
Special Events

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■ Introduction

Special events can be defined as occurrences affecting a large number of vehicular trips which occur on a one-time, infrequent or non-daily basis. Such events can include recurring ones (such as weekly football games) and a wide variety of non-recurring events, whether of a civic, athletic, or organizational nature. The following is an illustrative list of activities which can be characterized as being a special event:

- Parades;
- Festivals and fairs;
- Fireworks;
- Conventions and expositions;
- Holiday travel;
- Vacation, recreational, and tourist;
- Regularly scheduled athletic events;
- Specially scheduled athletic events;
- Concerts, theater;
- Olympics, world fairs; and
- Roadway re-construction and maintenance.

Special events, thus, can refer to the occasional, very large activity such as a summer or winter Olympics, or to almost regularly scheduled weekly activities as street fairs and baseball games. A special event also can be "point" oriented, such as a single stadium; spread over a large geographic region, such as Friday evening recreational traffic heading to a major vacation/recreational area; or corridor-based, such as could be the case with the re-construction of a major urban highway.

Special events affect large volumes of traffic that may be somewhat unpredictable in nature. Generally, in addition to the congestion which occurs on certain roadway segments at or near the activity, there are other transportation/air quality issues which must be dealt with at the same time. These include:

- Provision of adequate parking;
- Mitigation of adverse impacts on adjacent neighborhoods and areas; and
- Minimizing transportation conflicts with the more routine daily peak hour congestion which is a part of almost all metropolitan areas.

The congestion and air quality consequences of special events merit consideration because of the frequency with which these "special" events occur. Events of the kind which are the subject of this chapter are neither unique nor unusual in metropolitan areas today. In fact, because they are so frequent, transportation planners have developed a set of policies, programs and techniques to manage congestion associated with them. This chapter contains guidelines for managing the transportation aspects of special events, with references to places where these techniques have been implemented successfully.

In fact, the issues which must be addressed in the context of planning for these events are remarkably similar to a set of issues which occur in connection with transportation planning for more routine forms of congestion. The extreme case includes special events such as quadrennial Olympics or World Fairs which are once in a life time events for a metropolitan area. However, the same issues exist and the same solutions apply for special events which are much smaller in scale, even a neighborhood street fair.

■ Definition of Actions

Although the impacts of many special events can be predicted, and may be anticipated (at least in part) by travelers to the event itself, the impacts may be unexpected by travelers who are not associated with the event. Experience with special events demonstrates a remarkable commonality in approach to planning for very large or very small special events. The scale of effort may be dramatically different, but the basic activities required are very similar. As listed in Table 1, these activities also are essentially identical to those which would be undertaken in developing a good transportation management program for daily recurring traffic. As such, many of the measures discussed in other of these TCM Information Documents are directly applicable to Special Events, especially parking management, public transit, remote parking with shuttle services, traffic flow improvements, alternate work schedules, and area-wide ridesharing services.

While the specific actions undertaken for special events should be multi-modal and involve highway, transit, ridesharing, parking, and pedestrian initiatives, public education and information strategies are especially critical for special events. People develop basic travel patterns in response to routine events. Special events, by definition, are non-routine. Accordingly, special communication activities need to be undertaken

Table 1. Key Elements of Special Events Transportation Planning

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- Estimates of demand (hourly/daily).
 - Parking management, remote parking.
 - Increased transit and shuttle services.
 - Transportation systems management plan.
 - Key capacity improvements.
 - Integrating coordination.
 - Special marketing and media for communication of information.
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to reach both the traveler directly involved in the special event, and the traveler who is using the transportation system for other purposes and thus is indirectly involved in the special event. Basic functions such as locating a major destination and its associated parking facilities become very important for the new, non-regular visitor.

The use of remote parking in combination with transit shuttle and other transportation demand management strategies is especially important for special events. For example, the Hollywood Bowl is a large special events stadium located along a very busy freeway in Los Angeles. The 'Bowl' provides shuttle service to all of its events with the price of the shuttle included as part of the admission price. Many people use this service because only limited parking is available at the Bowl. More important, though, parking at the Bowl requires a great deal of time. Cars are "stacked" in the parking lot so it often takes an hour or more to retrieve one's car. Even though it may be necessary to drive several miles to a shopping center or other shuttle pick-up location, many people use this service, especially for week-night events.

