used will have increasing potential application particularly in older denser American cities. We should closely survey and monitor the case study cities as well as others before, during, and after the implementation of these concepts and techniques.
3. The Transportation Research Board Task Force can develop a "shopping" list of concepts, techniques, and procedures that are being tried and used in these case study cities as well as other ideas and approaches to improve urban transportation. It would be particularly helpful if this "shopping list of tools" could also contain criteria for use and even a digest of the results of the experience of the cities with each. The challenge to us is to make sure that it comes through loud and clear that all "tools" are not universally applicable and, therefore, the American cities must selectively choose actions and "tools" designed to fit the individual city. A further challenge before us is to try to incorporate into federal "guidelines" and requirements a recognition of local selectivity and choice in the application of these various techniques in relation to federal assistance from the Department of Transportation.
4. European cities are emphasizing mid-range programming (6-10 years). These programs appear to be based on long-range plans but the emphasis is on the program, simply because they too are experiencing difficulty with the implementation of long-range plans from both the financing and public acceptance points of view.
5. Finally, the Transportation Research Board must reemphasize again and again, the fundamental importance of the form, size, population density, development concentration or dispersal characteristics, historical and cultural constraints of cities, and particularly their cores in relation to transportation. This is the key so that officials at all levels of government, as well as the public, are not mislead into feeling that here is a concept - technique - procedure - tool - that will, by some magic stroke, solve the transportation problems. Rather, we must emphasize the need to carefully select those actions which are applicable individually and

in combination to the specific urban area, based on study and characteristics which would reasonably lead to the expectation of success in their use as part of a total transportation program.

Robert P. Aex, Executive Director
Rochester-Genesee Regional Transportation Authority

CONCERN FOR QUALITY OF LIFE IN ALL URBAN AREAS

The OECD Conference made it immediately apparent that the private automobile has overrun urban areas of European countries to such an extent that punitive measures against the auto are being seriously considered in order to restore the quality of urban life in Europe. The reports given at the conference by Uppsala, Sweden; Bologna, Italy; the Republic of Singapore; Nagoya, Japan; Munich, Germany; Besancon, France and Nottingham, England outline the specific measures already taken, or planned to be taken, in order to reduce the vehicle miles of travel by private automobiles.

The concern of European countries about the quality of life in urban areas is because of air pollution, noise pollution and traffic congestion resulting from significant increases in automobiles. In Singapore, for example, the annual growth rate of private cars has averaged 8.8% each year - 1962-1973. The growth rate reached a peak of 15.4% for 1973.

CASE STUDIES BY EUROPEAN COUNTRIES

The European countries which submitted case studies at the Conference reported measures to restrict the use of the private auto, such as:

1. the restriction of private cars within the central core;
2. the reduction of on-street parking;
3. the reduction of off-street parking and the diversion of such lands to other uses;
4. increase parking fees for both on-street and off-street parking;
5. heavy auto license fees;
6. reduction, or complete stoppage, of road construction.

The case studies presented also reported policies to promote the use of public transit as an alternative to the private auto; including:

1. exclusive bus lanes;
2. exclusive bus streets;
3. establishment of streets for pedestrians only;
4. establishment of cycle routes;
5. park and ride facilities;
6. free bus service at certain times;
7. traffic signal priorities for buses;
8. shuttle bus service;
9. staggered work hours;
10. additions to bus fleets;
11. expansion of rapid rail transit;
12. expansion of suburban bus service;
13. establishment of demand-responsive transit;
14. increased bus shelters;
15. increased night bus service.

POSITION OF U.S. DELEGATION

By comparison with the positions taken by delegates from European countries, the U.S. delegation reported to the Conference that the policy of the United States was to recognize the private auto as a part of the public transportation system and, therefore, U.S. policy is to promote the improvement in the efficiency of the use of the private auto.

The U.S. delegation also reported U.S. policy for the improvement and expansion of public transit in order to encourage more people to use public transit. Measures to improve public transit were reported to include:

1. exclusive bus lanes;
2. traffic signal priorities;
3. free bus service;
4. park and ride facilities;
5. expansion of rapid rail transit;
6. integration of demand-responsive transit with fixed-route transit;
7. additions to bus fleets;
8. increased bus shelters.

The Conference was told that the U.S. is encouraging traffic management innovations aimed at giving transit vehicles and car pools preferential treatment on freeways and city streets.

COMMON VIEW BY EUROPEAN COUNTRIES AND THE UNITED STATES

Notwithstanding the contrasting views regarding the private automobile, there is a common view regarding the objective of improving and restoring a quality of life in urban areas by reducing air pollution, noise pollution and auto traffic congestion in urban areas. Therefore, the United States has much to gain from the knowledge and experience from the plans of European countries in the improvement of public transit and the priorities given to public transit in urban areas. Therefore, the United States is well advised to learn about and emulate the successful efforts in Europe, in enhancing public transit and thereby being able to avoid the necessity of punitive measures against the auto such as viewed as necessary in European countries.

CONCLUSION AND RECOMMENDATIONS

A conclusion reached by the OECD Conference was that "the practical experiences and experiments reviewed at this conference show that policies combining selective traffic limitation measures and public transport improvement can achieve a better urban environment, enhance accessibility of people and goods and conserve energy.

The Conference emphasizes the need for continuing experimentation and research in this area and the dissemination through OECD and other international bodies of the experience and knowledge on these new approaches to the improvement of the urban environment."

It would be my recommendation that the United States take full advantage of further activities by OECD and actively participate in future meetings and conferences. Further, it is recommended that TRB establish an ongoing committee for the development of management, techniques and programs. The establishment of such a committee would provide needed leadership for U.S. cities in regions now faced with the UMTA requirement that a traffic management plan be a prerequisite for operating assistance.

Paul D. Foster, Deputy Commissioner
Boston Traffic and Parking Department

The OECD Conference held in Paris to which I was a delegate from the United States proved to be one of the most worthwhile that I have ever attended. The information furnished at the conference through case studies gave me the opportunity to hear what was happening in traffic management throughout the world and showed how effective restraints could be put into effect.

As enthused as I was about the conference in Paris, it was the on-sight trip to the case study city of Nottingham and trips to Leeds and London that gave me a first hand view of the implementation of the programs.

NOTTINGHAM----- Very bold action has been taken in Nottingham. Fortunately the political situation was such that drastic action, as banning all day parking in the business district, priority bus lanes, utilization of loop detectors for buses and even free buses could be attempted. The pedestrian malls were well constructed and landscaped---well maintained, and very heavily used. A new ring and collar scheme is to be implemented in Nottingham in August and Mr. Waller, our host, promised to furnish a report on the success of its use. Along with these positive measures, parking fees have been increased, parking spaces have been reduced, all in an effort to keep the automobile driver from using his car in the inner city. Particularly impressive, and I am sure largely responsible for the successful implementation of these programs, was the public involvement before plans were finalized, an extremely good public information program and public relations effort throughout. An important lesson to be learned from the Nottingham experience was that the public must have alternatives when a decision is to be made as there is little choice when shown one plan.

LEEDS----- Leeds is a city quite difference from Nottingham insofar as it is larger, more densely populated, highly industrialized with more of the big city problems evident. Leeds has built a ring road to help keep core city traffic to a minimum and has gone into the pedestrian mall concept rather heavily. Both my colleague and I were somewhat surprised at the malls in Leeds being intersected by very heavily trafficed roads. Bus priority lanes have been introduced and plans for further development along these lines are being made.

By comparison, Nottingham is much further advanced in their traffic management program than Leeds and I am sure than most cities in the world.

LONDON-----In visiting London we had the advantage of meetings and discussions with people of responsibility at the central, county and borough levels of government.

Our visit to the Camden section of London afforded us the opportunity to speak with Mr. Robert Lane from the Planning Department of the Borough, responsible for dealing with traffic. He pointed out the effect the bus and underground system had on his Borough, spoke of the difficulty of enforcing on-street parking at meters, and the impossible situation of trying to find people who wanted the job as Traffic Wardens or Meter Maids; quite different from Boston where the applications for the position numbers well into the hundreds. Mr. Lane further explained to us the use of a resident sticker parking program and I was fortunately able to tell him how we in the city of Boston implemented and enforced ours.

Mr. Lane pointed with pride to the fact that they had just recently instituted a small pedestrian area and looked forward to more when possible. Another of the borough's problems was in the collecting of fines due to the issuance of parking tickets. Mr. Lane was displeased with the low fine scale as this made ticketing ineffective.

GREATER LONDON COUNCIL-----At the Greater London Council we met with Mr. Tanner and Mr. Anthony May. A lengthy explanation was given about their proposed licensing scheme where vehicles entering a controlled area of London would have to display a license sticker to enable them to penetrate the area under control. The license would cost between $1.40 and $2.40 per day. This scheme has to pass the Parliament before it can become effective and the enforcement aspect still has to be worked out.

The Greater London Council is tightly controlling construction of new parking areas and is limiting one parking space per ten thousand square feet of office space.

Mr. May explained, and we saw for ourselves, the use of streets where buses and taxis had priority in the heart of the London shopping district. We were also told of the problem getting personnel to run the buses of the London Transport and the huge financial problem of replacing the old rolling stock and the need to increase fares.

DEPARTMENT OF THE ENVIRONMENT-----At the national government level we met with Mr. Fells of the Department of the Environment. He explained to us the national policy on traffic management and the emphasis appears to be on the following points. The counties must begin to pay more attention to traffic management with particular emphasis on restraint of private automobile usage in the core city, less money from the federal government is going to be available for operating assistance of mass transit, fares will have to be increased and car pooling, to which little thought has been given, must be looked at seriously.

The national government has increased the gasoline tax and the cost of the automobile license in hopes of conservation and restraint.

CONCLUSIONS-----The O.E.C.D. conference and the follow up trips have changed my thinking to a considerable degree. I have been shown first hand that it is possible to return the city to the people if you provide the proper incentives and, in most cases, that is good public transportation that people can afford.

I returned to Boston with a new attitude and spirit of determination to try to initiate some of those schemes that I saw first hand and have related my experience to Mayor Kevin H. White and Secretary of Transportation for the Commonwealth of Massachusetts Mr. Frederick Salvucci.

Some fundamentals which I will keep with me from the conference are as follows: where pedestrianization has taken place, business has improved contrary to feelings the opposite when such schemes were first proposed, and shortly, others begin to cry out for similar pedestrianization schemes on their streets; you must offer the community groups to have input to plan in process; good public information and public relations must be carried out before, during and after schemes are implemented. This last fact was clearly shown in Nottingham. Finally you must have your finger

firmly pressed on the political pulse of the city.