■ Case Study Examples

Five examples of special event planning are presented in order to convey the taxonomy of measures used to mitigate the impacts of special events. The first three are examples of relatively unusual special events: The Knoxville and Vancouver World's Fairs and the Los Angeles Summer Olympics. Given the magnitude of these events, both the spectrum of transportation strategies employed and their resulting impacts are well documented based on a before/after examination of traffic conditions.

The fourth example, Boston's Back Bay, represents a densely developed mixed use urban neighborhood that is the home of Boston's convention center and also the site of almost weekly smaller scale special events of one kind or another. Weekend congestion conditions typically are worse than weekday conditions. The Back Bay exemplifies the effect of the "typical" type of special event on traffic flow in a large city.

The final example is the reconstruction of Boston's Southeast Expressway, a two year effort on the region's most heavily traveled radial highway entering the city. Increasingly, the construction of major new highway and public transit facilities are being treated as long-term special events deserving of special planning, management and initiatives. The set of actions taken for managing the traffic impacts of the Southeast Expressway's reconstruction are remarkably similar to those utilized for the World Fairs and the Olympics. Just as the traffic impacts of the Los Angeles Summer Olympics were not nearly as serious as many had feared, the exact same situation occurred with the Southeast Expressway. The traffic impacts were lower than had been anticipated because of a well managed special events program of transportation, communication, and management actions.

Knoxville, Tennessee World's Fair

Between May 1 and October 31, 1982, Knoxville, Tennessee hosted a World's Fair which attracted 11,000,000 visitors. With an average day's turnstile count of approximately 60,000 visitors, the fair represented a major challenge to transportation planners. Its 184 day duration implied significant potential problems for local and regional transportation and air quality. The five-year planning horizon for the event afforded the opportunity however, to mitigate a number of adverse potential impacts.

The planning process for the fair consisted of three phases. The first was a period of organizational and preliminary planning, including local political approvals. This concluded in 1976. The second phase involved a series of federal and international sanctions, local state and federal approvals and funding commitments. This phase concluded in the Fall of 1979. The third and final planning stage included the implementation, construction and preparations for operations and the actual operation of the Fair, through October 1982.

Initial transportation planning consisted of the preparation of the following estimates:

- Design day attendance;
- Mode split;
- Necessary improvements;
- Day capacity needs;
- Parking needs; and
- Aspects requiring further study.

These elements are appropriate for planning any special event and constitute a basic checklist of topics which must be addressed. Refinements to the plan were completed in May 1980, two years prior to opening.

Final transportation plans were based upon a 90th percentile design-day, accommodating 80,000 visitors. The design-day estimate was drawn from daily attendance at prior fairs in Seattle and Spokane. The plan anticipated that 30% of visitors would arrive by bus, 65% by private automobile and the rest by other modes including taxi and walking. This estimate was based upon projected trip origin locations, visitor types and available travel modes, and involved professional judgment in the determination of final mode splits.

Auto occupancy was assumed to be 3.5 persons per vehicle, a range which is quoted as being typical for major events of this type. Bus arrivals included charter and tour passengers, local shuttle buses and the existing public transit system.

Key elements of the Knoxville Fair transportation management plan included the following:

Parking Management/Remote Parking

Planners determined overall parking demand to be 14,900 spaces; however, with only 82.5% of total daily attendance on site at any given time, maximum parking was determined to be 12,300 spaces.

Although there was some vacant land just north of the Fair site, planners concluded that new parking facilities would have to be developed at some distance from the Fair, since existing land use precluded having all the parking demand accommodated within convenient walking distances to the four visitor entrances. Thus, a special feature of this plan, characteristic of numerous special events, is a parking plan which is based upon the provision of shuttle service to and from "remote" parking sites. The provision of new parking facilities at even the largest special events generally is constrained both by the site and by project finances. Thus, planning for all such events requires a special emphasis on a package of parking management and demand management measures.

City officials adopted a new ordinance concerning the erection of temporary parking lots according to standards sufficient to insure public safety and user interests. The ordinance prohibited establishing lots in residential areas and required the issuance of a special City permit for all temporary lots. Private sector land owners responded to the ordinance by providing an ample supply of parking at official, agreed upon prices. During the Fair, a variety of price reductions occurred as demand continued to fall short of supply. The abundance of parking resulted in substantial benefits to Fair visitors who were able to park at prices far lower than at official rates; however, losses to the Fair from parking revenues were substantial.

Signage

Fair planners developed standard signs bearing the World's Fair logo and erected them in sufficient locations to direct motorists to the Fair itself. The goal of signage was to direct motorists to parking lots before they reached the immediate surroundings of the Fair.

Fair planners reported that signs were effective in directing motorists to appropriate approach routes and parking areas. There were few reports of lost motorists. Unfortunately, the signs became souvenirs and were stolen at the rate of two to three per week, a rate of loss which apparently could not be sustained easily with replacements.

Information concerning the availability of parking was distributed in coordination with information broadcast on the World's Fair information radio station.

Highway Improvements

A key component of project planning was the reconstruction of the major interstate I-40 through downtown Knoxville and its major interchange with I-275. In the years prior to

the Fair, a series of interstate project improvements were completed including I-640, an circumferential highway around the downtown, as well as improvements to I-40 and I-275, including one temporary interchange. In addition, improvements were made to key arterials.

Project construction in Knoxville was more substantial than typically occurs for special events. The longer the duration of the special event and the larger the magnitude of the projected impacts, the more likely and prudent it is to make major investments in transportation infrastructure. Improvements of the magnitude made in Knoxville are unique to such special events as World Fairs, expositions or Olympic events. The improvements represented a lasting investment in enhanced mobility for the city and region. Such improvements, though, can not be justified for smaller scale but nonetheless still significant special events.

Radio

The Fair assumed responsibility for the operation of an AM radio station formerly used by the State's Department of Transportation to inform motorists about delays due to interstate highway construction. Since traffic congestion did not materialize at the Fair, there was no need to broadcast advice on alternative routes; nor was there a need to make extensive use of the radio station to advise about parking availability. In all, the radio station, while a crucial part of planning for some events, was not particularly instrumental in assisting transportation operations in Knoxville.

Public Transportation

Bus terminals were established for loading and unloading immediately adjacent to three Fair gates. Each terminal served a distinct type of service (charter and tour buses, hotel/motel and local shuttles, and shuttles from official parking lots). A pedestrian bridge linked one of the terminals directly to the gate area.

Charter and tour buses captured between 14% and 23% of patronage at the Fair, with their mode split declining steadily over a six month period from the high- to the low-end of the range.

Ridership on numerous private shuttle services stabilized in the range of 2-3,000 riders per day on a week day, corresponding to approximately 5% of patrons. Demand on weekends was far lower, due to the availability of substantial parking opportunities in the downtown in the absence of commuters.

Public transportation to the site amounted to approximately 3,000 persons, or 5% of the daily visitation. In addition, commuter ridership on public transportation to the downtown increased approximately 20% due to increases in daily parking rates during the week, resulting from the substantially larger than usual demand for parking during the Fair's operation.

Plan Coordination

Representatives of the City Police, City Traffic Engineer, State Department of Transportation, and others met at regular intervals during the planning for the event. Such coordination is critical to successful implementation of a complex transportation management plan.

Summary

Transportation measures taken for the Knoxville World's Fair contained a number of elements which can be considered standards for all special events. These include:

- Parking management plans;
- Increased transit (bus) service;
- Strategic capacity enhancements;
- Careful coordination among participating transportation agencies; and
- Special media for public information and communication (signs and radio).

The Fair can be considered typical of many special events in that Knoxville has a modest, bus-only transit fleet and a high proportion of single occupant vehicle usage for most trip purposes. Under these conditions, parking management, demand management and special transit service play a critical role in ensuring a minimum of delays and adequate flexibility in mode choice.