In conclusion I believe it would be of great value to include more of the persons responsible for setting the local traffic policy and implementing the day to day operations of traffic schemes to this type of conference as I am sure that all those attending the O.E.C.D. conference came away with a firm determination and solid belief that we can have better towns with less traffic.

I am thankful to TRB for this opportunity and look forward to communicating with the people I met at the conference and in the English cities visited so that a constant two way flow of communication can continue.

Dr. William L. Garrison, Director
Institute of Transportation & Traffic Engineering
University of California

The OECD Conference provided for the exchange of much valuable information from instances where traffic restraints had been applied or were to be applied. In addition to these specific cases, information was exchanged on a number of systematic problems that arise when a restraint program is undertaken. This material was very valuable and will be available in the Conference Proceedings.

Here are some general comments beyond matters of substance.

First, the Conference and the work supporting it was organized by the environmental group at OECD under the general rubric of improving the urban environment. (Some of the environmental actors at OECD are very anti-automobile.) Many at the conference made the assumption that any (automobile) traffic restraint will lead directly to an improved quality of urban life. A number of persons, although a minority, made the stronger assumption that restraints on travel would improve the quality of urban life. The larger issue of travel management in order to reduce the negative externalities of modes of travel in micro--urban environments and in order to enhance opportunities in urban living was hardly in anyone's view.

The assumption that traffic restraint was a good thing was perhaps responsible for the lack of emphasis on evaluation at the conference. This lack of emphasis was mentioned from time to time by many of the participants.

Second, while the interests of OECD in this topic was timely because no one else (in Europe) has been performing an information exchange role, it is not clear that there is a function for OECD in this area. It may be noted that urban travel management is very much a local matter, or at least a within-nation matter, and there is no need for multinational cooperation and an organization that has that as its purpose. There is the European Council of Transportation Ministers and a variety of professional groups which could well provide appropriate programs for information exchange. At points in the conference, one had the feeling that the OECD was engaging in empire building.

Third, there is the difficult problem of transferability of European results to the U.S. scene. The old portions of European cities do not have counterparts in the U.S. cities.

Fourth, the substance of environmental issues was ignored. Noise reduction issues are perhaps most obvious for consideration.

Addressing now the question of what might be appropriate in the United States, the information exchange at OECD and, especially, the way in which that information was viewed, suggest to me that we need to develop a concept of travel management, or perhaps traffic management, that goes well beyond the notion of traffic restraints. A traffic restraint is in tone a negative sort of thing, and it is suggestive of goals of easing negative externalities from traffic. We are already well equipped to further this kind of program in the United States, using the initiatives of local institutions and utilizing the technical resources of the traffic engineering community.

But initiative and technical knowledge is needed to go beyond this concept to one which enhances the qualities of urban centers along the dimensions of improved accessibility as well as the dimension of the negative impacts of traffic. Additionally, there is the matter of energy consumption. An approach to that issue using the concept of travel management would be less simplistic than the approach using techniques of traffic restraint.

These matters of travel management were discussed by the TRB Task Force in Paris, and there seemed to be unanimity that this concept was appropriate and has higher priority than a more narrowly constrained approach.

John D. Simpson, General Manager
Denver Regional Transportation District

I attended the OECD Conference on "Better Towns and Less Traffic" from April 14 to 16, 1975, as a member of the U.S. Delegation and Transportation Research Board Task Force. In conjunction with attendance at the OECD Conference, I traveled to several European cities which are presently engaged in the use of public transportation and/or traffic management to reduce the adverse impacts of automobile traffic. This is a report on those visits as well as the conference.

I. PRE-CONFERENCE VISITS

A. LONDON

In London on April 6-7, I visited and rode some of the more modern extensions of the underground system, including the Queen Victoria line. I also had the opportunity to see the construction which is presently underway on the underground extension to Heathrow Airport. The terminal which is closest to the arrival points of passengers at the airport is under construction and will not be ready for revenue service for at least a year and a half (by the optimistic estimates of those involved) and, in my judgment, perhaps not for two years or more. However, a station at the periphery of the airport will be opened much sooner. This should provide an interesting opportunity for a case study in the impact on patronage of better access to a major trip attractor. It will be interesting to observe what changes in patronage occur after the necessity of a 10 to 15 minute bus trip to access the underground system is reduced to the walk-in time when the Heathrow central station opens.

A useful contact for visitors to the United Kingdom who want to become better informed on transportation activities in London is:

Mr. David Bayliss
Chief Transportation Planner
Greater London Council
County Hall
London SE17PB.

B. BERLIN

On Monday morning, April 7, 1975, I flew from London to Berlin. My interest in visiting Berlin stems from my past knowledge of that city and its transportation system when I lived there in the mid-1960's. I was greatly impressed in my three-day visit by the innovative approach which the city is taking to improving the quality of life by managing traffic. Berlin is unique in several respects. Most obviously, its isolation from a hinterland makes the city self-contained. In another respect, however, the city is a showplace for the Federal Republic of Germany as well as the allied powers who are represented in City Councils. Thus, Berlin has more funding than most cities at its disposal to implement imaginative programs. Finally, Berlin has a declining population such as that of many American core cities. It also has a high percentage of transit dependents--even for a European city--because the average age of the population is much greater than most cities.

In Berlin, there have been progressive improvements to the public transportation system. The U-Bahn was constructed in the 1930's, and remained at a given size until 1953 when additional construction commenced. Successive extensions were completed in 1956, 1958, 1963, 1966, 1971 and 1972. A further major extension is under construction with an anticipated completion date of 1978. In all, the underground system totals 89 kilometers, 33 of which have been put into operation since 1953. Seventeen kilometers of underground are under construction, and the planned system will cover 200 kilometers by the end of the century. The underground system is complemented by 80 bus routes with a total route length of 1,006 kilometers. Berlin formerly had a streetcar system, which was phased out during the 1950's and 60's. The last tramline ceased operation in 1967. In this respect, Berlin resembles many American cities which have eliminated streetcars in favor of underground systems and improved bus service.

Bus service in West Berlin is provided by a mix of double-decker and standard buses. Ridership has risen consistently since 1950 from 439 million to 805 million passengers per year. In 1950, 56 percent of the ridership was on streetcars, with 30 percent on the U-Bahn and 14 percent on buses. The current split is 34 percent on U-Bahn and 66 percent on buses. In conjunction with the expansion of the transportation system, the BVG (the city's transportation authority) has introduced some exclusive buslanes, particularly in the central businesss district and in some of the other major commercial centers. Generally, the exclusive lanes are very short, and are used simply to provide preferential treatment in the crucial block or two where major streets intersect. The city planners have conducted before and after studies and have observed that timesavings on the order of 50 percent during

the peak hours have resulted from the better buslanes. The city has an ambitious plan for future lanes, copies of which I obtained and have available for those who may want them (they are in German). I also have a copy of a study done in conjunction with the extension of the underground system to one of the major sections of the city. I thought it interesting to observe the ways in which the city accomplished street closings prior to the construction of underground stations, as a means for developing an aesthetically pleasing community and preventing intrusion of traffic generated by the stations from the residential streets of the adjoining community.

My contact in Berlin was:

Herr Hasko Theis
Abteilung, Verkehrsplanung
Berliner Verkehrs-Betriebe (BVG)
1 Berlin 30 Potsdamer Strasse 188
West Germany

C. WEST GERMANY

My next destination was Stuttgart, but enroute I visited and observed the status of transit in East Berlin, and in the cities of Braunschweig and Hannover. Hannover is of interest because it recently abandoned plans for a subway system in favor of further improvements to its light rail transit system. That system includes a central area subway segment, in which the vehicles are the type whose design was used as a basis for the U.S. standard light rail vehicle. In Hannover, I had hoped to meet Dr. Frederick Lehner, who is the retired director of the Hannover system and a renowned authority on German light rail. I was unable to make contact, but for those who may get to Hannover, his address is:

Dr. Frederick Lehner
Hannoversche Verkehrsbetreibeagam Hohen Ufer 6
3 Hannover, West Germany

My visit to Stuttgart was prompted by several analogies between that city and the Denver region. Stuttgart is immediately adjacent to mountains, as is Denver. The soil conditions in the area are similar to those encountered in the Denver region. The city is about the same size as Denver, and has been known for its ambitious plan to improve public transit while at the same time restricting automobile traffic in the central business district. The transportation planning for Stuttgart has been done in conjunction with land use planning, and considers such traffic controls as the elimination of long-term parking in the center city. Plans for the city's transit system included the entire middle Neckar region, with its S-Bahn intercity service as well as the intra-city system. The city has a good streetcar system, but congestion in the central business district limits the performance capabilities of the streetcars. There is a plan to convert 130 kilometers of streetcar track currently at grade into a 95 kilometer subway system. This is being done progressively with the substitution of underground segments for segments at grade. One interesting facet of Stuttgart's approach is the construction of underground facilities sized for full metro operations, but currently used with standard European streetcars. I obtained extensive literature on the approach which the city is taking to the progressive upgrading of its public transit system.

About 5 kilometers of underground is presently in service and another 3.3 kilometers is scheduled for completion in 1976. The operation is of particular interest in that it is being done in stages, with a clear long-term objective, in a way which attempts to integrate short-term and long-term needs. My contact in Stuttgart (who is an Australian-German and speaks excellent English) is:

Herr Harry W. Henning
U-Bahn Stuttgart
7 Stuttgart 50 Pelikan Strasse 19
West Germany

My next destination was Mannheim, West Germany, but enroute I drove through Karlsruhe to look at the light rail system in that city. In Karlsruhe, former railroad rights-of-way were converted to light rail use. The capacity requirements in the city and its adjoining communities are such that modern light rail systems, using the grade-separated right-of-way, are able to provide high-speed service at a lower cost than would be required for conventional rail systems. I rode and observed that system with great interest, since one of the alternative transit systems under consideration for the Denver region would use existing railroad rights-of-way with high-speed light rail service.

The principal purpose of my visit to the twin cities of Mannheim and Ludwigshafen was to observe a new approach to inducing people out of their automobiles. Mannheim has an extensive streetcar and bus system which serves both sides of the river. However, much of the system operates in mixed traffic at grade with relatively low performance. An innovative approach to urban transportation will provide an "aerobus" to connect the fairgrounds on the west side of the Rhine River (the city of Ludwigshafen) with the Fernmeldturm on the east side of the river (in Mannheim). The aerobus approach uses steel arches under which vehicles of about streetcar size, but suspended from cables, operate at relatively high speeds. At some points in the system the vehicles are suspended from T-shaped structures as well as the previously mentioned arches. I was in Mannheim for the first test run of the aerobus vehicles. There are a total of 8 such vehicles, with a capacity of about 100 passengers each. Two of the vehicles were being used to test the tension in the suspension cables throughout the route. When fully operational, the vehicles will move at speeds of 45 kilometers per hour over a 3-kilometer route. On the test run, speeds were much slower and progress was deliberate to insure that no safety hazards existed.