Vancouver, British Columbia Expo 86

As part of the Centennial celebrations for the City of Vancouver, the City and the Province of British Columbia hosted the 1986 World Exposition (Expo 86) from May to October of that year. Final attendance for the event exceeded 22,000,000 visits, establishing it as one of the larger events of its kind and an excellent source of information for planners of special events.

Vancouver is a community which has a well-developed public transportation infrastructure, in addition to its highway infrastructure. While Vancouver is outside of the United States, key planners for Expo 86 acknowledge their use of prior U.S. special events as the basis for the plans which were developed. Expo 86, thus, falls within the set of special events which are of relevance to the U.S.

Event Planning

Planning for the Exposition took place over a three year period and included the same essential elements as were undertaken for the Knoxville World's Fair (Table 1). An ad hoc coordinating committee was established, which met regularly between 1984 and 1986. Representatives on the committee included individuals from Expo 86, the City, the

Port of Vancouver, the Transit System, the Provincial Ministry of Transportation and others. The group was charged with the responsibility for physical improvement planning, operational plans for highways, parking and transit services, and coordination with other agencies, service providers and interest groups.

Plan Elements

Major Capital Improvements. The single largest improvement, analogous to the reconstruction of key elements of the interstate highway system in Knoxville, was the completion of a 22-kilometer regional transit facility linking the central business district of the City with other destinations in the City and region and with a special, independently operated 2 kilometer shuttle service between the two sites used by Expo 86. In addition, there were a series of bridge, arterial and access road improvements, the installation of a centrally controlled traffic control system, the construction of five park-and-ride lots for light rail or express bus services, selected expansions to the airport facilities, border crossings, bus terminals, and temporary parking lots.

As was the case in Knoxville, essentially all of the facilities were part of existing capital improvement plans for the region. The timing of completion of these elements was modified to accommodate Fair operations. However, with the exception of the construction of temporary parking lots and bus facilities, no significant capital improvements were undertaken solely on the basis of the special event itself.

Transportation Systems Management Plan. The comprehensive TSM plan prepared by the City included:

- The design and installation of special signage for automobile, bus and pedestrian traffic;
- Selected traffic control signal installation and turning prohibitions;
- Revised parking prohibitions;
- Police controls at selected intersections;
- Special pick-up and drop off locations for a special shuttle bus; and
- Special parking prohibitions in adjacent residential neighborhoods.

The signage employed for Expo 86 included a sophisticated combination of signs varying as a function of location. One type of sign was used to bring cars to within several kilometers of the site. At that point, a second type of sign provided information on the location of parking lots, buses and bus terminals. A third type of sign was oriented towards pedestrians, providing information concerning directions to gates and other locations.

The dedicated radio transmission system used for Expo 86 furnished information on the location and capacity constraints of area parking lots, sources of traffic congestion

resulting from vehicular incidents, schedules for various forms of public transportation and other useful information. The service combined broadcast-quality synthetic speech, with current traffic and parking information, together with live and taped event information generated by studio broadcasters. Official parking lots were equipped with touch-tone phones to call the radio station computer and contribute information on the current status of the lots.

This sophisticated broadcast information system was credited by event planners for substantially enhancing the success of the overall transportation plans for Expo 86.

Transit Services. Public transportation services for Expo 86 consisted of ten different services and facilities including the regional light rail system, the regional bus system, suburban park-and-ride lots, intercity and local charter bus services, employee and performer shuttle services, inter-site bus service, hovercraft, marine services and a rail-bus demonstration service. The variety of transit services certainly can be explained in part by the nature of the Expo 86 event. The theme for Expo 86 was transportation and a number of transportation system innovations and technologies were featured at the exhibitions on the site. However, the diversity of transit services provided in the Vancouver region by local, regional and national operators certainly enhanced the options available for solving congestion and air quality problems in conjunction with this special event.

Parking Management. Fair planners developed and identified 7,400 temporary parking spaces to supplement existing weekday parking capacity. The Exposition operators contracted with a private vendor to provide all necessary improvements and retain all operating revenues associated with the parking facilities. The vendor also provided bus shuttle service from remote parking lots to Expo gates. Fair planners acknowledge that there were "innumerable temporary parking lot operations" established in addition to those officially licensed.

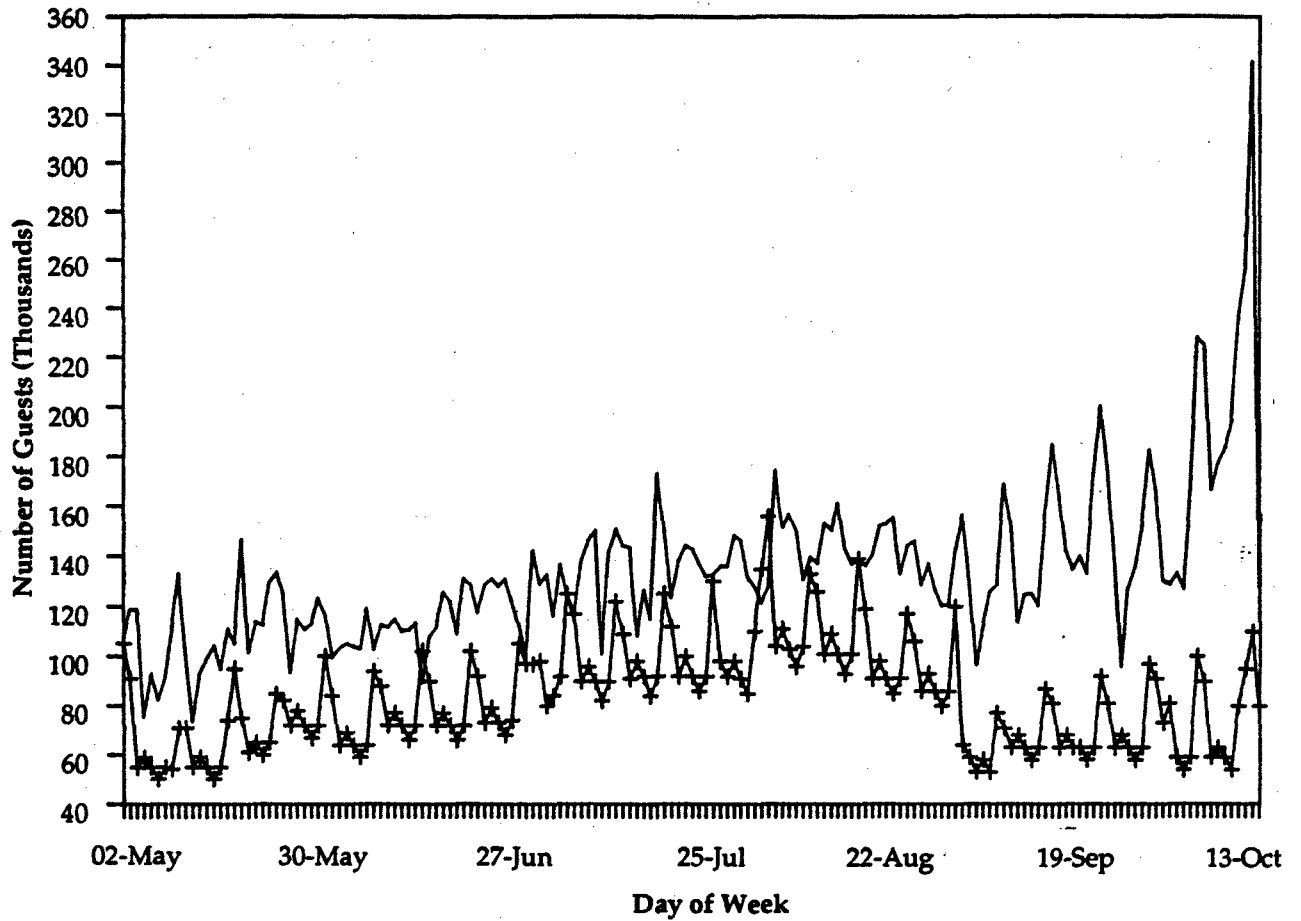
Results

Attendance at Expo 86 in Vancouver exceeded forecasts by approximately 50%. The final total attendance of 22,000,000 represented an average daily attendance of 134,000 persons.