My visit was on April 11th, seven days before passenger service was to commence. It was an interesting experience to have an opportunity to discuss the progress and problems of aerobus with the engineers on site. I have a full series of slides taken during the first test run which I could make available to anyone who might desire them. The contact for further information on the Mannheim system is:

Mr. R. Lang-Willar
Aerobus Engineering Ltd.
8-305 Dietlikon
Zurich, Switzerland

from Mannheim, I briefly visited the Frankfurt transportation system enroute to Koln (Cologne). My visit to Koln was prompted by information that that city has one of the most progressive light rail systems which provides not only inter-city service within Koln, but also connects the city to Bonn, the West German Capital. Portions of the Koln system are underground, especially in the old city center. The transit operating authority in Koln is:

Kolner Verkehrsbetreibeag
Scheidweilerstrasse 38
5 Koln Braunsfeld 1
Federal Republic of Germany

From Koln, I visited the Ruhr, observing the transit systems of Dusseldorf and Duisburg. In Dusseldorf the largest manufacturer of light rail vehicles for all of Western Europe is located. Duwag, as the corporation is known, is also conducting research on advanced transit systems. The address of the Duwag factory is:

Waggonfabrik Verdingen A. G.
Weerk Dusseldorf
4 Dusseldorf 1 Postfach 8405
Federal Republic of Germany

D. THE NETHERLANDS

From the Ruhr I traveled to the Netherlands, where I visited the public transit systems of Rotterdam, The Hague, and Amsterdam. In addition to light rail operations in mixed traffic on very narrow streets, Amsterdam has the interesting new approach of small, self-driven, short-term rental cars. This experiment in reduction of vehicle miles is one that should be observed as additional data become available. Amsterdam also is a city in which bicyclists are given special treatment, since the city has a higher per capita use of bicycles than any other city in Western Europe, and perhaps in the world. Bikeways and other innovative approaches to the management of two-wheel traffic are planned and in some cases implemented in the major Dutch cities.

II. OECD CONFERENCE - "BETTER TOWNS WITH LESS TRAFFIC"

From Amsterdam, I took the train to Paris on April 13, arriving in time for the start of the Conference on April 14. I found the meeting quite interesting, although three days with multi-lingual colleagues impressed upon me the difficulties of communication which result from cross-cultural values as well as simple language problems. A consistent theme throughout the conference was the need to emphasize public transportation in urban areas, and to reduce the number of automobiles which are clogging our center cities. The case studies focused on different approaches to solving the same kinds of problems. Some ambitious programs such as those planned for Singapore include restrictions which may not be practical in American cities. The political difficulty of outright bans on traffic or the administrative difficulty of sticker systems or the like seem to make transferability of these solutions to U.S. cities highly questionable.

While there is broad agreement on the need to reduce the negative impact of automobile traffic in urban areas, and on the general approaches which can be taken toward that end, there is little evidence available as to the impact which can be expected from various incentives and disincentives. I came away from the Conference with a sense that intuition, rather than analysis, is guiding the current efforts in most countries - and not just the United States. One matter of some concern to me was the tendency of Conference attendees to focus on the restriction of accessibility by autos without placing comparable emphasis on improvements to public transit systems, which must inevitably accommodate a majority of the persons displaced from automobiles. My focus in the earlier part of this report reflects my own belief that we must do as much to provide high-quality public transit service as we do to restrict automobile traffic. Additional work is also required to provide evidence as to the link between land use and transportation planning.

Paul C. Watt, Executive Director
Metropolitan Transportation Commission-Berkeley, CA.

My first observation is very general in terms of an overview across all facets of the program period. The approach, in particular the conference sponsored by OECD, where formal presentations and discussions were held on the subjects to be viewed later in the field, was an excellent one. Too often we tend to get our impression only from one (presentation or discussion) or the other (field inspection) which does not give the depth of understanding made possible by the way the program was developed. The "Public Transport and People" Conference was more traditional and did not particularly add special significance, although the presentations and discussions were very interesting and somewhat enlightening.

Another general observation which was sparked by the opening conference paper by Dr. Ingrid Leodulter of Austria and continually reinforced throughout the total program was the European cities and towns are in fact approaching the problems of auto domination and the resultant environmental concerns. We in this country have been grappling with this problem during the past two decades and have only had modest success in resolving the issue.

Europeans are mobilizing much more quickly to successfully cope with their problems. This response must be placed in proper perspective relative to scale, physical restraints, historical significance, different institutional response mechanisms, and different attitudes toward governmental institutions and officials. Because of these differences, particularly their greater trust of government and its officials, "citizen participation" as we view it was not nearly so significant a factor in the decision-making process. They generally tended to handle solutions as more of "demonstration projects" to be initiated and then refined over time with the implication that if a project could not be made to work, it would be thrown out and another approach tried.

It was also my impression in conference discussions and field studies that their planning, engineering, and institutional solutions were very carefully planned out with a high degree of professional excellence. This professional competency served to strengthen their "position" with the citizens as regards "official acceptance." Additionally, the technology of their hardware, traffic control and monitoring

systems served to carry the impression of quality with a high reliability confidence factor.

Overall, the European programs are geared to a total system concept (trunk-line and feeder). This concept was noticeably evident on the Paris Metro and buses; the U-Bann-S-Bann trams and buses in Munich; the tram in Zurich; the trams, State Rail service, articulated and regular buses in Bern; the buses in Besancon; and the tube and buses in London. They are much less inhibited by transfers (the Paris Metro and London Underground provide excellent transfer system service). Likewise, they are less constrained by safety hazards. For example, the Paris Metro has varying step-up and step-down entrances to their trains. The spaces between cars and platforms vary as well. There is no cover over the third rail and no crawl-space under the platform or overhang. Doors can be opened manually while a train is still moving. All of these conditions would be viewed as unacceptable by our regulatory agencies. Yet Paris travelers were not deterred because of these conditions. I was very impressed with the attitude of operators and passengers toward helping the handicapped, elderly, and mothers with prams. No special equipment was used, but everyone helped these people in boarding and disembarking.

My final general observation pertains to vandalism, personal safety, and respect for rules of the system. Everyone we talked to assured us vandalism and personal safety do not pose problems. People seem to respect the rules set forth and look on their systems with pride. This attitude was especially evident in the matter of fares and use of the 1st and 2nd class units. In Munich and Bern where the honor systems are used, there seemed to be very little cheating. At one checkpoint in Munich, I saw three passengers picked up out of approximately 100 passengers who disembarked.

SPECIFIC OBSERVATIONS - OECD

I would like to categorize my specific observations and impressions in two groups. One will deal with those areas and approaches that were discussed at the OECD Conference; the second will touch on the "three-city" set which was discussed both at the conference and in the field--Munich, Bern, and Besancon.

Uppsala, Bologna, Singapore, Nagoya, Gothenburg and Nottingham were discussed at the conference. Nottingham, Gothenburg and other areas were also discussed in the field by other members of the team, and I assume will be covered in more detail by them. I am not going to try to critique these programs individually but instead will extract some of the specific proposals and experiments that I feel deserve consideration for application here.

The fact that most of their towns and cities have such a tremendous historical time span, i.e., 1701 (Uppsala) greatly induces the necessity for unique solutions. Major demolitions are almost uniformly out of the question. Comparable areas here might be the Vieu Carre in New Orleans, Old Savannah, and Old St. Augustine, etc. It is important to understand the historical significance as a factor in their solutions before trying to apply some of their approaches here. Scale is a problem of similar magnitude. Densities are uniformly higher there and overall land utilization is consequently much tighter. Topography and waterways often are significant factors affecting solutions. Narrow streets are a major factor. Even though

the size of automobiles is more in scale to the narrower rights-of-way, often there is a contradiction in the sizes of buses. Bern, for instance, effectively utilized very large articulated vehicles that did very well on some of the narrower streets.

There were a number of unique approaches being proposed or tested by various towns and cities to restrain use of autos and to improve the flow of people movement. These approaches were primarily geared to transit, although provision was also made for cycles and pedestrians. A number of schemes offered innovative, regulatory, and licensing plans. Singapore's Area Licensing proposal was probably the most extreme. It requires a monthly fee varying from a high of $120 to $140 per month to a low of $10 or $20. The exact figure is determined by the type of use of a vehicle within the restricted zone (an area of 62 hectares). Once this operation becomes effective, plans are to have it very strictly enforced.

A significant point that seemed to apply to all of the experiments was that each case was orchestrated as a management package. Careful analysis enabled utilization of the best attributes of each system in finding a solution to the problem. These approaches included transit improvements, signal systems to regulate flows with tram preference, fringe parking areas, and pedestrian only zones.

Results from these programs were quite significant. Uppsala, Sweden, for instance, measured 50% reductions in carbon monoxide following institution of their program. Only modest reductions in noise levels were achieved. Their traffic reorganization plan within this area reduced accidents by all means of transport some 45%. There was only an 8% increase in traffic on the perimeter road system as a result.

Bologna, Italy, had an interesting proposal. They are trying a policy of free fares on their transit system from 6:00 a.m. to 9:00 a.m. and from 4:30 p.m to 8:00 p.m. Deficits in nearly all cases discussed were looked upon as required funds to provide a service.

The use of transit preferential signal programs was an area that seemed to have great transferability potential. There was very good progress for favoring both trams and buses, either separately or in combination. Helsinke, for instance, was able to increase tram and bus speed by 10% with their system. The tram saving seemed to slow other traffic, while the bus saving did not seem to affect the overall flow as much. Gothenburg, Sweden, for instance, utilized late release approaches for mixing. Tram stops were located between intersections for better progression.

Reserved bus lanes, including contra-flow, were utilized in many of the programs very effectively. There were no real problems of enforcement or acceptance. Nottingham seemed to be exploring some innovative approaches in this area, particularly the closing of Arkinright Street to all traffic except buses and licensed taxis.