Figure 1 indicates daily attendance patterns during the six months of Fair operations. This pattern appears consistent with data available from Knoxville and other successful events, in that it displays a very high level of daily attendance during the closing days of the event. Variations in daily attendance also can be explained by the high levels of attendance on weekends. Weekend peaking and growing attendance during the closing stages should be considered fundamental facets of trip making behavior for any major, long-term special event plan.

In contrast to Knoxville, the Vancouver Fair automobile mode share was 48%, with 35% arriving by scheduled public transit, 10% by charter and private shuttle services, and 7% by other means. Planners attribute the high transit mode share to pre-event publicity

Figure 1. Vancouver Expo 86 Daily Attendance (May 2 - October 13)



— Daily Attendance
+ Forecast Attendance

Source: Rice & Levy

concerning the likely levels of congestion in the vicinity of the Fair; however, the numerous mode choices and their quality also must be considered an important factor.

While the extensive use of transit contributed to a substantial excess of spaces available in parking lots within walking distance of the Expo site, park-and-ride lots proved extremely popular. In contrast to conventional wisdom, Fair visitors endured relatively high costs and lengthy waits for transfers from shuttle buses to SkyTrain, the special Fair rail service, in order to reach the Exposition site. Ridership on SkyTrain represented almost 30% more Expo related passengers than was originally projected for the entire transit system, including buses and light rail service. Figure 2 shows the incremental increase in passengers served by the Sky Train Transit System during the period the Fair was in operation. The popularity of the newly opened transit service may be partly the effect of the novelty of the service itself as well as the willingness of recreational travelers to use their time for attractive, high quality transit service.