The "pedestrian only zones" programs in various cities and towns were very interesting. Their success was tied to management of the total program of revised traffic flow, fringe parking, improved transit, and preferential signalization. Use of pedestrian zones weekday and weekend was amazing. Scale was very important--widths, heights, and distances were all influencing factors, as were street furniture, plazas, and

fountains. Pedestrians seemed to be in scale with their surroundings--not overwhelmed by wide streets, sterile facades, annoying vehicles or noise intrusion. This point is difficult to describe. We are missing something in our urban design scale to entice people to get out and walk or to come downtown in the evening or on weekends and just stroll and visit.

The impact of the various programs and projects reviewed as they relate to energy conservation was not very clear. Considerable effort was made to enunciate the relationship between urban traffic limitation and energy conservation.

It was pointed out that the percentage of energy consumption directly allocated to the transportation sector in the OECD countries is between 15% and 20%, as compared to 25% in the United States. Oil consumption percentages are 20% to 30% and 50% respectively, and climbing. The auto is responsible for 7% (direct) and 12% (direct and indirect) of the national energy consumption in our country.

Traffic limitation as an energy-conserving factor was generally considered to be a short-term solution, both as it relates to policies and vehicle technology. The policies can shift traffic to more efficient systems and increase the load factors while the technology can contribute to increasing effectiveness of energy consumption through engine compression adjustments and spark-retard adjustments.

The long-term solution revolved around further changes in technology of vehicles and reduction in demand for trip-making. This equated to smaller vehicles and better land use planning. I generally had the feeling that rail transit alone did not offer substantial immediate change in energy conservation. Rather, it was important to look at the overall system concept as being part of a viable alternative system.

SPECIFIC OBSERVATIONS - THREE-CITY GROUP

Following the two conferences in Paris, our three-member team visited Munich, Bern, and Besancon for a field review of the programs we had discussed at the OECD Conference. I was most impressed by the efforts of people in each of these cities to inform us as to their programs. Their hospitality was particularly gratifying. Our Embassy was most helpful in getting us off to a good start in each city where they have an office. The questionnaire to be filled out relating to population, travel statistics, etc., was left with each city. These will be sent back to Washington via the Embassy.

MUNICH

Embassy Representative - Steven M. Brittain
Munich Resource People - Mr. Uli Zech, Chief, Planning Department
Mr. Hans Doleschal, Transportation Planner
Mr. Gerhard Meighorner, Town Planner

Our meeting was held in the offices of the Transportation Planner in the morning to discuss the program. The remainder of the day was taken in riding the systems, strolling through the pedestrian areas, and visiting the Olympic Park, which was at one end of the U-Bann line.

The staff briefly reviewed status of the Munich program and followed with a lengthy discussion of all aspects of the program. Munich has a city population of 1.3 million (decreasing) and a regional area population of 2.2 million. There is no major competing city within the region. For every 3.5 persons there is one auto.

Considerable time was taken to establish the relationship of their Federal (German Bundt), State (Bavaria), and city/regional entities. While policy roles seemed to be better enunciated by the Federal, State and city (local) levels than we attain in the U.S., I was of the impression that their regional coordination still left something to be desired. The fact that Munich is a singly dominant center in its region and has very clearly defined policy seems to set the course for the regional area. The State of Bavaria is in the process of developing a stronger regional approach to be introduced.

During discussion of the various programs and their implementation, a significant factor kept reappearing. It is that the City Council of Munich is elected for six years which provides a steadiness in long-term policy and decision-making. This factor is one of which we should take heed. It is very significant in the acceptance of technical solutions and facilitates citizen participation activities. Munich, of all areas visited, appeared to do the most in getting citizen understanding and response.

While in the field, I was much impressed by efficiency of the U-Bann and S-Bann. There was smooth coordination between the Federal and municipal operations giving the impression that it was actually one system. The honor system on fares referred to earlier was very impressive. A rather complicated ticketing system is used with vending machines, although it did not seem to be a deterrent once the user was checked out. It was significant to me that the tram and bus system, both very good, were judged almost equally by the people. The tram barely edged out the buses as the public's favorite.

Munich's approach for coordinating and managing the total set of programs designed to improve movement, access, signalization, parking, etc., was very good. The pedestrian zone was quite large and equally impressive. In the Maierplatz area, for instance, 115,000 pedestrians were counted between 9:00 a.m. and 7:00 p.m. Five minute pedestrian counts ranged as high as 1,100 showing an increase of two times between 1968 and 1972 in certain areas. The shops seemed to greatly benefit from this action. A 40% increase in retail sales was reported. The cost of the first experiment has been borne by the municipality. Because of the shopkeepers' success, it is hoped future costs can be shared by them.

Another program worth monitoring as to possible transferability is that of Munich's test with "route bound" taxi service. This is an experiment whereby cabs cruise the transit system fixed routes in the off-peak (during increased headway time) to give the populace more options for not using their automobiles.

BERN

Embassy Representative - Ray Ewing
Bern Resource People - - Mr. Kurt Hoppe, City Traffic Planner
Mr. Siegfried Unger, Vice City Traffic Planner
Mr. Peter Scheidegger, Vice Manager of VBW
Mr. Rheinhard Brunner, Manager of SVB
Mr. Peter Korda, Traffic Planner

Bern is the capital of Switzerland and a very old (founded in 1191), beautiful city. It was billed as the smallest of the larger cities of Europe. The city population is 160,000. That of the region is 270,000. The old city is located in a bend of the River Aare. Our meeting with the public officials in the Rathuns was most impressive. Each of the gentlemen had painstakingly prepared his remarks in English and read them to us. We were most grateful for this extreme courtesy.

The Bern program is another impressive one. They have done excellent work in developing a centrally-controlled (by computer) traffic signal system that gives preferential treatment to public transport. They use a system called "entry breaks" which is similar to our ramp metering, except that it is actually central area metering. Capacity of the central area is continually being calculated to restrict the number of private autos allowed in so that preference is given to trams and buses.

Bern suffers from very narrow roadways, especially in the older parts of the city. However, as mentioned earlier, the large articulated vehicles included in the transit system (both regular bus and trolley bus with a 220 person capacity) seem to negotiate these streets very well. The traffic control system really smooths out the flow. Their tram system is very good and is being extended outward to new growth areas. One line going north to an area of "new town" development has considerable new right-of-way separate from the street system.

We were transported around on one of their new buses which was very comfortable and attractive. The SVB (City Public Transportation Authority) system is being coordinated with the SZB (the Federal and State system) which operates into the main railroad terminal downtown Bern as a commuter rail system. We rode this system and again found it to be well managed and operated with excellent equipment. The main railway terminal is new and set up to coordinate rail, bus, and auto facilities.

During discussion of the public transport system, it was pointed out that each inhabitant uses public transport at least once a day. I was amazed at how many people go home for lunch on transit. At the noon hour, the stops are queuing up as it was a peak-hour period. The people and officials have great pride in their system. It was also significant to me that with a 22% fare increase the previous year ridership stayed the same on their system, whereas we in this country would have had a significant drop. They attribute this to their high level of service and, of course, to less auto option. As a footnote, gasoline prices in Bern are running about double ours.

Bern has a goal to eventually make all of the old city a pedestrian zone. Certain portions of this area have already been made free of autos and are served by transit and taxis. The pedestrian activity is overwhelming, particularly at night when one would expect less action. One night at midnight it was interesting to see a large group of people standing around cheering a huge chess game in the middle of what had been a street with six-foot squares and chessmen four feet high. In another area a portable theater had been set up and a play was in progress.

BESANCON

City Representative - Lord Mayor
Dr. Marilyn Gill, Linguist, translator for Lord Mayor
Mr. Andre Regani, Assistant to the Mayor for Transport
Ms. DeChatelle, Ministry for Transport from Paris

Besancon is a charming little city of 135,000 inhabitants not far from the Swiss border. It is considered a regional capitol of this part of France. The city is an artistic and university centre with industrial and commercial strengths as well. It is the birthplace of Victor Hugo and Bertollini. The city is surrounded by hills, many of which have old fortresses that were used to protect the city as far back as the Roman invasion.

The old city is plagued with very narrow streets; and, as the city has grown and auto registrations increased, traffic has become intolerable. This situation led to the program Besancon developed as a pilot project with the French Ministry of Transport contributing financial aid. Besancon's older city is hemmed in by a loop in the river Doubs which complicates the transport problem. Most of the new growth, anticipated to be at about 3% per year, would be directed by municipal policy to the "Z.U.P." (priority development area) suburban area of Planoise. This would be an area chiefly made up of about 40,000 workers.

The solution to the traffic problems required a determination of priority actions with the major priority given to the city centre. The plan was to protect and humanize this center and develop a transport scheme to do this. Personal mobility was stressed. Planning the city to suit the motor car was felt at best a rear-guard action. A strategy of banning through traffic was chosen. Provisions were included for a ring road to handle through traffic that would be excluded from the centre, and for creation of a pedestrian area. To make this work, a greater emphasis was given to transit. The scheme is working very well.

The centre area was divided into traffic cells--the market area, administrative area, municipal offices, etc., and two other cells. Driving from one cell to the other is prohibited by means of a reserved street for "functional" vehicles only (essential service vehicles). Traffic is facilitated in each cell. A special sticker is required by a resident to allow access to the cell. To get from cell to cell, the motorist has to go out around the ring road and in again. Transit, taxis, emergency vechicles, lorries, etc., are given preference. The transit system, in particular, does an excellent job of moving the people in and out. The ring road itself was improved to assure maximum movement. Contra-flow bus lanes are also provided and seem to be functioning well.

The pedestrian only areas are handled with great care to scale, urban design, and charm. Some of the before and after effects are startling. In one instance, what was a typical car parking lot is now paved over with marble slabs and has a fountain, trees, and flowers. All of the street paving is in varying patterns of surfacing at the same level building line to building line. Pedestrian counts have reached as high as 11,000 per hour. Again, the merchants are very pleased.

The transit service is handled very smoothly with a new fleet of good design and colorful exteriors, both medium size and mini-size vehicles. We visited their modern shops and computer center and were graphically shown by use of lights where each vehicle is on the system and whether it is on schedule or late. They are in touch with each vehicle by radio and can adjust their spacing as needed. The computer senses spacing by readings on the number of turns of the axles on each vehicle. The mini-buses or "intramural" service is designed to connect the centre with fringe park and ride facilities. In riding one of the typical bus lines, I was impressed by how on schedule and how well the routes served the areas, especially the schools. I was also very impressed with the level of transit service a city the size of Besancon could achieve.

The group was hosted by the Lord Mayor of Besancon, who was a strong supporter of the system and the staff who developed it. He demonstrated the great pride that he and the Council, and the people, have in their system.