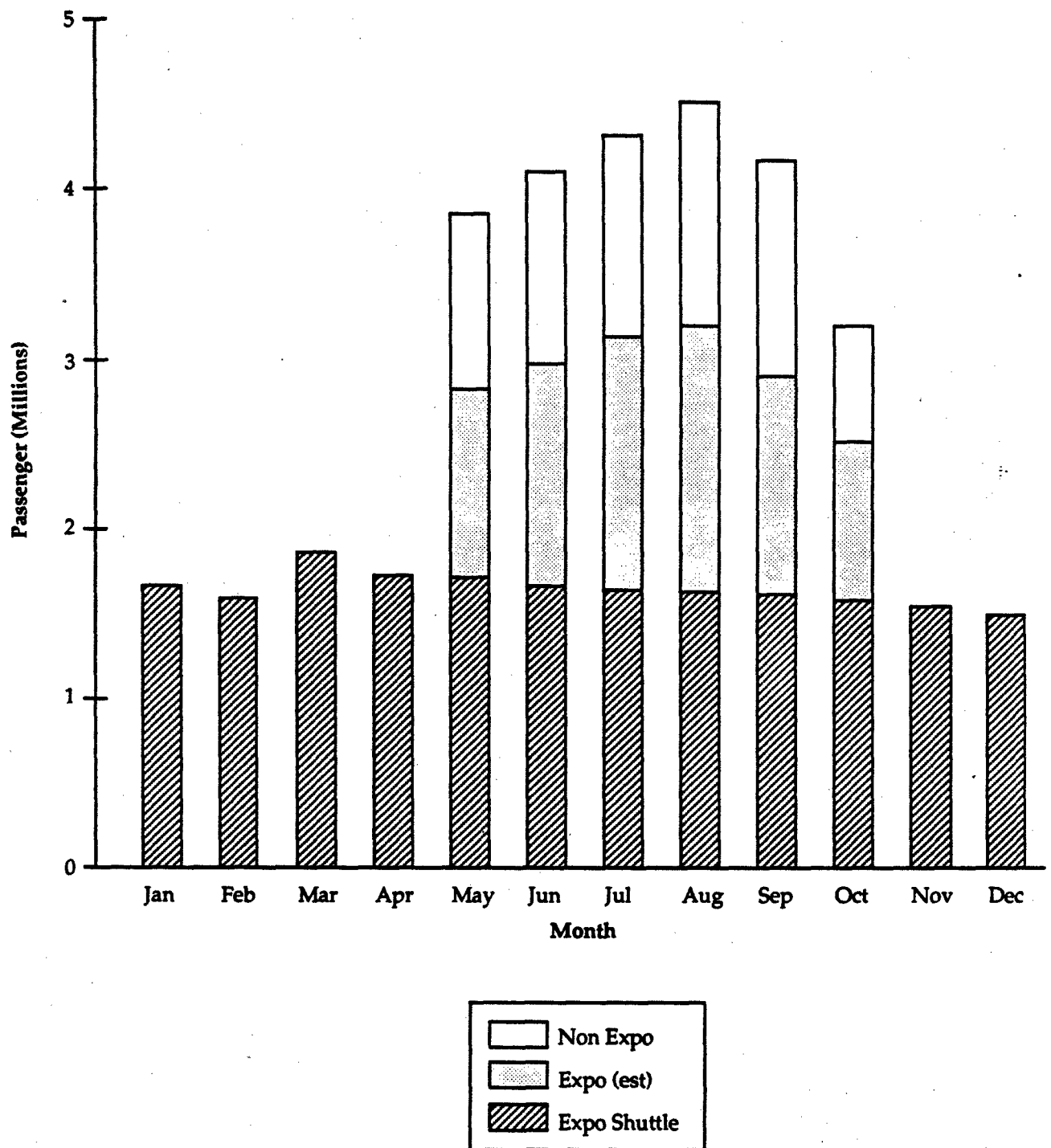
In a manner similar to Knoxville, charter and shuttle bus share of total mode split was substantially lower than anticipated. Despite an ambitious program of marketing to tour operations, charter bus volume was only 50% of the volume forecast. Overall, in the case of Expo 86, traffic conditions proved not nearly as bad as had been forecast. While this result was consistent with the results of the Knoxville World's Fair experience, the reasons for it appear to be different. Expo 86's success in demand management occurred despite a 50% increase in attendance over forecast levels, unlike Knoxville where attendance matched forecast levels. The high level of transit and shuttle bus patronage apparently more than offset the higher number of arrivals and, combined with the other actions taken, produced little congestion. Despite preliminary forecasts indicating that average daily traffic would be 25% higher during the Exposition, actual volume increases were far more manageable. The benefits of substantial diversity in modal choice for special event visitors in the Vancouver region and careful planning for several years prior to the commencement of the special event itself paid off well for Expo 86 in Vancouver.

1984 Los Angeles Summer Olympics

The Los Angeles Olympics, held in the Summer of 1984 at several locations throughout Southern California, attracted over 1,000,000 visitors, 6,000,000 spectators and 25,000 athletes, media and related personnel, into and out of the numerous event sites on a transportation network that is perhaps the most congested in the United States. Under these circumstances, the unqualified success of the transportation planning that preceded and coincided with the Olympics gives ample evidence that special events can, indeed, be managed.

The transportation plan for the eight Olympic sites within the City of Los Angeles itself incorporated an unprecedented variety of programs, strategies and techniques. They can be grouped into three broad headings:

Figure 2. Vancouver Expo 86 Transit Impact; Skytrain Ridership by Purpose



Source: Rice & Leoy

Transportation Systems Management

Since major augmentation the highway system was not an option in Los Angeles, the objective was to manage demand vigorously. Elements of the TSM program included:

- Operations response teams at each site composed of engineers and others equipped with communications sufficient to identify and correct a large variety of problems;
- Automated surveillance and control systems – a recently installed first phase of a citywide signal control system enabled planners to respond quickly to congestion;
- Bus priority streets;
- Parking restrictions, which were enforced as late as midnight in some cases, accompanied by a vigorous parking enforcement towing program; and
- A traffic coordination center linked with field teams, helicopters and key managers of participating transportation agencies.