In conclusion, I would like to state that the three-city group made for an interesting study. We ran the gamut from a large metropolitan city to the smaller city of Besancon. In all cases the solutions being tried had certain aspects that have potential transferability to the United States. These should be monitored to see how well their goals are accomplished.

MISCELLANEOUS OBSERVATIONS

I have two miscellaneous observations to add. First, since the trip to Zurich, Bern, Besancon, and Paris was made by train on the Swiss and French National Railways, I would like to comment briefly on their rail service. I have never ridden a system that maintained the scheduling these services provided. They left on time and arrived on time to the minute. The trains were clean, fast, and comfortable. Everyone was most anxious to offer assistance. Their roadbeds were well maintained, enabling a fast, smooth ride; and their signal systems seemed to be well-phased. The train terminals were well coordinated with local transit systems. It would seem that unless we do something to upgrade and maintain our roadbeds, the Amtrak system will not achieve the European service levels.

My second observation pertains to the Transpo exhibit held at LeBurget Airport in conjunction with the "Public Transport and People" conference in Paris. I found the exhibits interesting but did not see any innovative break-throughs relating to PRT-type proposals. The one system exhibited there seemed to have operating deficiencies that needed to be solved.

Frances T. Banerjee
Southern California Association of Governments

CITY OF STOCKHOLM

BACKGROUND

Meetings with city officials made it clear that transportation planning in Stockholm is part of an overall development policy clearly described in the city's Master Plan. Transportation projects are one aspect of the expansion and redevelopment of Stockholm and are phased to compliment other measures such as land use controls, housing development policies and so forth. A few facts place transportation planning in perspective (Source: Stockholm the Milieu Urbain, Stockholm Planning Department. February, 1972):

-Under the pressure of WW II conditions, the traditional system of financing and building dwellings almost collapsed. The National Government took over and offered the necessary legal and financial support for "public housing." This enabled the City of Stockholm to plan and build - on city-owned land - an extensive system of suburban units. (In 1964 the City owned 70 percent of the land in the suburban areas inside the present city boundaries.)

-In 1967 another national law was passed. When any provate land is being sold, the city may under certain conditions purchase it before the intended buyers. The land must be needed for future housing or buildings that are ancillary thereto.

-From 1950 on, planning principles were modified to Cluster of Neighborhoods with a total of about 50,000 inhabitants, with one of the units containing possibly 20,000 persons. Increasingly, more and more of both commercial and noncommercial services are gathered in the main centre in each cluster.

The extensive development of new suburbs was possible, then, because the city owned extensive portions of land, and also strongly. The small apartments are no longer in demand and in some cases high vacancies occur in the planned units. The young couple is desirous of single family housing and in response to enormous public pressure about 50 percent of new housing starts in Sweden are single family.

Additionally, the automobile is becoming a problem. As auto ownership increases, more people are using this vehicle for daily work commute. It is predictable that as more single family developments are constructed, auto commutes will increase. Transportation planners in Stockholm recognize that single family home ownership and high transit ridership are seemingly conflicting objectives. The Master Plan is revised every five years and many express hope that attention will be focused on this politically sensitive conflict.

TRAFFIC CONTROL MEASURES

The background information is essential because traffic restraint measures are projects within the overall planning policy. Interestingly traffic controls are not viewed primarily as mechanisms to induce higher transit patronage. Rather, the restraints are intended to support residential redevelopment within the city streets to travel downtown and thereby decreasing the neighborhood amenities in affected areas. Many residential units in such areas have become vacant and in general do not attract households with children. Since population mix is an important principle of neighborhood development, attraction of family groups is necessary. Traffic restraint measures prohibit cross commuting and improve the environmental quality of neighborhoods and improve child safety. Areas where such controls have been implemented are regarded favorably by the public. Residents can drive through the area since they are familiar with the intricate maze of controls, however outsiders are strongly discouraged.

One of the more interesting aspects of this project is political feasibility. Politicians were in favor of implementing auto controls. It should be pointed out, however, that the same politicians endorsed the downtown residential renewal program and the traffic controls were one method of implementation.

Larger shops opposed the traffic restraint measures, others opposed the measures after they discovered that they could not locate in the test area. Residents in the test area favored the plan, however, residents bordering the site were strongly opposed since diverted traffic would travel on surrounding streets.

City officials plan to extend the traffic restraint program. The next test site will be an area with seventy year old housing. The housing will be renovated and a neighborhood redevelopment will be initiated including restriction of through traffic.

STOCKHOLM COUNTY COUNCIL

BACKGROUND

The Stockholm County Council is responsible for planning at the regional level. It is concerned with broad policy planning and implementation of national planning goals.

One of the main problems stated by County planners is a lack of consensus by politicians in identifying major goals to be incorporated in the planning process. Four main concerns being discussed are:

- -maintaining and encouraging population mix; elderly, young, young families, etc.
- -housing mix: single and multiple unit dwelling.
- -degree of public services: should people reach more places in a reasonable time or few places in a short time.
- -alternative physical structures.

Combinations of these issues will have various implications for the individual and will place a range of demands on both energy resources and transportation services.

One item discussed extensively with the Stockholm County planners is the national policy of decentralization. The majority of Swedes live in the southern part of the country, and in three main urban areas; Stockholm, Gothesburg, and Malmo.

Concentrations are particularly significant in the case of Stockholm. Forty-six percent of the country's population live in Stockholm. There are relatively more gainfully employed persons in the Stockholm area than other parts of Sweden, especially for women, and the average income per employed in the Stockholm County is about twnety percent higher than average for the country. Consequently many people, particularly those with college degrees and specialized training leave other parts of the country and move to Stockholm. (Source: Stockholm, The Milieu Urbain, Stockholm Planning Department. February, 1972).

In order to fully implement the population mix goal, provide more people with single family houses, and plan in an ecologically sensitive manner, national planners have advocated a decentralization policy. This policy is implemented by means of measures such as:

- industrial location incentives: tax incentives for firms locating to the central and north part of the country; special transport and telephone rates making communications and transport costs reasonable.
- provision of single family houses in response to public demand.
- decentralization of government jobs particularly national jobs.

Planners expressed concern regarding decentralization policies and transportation implications. People use time to buy amenities and as new settlements are extended, so too people move further out. It is estimated that as much as thirty-five percent of energy consumed for transport purposes could be saved if people in outlying areas rode transit.

The dichotomy between decentralization and other planning policies was brought up continually during discussions and likely will be a major point of controversy for the next few years.

NATIONAL SWEDISH COUNCIL FOR TRANSPORTATION RESEARCH

Discussions were interesting insofar as the energy conservation aspects of transportation planning were rarely mentioned during other site meetings. As mentioned in the city reports, traffic controls matters were related primarily to land use and secondarily to urban design. Factors such as air quality improvement and energy conservation tend to be handled by research institutes.

In 1974, the Institute initiated a program for energy and the transportation sector. This program is designed for a three year period and of a total energy budget of 290 million kroner (approximately $72 million). 34 million kroner (approximately $8.5 million) will be spent on transportation analysis.

Projects referenced in this program fall into three categories:

1. The relation between energy conservation in transportation sectors and other sectors.
2. Energy conservation in the transportation sector.
3. Effect of institutional arrangements on the use of energy resources, for example implementation aspects of gas rationing, truck delivery allocation, public education--particularly of transport employees such as rail and bus drivers, terminal operators and so forth.

Staff listed a range of proposed research topics in each of the above categories. These research topics are preliminary and only a few have been contracted as research grants. It is expected, however, that most work will be underway by September 1975. (Most of the research is contracted to university professors and so September appears a logical start-up time). Research projects proposed in this program are as follows:

1. The Relation Between Energy Conservation in Transportation Sectors and Other Sectors

   Projects:

   - Short and long term effects of reductions of transportation output.

What are likely to be the resulting changes in land use patterns and energy consumption on a national and regional level?

$1 million (U.S.) is allocated to this issue and extensive coordination of the project has been made on a regional basis.

- What are likely to be the overall impacts of energy conservation on total output and what are the likely resulting impacts in port activity--particularly the likelihood of empty ships?

2. ENERGY CONSERVATION IN THE TRANSPORTATION SECTOR

Projects:

- It was recognized that little information was available for an analysis of energy conservation in all transportation activities because data sets were not compatible. $1.2 million (U.S.) was allocated to this project in hope of establishing a common uniform data base for subsequent analyses.

- Capacity utilization in different transportation modes is another area of concern. Some planners have raised the issue of over capacity in selected geographic areas particularly when all modes are considered. This project is designed to do "lateral cuts" through the region of Stockholm and look at modal capacity and choice. $70,000 (U.S.)

3. EFFECT OF INSTITUTIONAL ARRANGEMENTS ON THE USE OF ENERGY RESOURCES

Researchers tended to feel that major energy gains are in the area of automobile and truck operations and institutional/implementation issues must be addressed. This seemed to be the category that was stressed in discussion and although specific dollar amounts have not been allocated to some of these projects, it is likely that monies will be forthcoming in the near future.

Projects:

- Effects of different systems for gasoline rationing.

  Sweden has a history of gas rationing. During World War II extensive rationing was in effect and facing the recent gas crisis rationing was in effect for three weeks. People accepted the rationing policy. Those who would incur undue harship applied to a special agency set up for rationing problems.

  It is doubtful if rationing will be implemented in the future. Gas taxes are rising and it is expected that automobile efficiencies will be improved.

  During implementation of the rationing it became apparent that priority schemes must be designed particularly for rural areas. Issues such as food distribution became very sensitive political issues.

  Researchers intend to synthesize the experience gained during various stages of gas rationing programs and prepare a system as a backup measure in the case of another fuel crisis.

- Changes in automobile fleet

  Currently automobiles are taxed according to the weight of the car and size of the engine. This policy will be analyzed to determine its effectiveness.

- Travel Speeds

  The feasibility and impacts of lowering urban travel speeds will be analyzed to determine energy conservation benefits.

- Technological systems for piggyback transport

  National planners are trying to work with private industry to affect a change in the freight handling process. Piggyback shipments are of major concern.

- Energy reduction in the air flight sector

  Currently air flights are programmed for high traffic conditions. Analysis is proposed to determine if rescheduling and programming would be more energy efficient.

  There also seems to be a policy of airport proliferation as a measure to further decentralize industry. Analysis is proposed to consider the long term implications of this policy.

- Pipeline Planning

  There were plans to construct a pipeline across the Baltic Sea with the Russians. Negotiations broke down because of excessive Russian demands; however, this situation is subject to change and background research will be prepared.

- Energy for Shipping

  Researchers expressed interest in the travel time requirements for various shipping needs and the energy costs in meeting those needs. The relationship between travel time, containerization, and energy requirements will be examined.

- Traffic Control Measures

  A range of control measures including carpooling, vehicle restraint measures, gas tax, flexible working hours, etc. will be assessed to determine further applicability in Sweden.

ADDITIONAL TOPICS

One topic of particular interest is plans to modify the National Census home to work questions to obtain data on time budgets. The average person in Sweden has 4-6 weeks vacation a year and in most instances provision of free time is a greater incentive to workers than a pay increase (because of high taxes). Therefore time budgets may be a more significant variable in both energy and transportation policy than was thought initially.

CITY OF UPPSALA

BACKGROUND INFORMATION

Of all the sites visited, the city of Uppsala had the most coordinated program. Perhaps this is a reflection of the length of time transportation controls have been in effect. Controls were first mentioned in a 1967 planning document but were extensively discussed in a 1969 document which focused on the following objectives:

- to leave as large a part as possible of the vehicular traffic outside the city core
- to restrict private car traffic within the core
- to give priority in planning for facilitating the operation of city buses
- to form an unbroken system of separate routes for pedestrian and cycle traffic within the city core, as well as to residential and recreational areas and places of work
- traffic without a destination in the central area should be diverted; no provisions should be made for the through traffic, except for the pedestrian and cycle traffic.

This new traffic policy adopted in 1973 can be summed up as follows:

> The private motor car has a built-in tendency to counteract itself. For its necessary accessibility it demands so much from the traffic apparatus that this simply cannot be satisfied within the central urban area. The diminished accessibility results in a lower efficiency of the urban functions. As a consequence, e.g. retail trade will be tempted to move out to external sites where the car accessibility is larger.
>
> The bus and the cycle has on the other hand the opposite effect--they increase the accessibility of the inner urban core.

TRAFFIC CONTROL MEASURES

Of particular interest in Uppsala were the planning of traffic control measures in a manner to encourage both transit and bicycle ridership. The transit aspect is not surprising. Uppsala, like other areas has selected portions of the city restricted to bus only. These areas are used as major bus transfer points. The monthly transit fare is reasonable and overall ridership is high. Given the strong development of transit, the emphasis on bicycles is surprising. Close to eighty percent of the population own a bicycle and many people use bikes extensively as a means of travel. It is reasonable to provide areawide bicycle facilities in a city with a large college student population and expect these services to be used. What is somewhat unexpected, however, is the extensive use of these facilities by a range of population groups particularly in the 30-65 year range. Bicycle facilities are located at most transit areas and are attached to all parking lots in the downtown area. Streets that have been connected to bus

only or to single lane traffic also contain a striped lane for bicycles only.

Another interesting feature of the Uppsala plan is the goods delivery process built into the auto free shopping area. Trucks enter parking lots at the periphery of the auto free area and through a designated level of the parking structure can service a few stores. Stores served by this system are located in older buildings and so the process was not incorporated into the overall design scheme. Modifications for goods delivery came after the traffic control techniques were implemented.

Of all the areas visited, Uppsala had the most integrated multi-modal program. Perhaps because of this approach, it was the only place where planners could state positively that the overall volume of traffic had been reduced--not diverted--by the plan. It should be pointed out, however, that even in this successful case, politicians remain wary of the plan. The measures have been in effect for a few years now and the program is publicized widely--yet the measures are implemented by makeshift techniques and temporary barriers. No funds have been allocated to make the plan a permanent traffic operations program.

TRANSIT DEVELOPMENT ISSUES

The future of Uppsala's transportation program will be interesting to follow. Uppsala is one of many communities affected by a strong desire on the part of many residents to own single family housing. Many new single family housing developments--called communes--have been constructed on the fringe areas of Uppsala (about a 20 minute commute to the center city). Most of these families own a car and since transit service is low, these people use their cars in commuting to work.

Many communes have asked that Uppsala transit service be extended to cover their area. These communities have their own transit services--albeit limited--however costs are about 3 to 4 times that of an average trip on the city system.

Communes are lobbying to force extension of the service; however, this issue will not be resolved for a few years. In the meantime it is likely that auto usage will increase. This situation is a clear example of current growth policy implications where provision of single family housing and low cost transit service appear to be in mutual conflict.

CITY OF GOTHENBURG

By the time we met with individuals in Gothenburg, some basic principles of Swedish transportation planning were becoming clear. One could see how three distinctly different areas (Stockholm, Uppsala, Gothenburg) were approaching the transportation problems in a singular context. As in the case of Stockholm and Uppsala, land use planning is a key starting point and urban design becomes the medium through which transportation interfaces with residential planning. Efforts are made to reinforce the human scale and encourage pedestrian activity in redeveloped and preserved downtown areas. Efforts are also made to make inner city living more attractive by not allowing through traffic to degrade urban residential areas.

It is difficult to observe the traffic management scheme in operation. Autos are allowed on most streets and it is not immediately clear that the controls are on crossing various sectors of the city. (That is you can enter one zone easily, but it will be difficult if not impossible to reach any other zone since inter-zonal movements are discouraged.)

The scheme appeared to work well in terms of improving the quality of urban design. From a transportation sense, public transport functioned more effectively. An important factor however is that the amount of travel actually may have increased with implementation of the scheme. Autos were diverted from urban residential areas and so many people had to reroute commuting patterns. The result was greater travel and more time spent in queues since additional volumes were diverted to collector streets. Since both VMT and congestion generate pollutants, one should question seriously the air quality results of such programs.

Another point that came to mind in viewing the Gothenburg program was a reference to over-capacity made by a member of the Swedish Research Institute. "Perhaps many areas have overcapacity." In Gothenburg this may be the case regarding transit. Buses, streetcars, and commuter rail lines seem to continually cross each other. It is possible that transit ridership is high simply because of the great investments made and the extensiveness of service provided. The survey material requested by George Wickstrom may answer this question.

One additional aspect of Swedish transportation systems became clear in Gothenburg. Many major transit and/or rail facilities have enclosed pedestrian areas leading to stores and employment areas. Since these passageways lead to transit services, the individual using them to avoid inclement weather may be induced to use transit. Given the low temperatures in winter, extensive use is made of these tunnels.

OBSERVATIONS BY ISSUE

While talking with transportation planners in Sweden, I became aware of some major issues that should be addressed before any comments on transferability of experience can be made. Following is a brief highlight of selected issues.

OBJECTIVES IN IMPLEMENTING AUTO CONTROLS

It should be pointed out that none of the Swedish traffic restraint programs were implemented to reduce vehicle miles of travel. In fact, the only environmental objective stated was a reduction in noise pollution caused by traffic. This is important because most traffic reduction programs in the U.S. were generated in response to EPA Clean Air requirements and so the reduction issue is central.

Most Swedish programs were designed to improve quality of life; more specifically to improve the quality of shopping and residential areas; and even more specifically to reduce noise pollution and make pedestrian and residential areas safer. In some cases overall traffic may increase, as in the case of Gothenburg. While noise and safety standards are worthwhile objectives, it would be short sighted to expect implementation of the same types of programs to suddenly be effective in reducing VMT. Clearly, something other than the types and extent of controls used in Sweden will be needed.

The overall objective of reducing travel should be assessed carefully. If the automobile can be made significantly less polluting, then the objective of a VMT program may be to improve quality of life through urban design and traffic programs aimed at shopping and residential areas. Certainly there would be numerous long term benefits of such an approach.

For most U.S. cities, determination of overall objectives can be made only with provision of information in the changing polluting and energy efficiency characteristics of automobile design. It is very difficult for a state, regional, or local agency to obtain such information from manufacturers and here the Federal government could be of help. Certainly long term changes in the polluting aspects of the automobile will be the singlemost variable affecting auto control programs in Southern California.

INSTITUTIONAL FRAMEWORK

Perhaps one of the most important insights gained from viewing the Swedish experience was the manner in which institutional arrangements for auto control planning were related to plan implementation. First auto control plans are part of a wider community redevelopment project. Redevelopment projects support many goals and a wide representation of planners and politicians review the entire program. It is at this point that most controversy is generated and at completion of the plan a cohesive policy is established for the affected area. Transportation controls are often designed to complement and implement adopted policies and these plans are also reviewed by the same wide representation of planners and politicians to insure consistency with the overall plan.

To date, this has not been the American experience. Traffic controls were first regulated by EPA in the controversial Transportation Control Plans. Measures were promulgated and local transportation agencies were charged with the responsibility to these demands.

Currently many regional areas have transportation programs designed to improve air quality through transportation controls. The problem with many of these programs is that they are developed at a larger scale along with other metropolitan transportation services. The large scale planning is justified insofar as only a major effort will result in traffic reductions. However, not enough attention is paid to the communities affected. Traffic controls are tied to areawide services and are reviewed by transportation committees and ultimately political committees. There is little opportunity for input from community development planners.

The Swedish experience showed clearly how closely traffic controls are related to community development. This becomes acutely clear when one realizes that the first impacts of any control plan will be to divert traffic, not reduce it! If such plans are adopted and implemented without consideration of community plans, it is likely that they will not succeed.

This issue should be assessed carefully by DOT. Current plans to amend the UMTA Section 5 program by adding parking management regulations may exacerbate this problem. Parking management is needed but a more positive institutional approach

may be to make it a requirement of redevelopment grants rather than an add on to transportation systems planning. Perhaps it should be a requirement of both areas. By relating traffic controls to community plans, a greater assurance of overall consistency and coordinated development planning is achieved.

COORDINATION

Swedish planners place a high value on program coordination. Particularly there is a strong relationship between land use planning and transportation planning with urban design as one major point of interface. I have yet to see this degree of coordination in any U.S. transportation planning process. In the U.S., land use and transportation is regarded as a chicken-and-egg situation. Such ambiguity never seems to arise in the Swedish situations. Land use is the guiding policy and transportation a method implementation. Even in new growth areas, land use and a rate of permissable growth is determined and transportation services are provided to support that land use and growth rate.

It appears easier to plan traffic controls in a situation where land use policies are clearly indicated. Rather than asking for parking management plans, perhaps DOT should be requiring specific land use plans indicating areas of growth. In this way, DOT would be requiring updated information that will be necessary to adequately prepare auto controls. Regulations for auto controls could be phased with the process after Congress considers the implications of the Clean Air Act in 1977. In this manner, if Congress wished to move ahead with stringent auto controls, at least the basic information would be available.

SCALE OF PROJECT

Scale of project implemented in Sweden should be mentioned. All the projects were very small in size - no more than four city blocks square as auto free. Provision of transit-only areas were confined to bus terminal and transfer point locations. Disincentive programs for residential areas were no more than ten city blocks square. Projects all seemed to be very small in scale and located very selectively. These projects served as constant small reminders of the inconvenience facing use of the automobile. It is not clear whether many small projects will result in less reliance on the automobile. Certainly the small projects are more likely to be accepted by the public than large area-wide controls. And smaller projects are easier to plan in conjunction with local communities. If political support and public acceptance prove to be as difficult to obtain as expected, U.S. transportation planners may consider developing a program of small incremental projects as was done in Sweden.

GOODS DELIVERY

With the exception of Uppsala, Swedish planners did not give much attention to the goods delivery process. In Stockholm, delivery trucks were permitted entrance into restricted areas, and service trucks were given passes. Yet this system seemed inadequate for the needs of the stores as well as the carrier. Uppsala had an innovative program of connecting sections of underground parking areas into goods delivery areas for a few buildings in the vicinity of the parking facility. Parking management requirements of downtown land use and transportation plans should address the feasibility of using/modifying underground parking facilities for goods delivery process. Goods delivery process tends to be downplayed in most cities yet it one transportation section that is likely to suffer from traffic controls.

IMPLEMENTATIONS

It is interesting that even in the case of Sweden where auto controls were well planned and implemented with success, politicians remain wary about making such programs permanent. All are referred to as experimental schemes and none have permanent construction or fixtures. Given this experience, U.S. planners should clearly label the programs as experimental and offer a range of contingency plans in case the adopted measures fail.

Additionally it should be pointed out that planning controls are more centralized in Sweden. The cooperative planning process is not as elaborate as the U.S. 3-C planning process. Implementation time is apt to take less time in Sweden and no direct comparison can be made between Sweden and the U.S. It appears that programs require approximately three year period between initial planning and project implementations.

Larry Dallam, Director of Transportation Planning
Twin Cities Metropolitan Council

U.S. Delegation to OECD Conference in Paris, France and tour of Munich, Bern and Besancon, April 14 to April 26, 1975.

I. TRANSFERABILITY TO THE UNITED STATES OF WHAT I OBSERVED IN EUROPE

There were three basic themes promulgated at the OECD Conference and incorporated in the transport plans of Munich, Bern and Besancon: (1) enhancement of the urban space in the town center to provide a total pleasurable experience for human interaction, (2) traffic limitation or restraint on private car usage, and (3) improved public transport and traffic management. The ideas and actions that I believe are appropriate for U.S. implementation or detailed study are:

(1) Enhancement of Town Center

- Provision of pedestrian-only streets with urban design improvements such as trees, small gardens, small parks and squares, sculpture, sign control, integrated architecture.
- Provision of planned activities in pedestrian zones of wide variety including shops, sidewalk cafes and bistrots, and cultural, entertainment and leisure opportunities.
- Provision of low, medium high income housing around and/or within town center and the provision of the necessary services for daily living.

(2) Traffic Limitation

- Introduction of "traffic cells" in downtowns and suburban areas.
- Move parking lots from the CBD core to the fringe.
- Increased short and long term parking fees.

NOTE: I don't think the U.S. is "ready" for banning auto traffic in downtown restricted areas.

(3) Public Transport and Traffic Management

- Reserved bus lanes
- Bus traffic signal actualization
- Replace buses by the use of taxis on scheduled bus routes in off-peak hours (evenings and weekends) to reduce operating costs.
- Eliminate bus drivers handling tickets, etc., by introducing self-service ticket machines and honor system with random checking (in order to decrease bus travel time -- up to 16% reduction achieved in Bern).
- Reducing lane width to 9.5 or 10 feet and thereby converting a 3-lane arterial into a 4-lane arterial (this was done in Zurich).

II. IMPLICATIONS FOR ENERGY CONSERVATION

- The implementation of the preceding ideas would lead in general to a significant diversion of auto drivers to public transport and therefore in medium to high density metropolitan areas there would be a significant reduction in use of petroleum energy. However, in low density metropolitan areas like Minneapolis-St. Paul where less than 10% of daily person trips are oriented to the downtowns there would not be significant energy conservation even with modal splits of 40% or higher. It appears that paratransit solutions coupled with land use strategies will be more effective in low density metropolitan areas.

III. EUROPEAN CONTACTS

The following persons I expect to either correspond with or interact with in the future:

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INTRODUCTION

A recent confernce entitled "Better Towns With Less Traffic" concluded that:

- concentrated use of motor vehicles, particularly in central and residential areas of towns, has often led to a deterioration in the quality of life, and created severe difficulties for other forms of urban travel such as walking, cycling and public transport.
- these problems have led to a change in emphasis in traffic and transport policies in many cities and countries. Rather than concentrating on the accommodation of private cars, the aims are: to restore the city to a human scale and preserve it as the center of economic, social and cultural life.

- to this end actions are being taken to:

    - ensure or improve accessibility
    - reduce air pollution, noise, accidents and other adverse effects of motor traffic
    - conserve energy resources

- to meet these aims, better traffic management is frequently employed. Such policies increasingly include measures of motor traffic limitation where cities have found that the foregoing aims cannot be achieved unless the volume of private cars circulating on streets is reduced, and public transport, as well as facilities for pedestrians and cyclists are improved.

At the conclusion of the conference, several countries were visited under sponsorship of the Transportation Research Board. This report is the results of one such visit to Stockholm, Upsalla and Gothenburg, Sweden.

VISIT TO STOCKHOLM

Stockholm is the capital city of Sweden and its largest city with a metropolitan area population of 1.5 million, with just under 700,000 in the city itself. Only a moderate (by U.S. standards) population increase is forecast, entirely in the suburbs, due at least in part to a national government policy to encourage growth in smaller cities and to the northern part of Sweden.

Within Stockholm, there are active plans to reduce vehicular traffic and improve conditions in the center city. Traffic planning goals are to reduce the number of people coming from the suburbs to the city to 25%, and to reduce this to 10% for those who work in the CBD. (Present modal split is 2 of 3 by transit to the city and over 8 of 10 to the CBD). The city has tried to achieve this by raising the price of parking as well as by reducing the supply of parking facilities.

The city has an extensive bus, commuter rail and subway (rapid transit) system. A monthly pass is available which permits unlimited travel, even to suburban areas for 50 Kr. per month or $12.50. Elderly and handicapped can ride for one-half this rate. The subway system totals 39 miles with 63 stations, not including a new line to open this year.

The monthly pass is used by 3 of 4 commuters to the central area. This is not done without cost, however, and the yearly deficit is now at 500 million krona per year for the system as a whole (125 million dollars per year). Planning policy is to expand transit service to attract circumferential travel as well as radial. The Stockholm Council recently turned down proposals for a ringroad (Beltway).

TRAFFIC MANAGEMENT IN STOCKHOLM

In 1972, the City Council approved guidelines for traffic reorganizations in town districts built before 1950. One experiment was carried out in Ostermalm with great success. This is a fairly large residential section of the city.

This sector has the grid iron pattern so typical of the inner city, most of the

streets having been laid out during the second half of the nineteenth century. The sector comprises about 70 precincts with some 19,000 residents and a working population of about 23,000. Most of the work places are located in the south-western corner of the sector, which adjoins the main working and retail district of the city.

Before the reorganization was effected, most of the streets in the experimental sector had a traffic load in the region of 3,000 - 6,000 vehicles daily, though some streets had a far heavier load, up to 10,000 - 20,000 vehicles daily, a great deal of this traffic being through traffic. The immediately surrounding streets were used by some 20,000 - 40,000 vehicles daily.

Traffic reorganization is based on much the same principles as are applied to the planning of new urban development:

- no through traffic
- a differentiated motor traffic network
- the separation of pedestrian and cycle traffic from motor traffic
- better flow for public transport

To prevent through traffic, the sector has been divided into two zones. Traffic between the zones is not allowed to cross zone boundaries but is channelled via peripheral streets. Buses and taxis on the other hand are allowed to cross zonal boundaries.

In this way the motor traffic network is differentiated in such a way that the peripheral streets take the circumventing traffic and traffic between the zones.

The peripheral streets are connected to the internal street systems of the zones via a limited number of points known as gates. From these points traffic is distributed between the zones via two-directional feeder and distribution streets. Other streets for motor traffic take the form of so-called entre streets, most of which are one-way streets.

To reduce the number of points of conflict, the entre streets opening into peripheral streets have been cut off from the latter as far as motor traffic is concerned and thus made into cul de sacs.

Along the most intensive stretches, pedestrian traffic has been separated from motor traffic for certain periods by prohibiting motor traffic after 11 a.m.

The flow of bus traffic has been improved by means of reserved lanes along the peripheral streets and along one street passing through the sector.

The effects of the traffic reorganization have been studied from a number of viewpoints, including

- changes in vehicular traffic
- noise and air pollution
- road accidents

Traffic flow and traffic VMT within the sector have been reduced by about 40% (from 120,000 vehicles daily to 70,000). The reduction within the sector has been attained by a corresponding reallocation of vehicles to the peripheral streets. There has not been any total decline in the traffic in the sector. Total traffic VMT, including the peripheral streets, has risen by 4%.

Traffic noise has declined somewhat in most of the streets in the sector. This decline is generally in the region of 5 dB(A). Isolated streets have sustained a reduction of approximately 10 dB(A). In spite of the greater traffic load, the peripheral streets have not undergone any significant deterioration in terms of noise, but traffic noise was severe in these streets even before.

Air pollution follows the changes of vehicular traffic, but the increases occurring in the peripheral streets has been less than expected in view of the increase in traffic, due probably to the traffic flowing more evenly following the closure of most of the exits from adjoining streets.

Road accidents have undergone the most positive change. There was a decline of 30% within the experimental sector and 25% in the peripheral streets. The decline occurring in the peripheral streets despite the heavier traffic probably attributable to the steadier flow of traffic.

The effects of the traffic reorganization experiment have been so favorably assessed that the arrangement has now been made permanent. A number of minor adjustments have been made following discussions with the traffic consultative meetings mentioned above.

The first stage of the traffic reorganization experiment has cost approximately 2 million Kr, ($500,000) the principal measures involved being the erection of new signs, street markings and temporary closures of streets. The cost of the rebuilding of pedestrian streets, the paving of sealed off street openings, the provision of street lighting and other measures required to put the traffic reorganization on a permanent basis have been estimated at 9 million Kr. (2.25 million dollars).

Principles for traffic reorganization formed in the Ostermalm reorganization were:

- that traffic zones must not be too large
- that traffic zones should have two "gates" at least
- that through traffic must be stopped completely
- that road users must be guided by clear signs but that streets must be designed differently for different traffic purposes - for example as feeder streets or residential streets
- that traffic cannot be regulated only by signs and control but to a great extent recourse must be made to physical obstacles
- that such obstacles of a temporary nature--concrete blocks and the like--must be replaced by planted bushes as soon as possible.

Traffic reorganization is now being extended to the "Old Town" portion of the city and will eventually encompass all of the older areas of the city. The temporary reorganization of traffic in all the older sectors of the Municipality is expected to cost 15-20 million Kr. (4-5 million dollars) at the 1972 level of prices. This will take place over a five-year period.

In implementing the traffic reorganization plan throughout the area, an extensive program of citizen involvement has been followed.

For purposes of planning and information, the Municipality area has been divided into nine sub-sectors. During the first stage of Planning, a discussion paper was drawn up concerning a general plan of traffic reorganization. This paper divides the reorganization areas into traffic zones with no through traffic and indicates the main traffic routes. This discussion paper has provided the basis of wide-ranging consultations together with the general public and local organizations in the various sub-sectors. Consultation does not replace the normal policy making procedure but is designed to furnish a broader basis for the decisions of municipal authorities.

Some 500 local associations and organizations have been invited to send representatives to consultations, which have also been open to private persons not belonging to any such association or organizations. Between 500 and 600 participants have been directly involved in these consultations. To them must be added those who have attended the internal meetings held by the various associations to discuss issues concerning traffic reorganization. On average between 10 and 12 consultative meetings have been held in each sub-sector. The results of these consultations have been documented for each sub-sector in summaries approved by those present. The participants have also been given the opportunity of appending separate statements.

The material resulting from these consultations provides the basis on which a general traffic reorganization plan will be drafted. This plan will then be circulated in the normal manner to municipal and national authorities and to central organizations for comment. After this, and after further adjustments have been made, the draft plan can then be put before the Municipal Council.

The plan thus adopted will provide the basis of a second stage of planning involving the more detailed design of the traffic system within the traffic zones.

During the 5-year period mentioned above, the entire zone system will be established on a preliminary basis by means of temporary measures. A second implementation stage will then follow, involving more permanent measures of traffic regulation through the reconstruction of streets, junctions, etc.

Unlike Gothenburg, the Stockholm CBD does not have a ring road. This has not made it possible to exclude almost all through traffic and to have the central streets or squares reserved for pedestrians only, although a few shopping streets have been so reserved.

VISITS TO UPSALLA AND GOTHENBURG

Upsalla, a university town north of Stockholm, was one of the cities reported on at the OECD Confernece in Paris. A full report (which was presented at the conference) is available from OECD.

Of interest, however was the fact that the traffic reorganization in the downtown area did not meet with complete initial approval.

Businessmen, in particular, were opposed to the plan and only reversed their attitudes after the initial six months experiment was extended an additional six months. Here, too, plans are going forward to make the reorganization permanent, and extend the plan to other areas of the city.

Gothenburg is a seaport city of 450,000, Sweden's second largest. The Gothenburg "zone plan" for the CBD has also been extensively reported on in the literature. Significant items are:

- That the scheme was "sold" to the public as an environmental improvement scheme, not a traffic restraint plan
- An existing arterial street was converted to the ring road needed for through traffic
- Traffic flow stabilized after the second month
- Traffic volume was reduced along the main shopping street by 70% and on other main streets by 50%. The ring road traffic increased by 25%. Overall, there was no significant change in vehicle-miles of travel. There was a 6% weekday increase in transit use
- An hourly parking fee increase of 100% (from 20¢ to 40¢/hr.) greatly increased turnover
- Accidents increased, especially on the ring road
- Carbon monoxide concentrations dropped from 60ppm (30 minute mean value) to 5ppm on the main shopping street
- Noise has dropped only 4 dBA from 75 to 1
- Taxi drivers were and still are opposed to the change. They are treated the same as autos (they cannot use lanes reserved exclusively for public transportation)
- The restraint scheme has been received favorably, even by motorists
- Two of three inhabitants were definitely in favor of the scheme with one in ten opposed. Eighty five percent reported no difficulty in finding their way to the central business area

The ultimate aim is to extend the scheme, and to divide the entire central area of Gothenburg into zones. This area is six times as large as the one now in operation. The entire area would be encompassed by a motorway ring system, and the local roads by ring streets. Gothenburg, like Stockholm, has a monthly transit pass for 60 Kr. or $15 per month.

ENERGY RESEARCH IN SWEDEN

While in Stockholm, the author also visited the National Swedish Council for Transportation Research. The Swedish research program includes:

- Relation between Energy Consumption and Other Sectors
- Short and Long Term Effects of Energy Reduction
- Relation between Energy Consumption and Land Use Patterns
- Effect of Rationing
- Pricing
- Communications Substitutes
- Staggered Hours
- Energy Consumption in the Transport Sector
- Effect of Institutional Agreements on the Use of Energy

Studies made in Stockholm indicate that transportation accounts for 13% of all energy use. Travel from suburban areas use more energy than Central areas. The range is from 20 kw-hrs to 7. Thirty five percent can be saved by shortening trips from the outer district areas.

Forty percent of all trips are now on transit. If this were changed to 50% this would save 10% of energy consumed in transportation.

The trend is toward single family houses which are high energy consumers. Only 25% of all new homes were single family four years ago--this is now up to 50%.

THE POTENTIAL FOR TRANSFERABILITY OF SWEDISH EXPERIENCE TO THE U.S.A.

The potential of transferring information about planning practice and operational programs from Sweden to the U.S.A. seems great. The Swedes have a well-advanced land use and transportation planning program and have been able to implement their plans over the last decade and a half. Since many of these programs are now being considered or being implemented in the U.S.A., it would seem that the Swedish experience could prove very valuable. Besides traffic management, which is the practice in many Swedish cities of varying size (Stockholm, Gothenburg, Upsalla and others) Sweden has a well developed rapid rail (and commuter rail) system in Stockholm, while Gothenburg has light rail systems both for commuter and intra-city traffic.

Stockholm has high density residential and commercial development at its railway stations, much along the lines of Washington's wedges and corridors concept. Of great interest is the use of monthly pass for transit in both Stockholm and Gothenburg. This pass, enabling unlimited travel costs $12.50/month in Stockholm and $15.00/month in Gothenburg. The effect of such a pass on car ownerships and auto travel could be determined from the data available. (Data bases are excellent).

Also of interest is the Stockholm Council's recent decision not to build a circumferential highway around the city. The Washington, D.C. area faces a crucial land use-transportation policy decision in deciding whether or not to complete the outer Beltway. Stockholm planners are talking about introducing improved public transportation as a substitute. While I personally doubt that circumferential transit can be successful in attracting significant patronage, it is worth watching.

Citizen participation is at a very high level in all planning. Stockholm's transportation planning policies are very goal-oriented. A policy objective of 9 out of 10 work trips on transit to the CBD has just about been achieved. Washington, D.C. forecast calls for 6 of 10.

Despite the high cost of owning and operating a car, car occupancy is low. This suggests that good transit and high car occupancy are mutually exclusive alternatives.

Also of interest is the high ownership of second homes some distance from the urban areas. (Over half of all dwelling units in the Stockholm Metropolitan Area are apartments).

A Major governmental decision which should be monitored is the Swedish national government's decision to channel future growth away from the larger cities. The national government will move its employees out of the Stockholm area over the next 6 years. In addition, so as to encourage development in smaller communities, especially in the Northern undeveloped part of Sweden, tax and travel incentives are being given to industry. Even phone rates will favor these areas. This policy, which amounts to a National Growth Policy, can have major implications for travel and energy consumption. Will reduced travel result as people can move closer to their jobs in smaller communities? Or, will increased separation between smaller centers actually result in increased travel? This policy will enable many families to have a single family home which would not be possible because of higher land costs in the larger urban areas. This resettlement policy will also enable many smaller apartment units in the city (Stockholm) to be converted to larger units. It is hoped that these amenities will attract families back to the city.

In summary, there are many items of interest to policy makers in the U.S.A. from Swedish practice and experience. At the local level, with direct application to Washington, Atlanta, Baltimore, and other large urban areas with rapid rail transit is the Stockholm experience with monthly fare systems. Land use practices are also of great interest. I would suggest a project which would develop aggregate modal choice models using density, fare, auto use cost, car ownership, and family size and income as independent variables. Because of the greater range of the variable in Swedish cities (beyond U.S. experience) it could indicate what we could expect by pursuing such policies. The effect of higher gas prices on car ownership and VMT is an important current item on which Swedish experience might be transferable.

Of course, continuing monitoring of the traffic management proposals is essential as the major cities expand their downtown systems to cover the entire older city area.

At the national level, the energy research program is of interest, as is the national resettlement policy. The effects of this policy could be substantial on both new and old areas.

The social, environmental, economic and energy impacts of such a decision could evaluate the potential for a similar program in the United States.

SUMMARY AND CONCLUSIONS

Traffic restraints work well in Sweden. Traffic restraint is not closing streets - the area involved needs to be totally re-planned. Perhaps that's why they work. Restraints are part of a larger process of city planning, citizen involvement and traffic management whose basic goal is to gradually alter the traffic flow in older built-up areas (both commercial and residential) so as to achieve, over time, the same standards of safety and environmental quality as is achieved when planning new developments.

The processes involved include:

- outlining the broad total plan
- do an area plan
- obtain public involvement
- gain political acceptance
- implement
- monitor

Principles involved are to:

- alter structure
- improve transit
- separate traffic
- differentiate between traffic networks
- provide uniformity, simplicity and clarity of detail

Key questions in application are:

1. Can thru traffic be excluded? (or completely separated?)
2. Can activities be reduced?
3. Can better public transport be provided?
4. Can on-street parking be eliminated?
5. Can car-free zones and foot and cycle paths be introduced?
6. What points of conflict remain?

In this connection, it may be difficult or impossible to eliminate through traffic in central areas without a heavy-duty ring road around the area.

Swedish cities also have a high level of transit use, despite relatively high auto ownership (7% of families in the Stockholm area own two or more cars) largely due to a low monthly charge for an unlimited use pass, and extensive service, and high densities of development, especially at transit use, even at considerable levels of public subsidy. National land-use policy is to maintain a high quality of life in the larger cities by limiting their future development outside cities in sparsely settled rural towns.

Quite obviously, planning and research in Sweden is of the highest quality. Implementation of these policies is proceeding and the United States could learn much by monitoring the results of such efforts.

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