These techniques in combination enabled event planners and engineers to monitor and evaluate congestion in time to mitigate it.

Transit Service Enhancements

A special Olympics bus system was established in cooperation with the Southern California Regional Transit District. Over 500 buses were allocated to three different types of services – shuttles, park-and-ride and express services. Transit district estimates indicated that over 1,000,000 boardings occurred on the 24 lines comprising the service. While this number was impressive, it represented less than one-third of expected levels of patronage. Transit planners attributed this to a higher than expected proportion of attendees residing in southern California and levels of attendance that were approximately 20% lower than forecast for the event.

The key element, however, in the successful transportation program for the Olympics was not the provision of public transit, but rather the willingness of area residents (both those attending and not attending the Olympics) to modify their travel behavior in a variety of crucial ways.

Public Information

The public information program for the Los Angeles Olympics included public interest ads on television, business briefings, media briefings, ticket buyers guides and special programs designed to provide information on congestion patterns around Olympic sites and suggested alternative travel routes and work schedules. In addition, Olympic event planners undertook discussions with trucking associations and major shippers which led to shifts in regional truck shipment patterns and local deliveries to off-peak periods, weekends and alternate routes.

Results

The combination of transportation and public education actions taken led to dramatic behavioral changes. In a simulation of the effects of these measures on traffic conditions in the Los Angeles area, research by Giuliano has shown the distinctive contribution made by each of the key measures to overall reductions in vehicle hours traveled and increases in travel speeds (Table 2). Improving system performance also appears to have been the result of scheduling as many Olympic events as possible at off-peak hours. The contribution of event scheduling to network performance was nearly twice that of any other variable studied.

Transit use by spectators, while not meeting initial expectations, nevertheless made a valuable contribution equalled by a series of behavioral changes made by area residents who were not themselves involved in Olympic travel. These included voluntary absences from work (for vacations or other reasons), and reduction in non-work trips on a discretionary basis.

A third level of contribution was made by work schedule changes implemented by employers and employees in the vicinity of the sites. Reduced truck traffic by voluntary actions of shippers played a role of equal magnitude.

These six measures indicate the diversity of the strategies which can be employed to minimize congestion and adverse air quality consequences of special events. They include certain activities which relate to the event itself (such as event scheduling) and the provision of enhanced transit service as well as behavioral changes both by spectators and by area residents.

The importance of these behavioral changes has been underscored by the observation that congestion in the vicinity of the Olympic sites actually increased daily from the beginning to the end of the Olympic period. This steady erosion in supportive behavior by area motorists over a two week period shows both the transitory nature of the voluntary behavioral change and the desire of motorists to revert to old habits to the degree that the absence of congestion allowed and encouraged.

Giuliano's research also indicated the modest effects of several other related transportation measures implemented during the Olympics. Ramp metering, one-way streets and ramp closures, in this particular case, all contributed adversely to the ability of the transportation system to handle the increased demand.

The Los Angeles case study is distinguished by the breadth of transportation management measures which were implemented in order to preclude the potentially catastrophic consequences which might have occurred on the region's transportation network of adding some 7,000,000 visitors and related trips during a two week period of time. While the array of TSM measures is more extensive than that likely to be implemented for less substantial events, the Los Angeles experience indicates the critical role which such actions can play in mitigating traffic congestion and vehicle emission problems.

Table 2. Relative Impacts of Los Angeles Summer Olympics Transportation Strategies

Scenario	Impact on Overall Network Speed* (Percent)	Impact on Overall Network Veh-Hrs* (Percent)
Event Scheduling	-54%	+117%
Spectator Transit Use	-28%	+49%
Absence from Work	-22%	+43%
Reduce Non-Work Trips	-21%	+38%
Work Schedule Change	-7%	+18%
Reduce Truck Traffic	-5%	+11%
Ramp Metering	0	0
One-Way Streets	+1.6%	-1.3%
Ramp Closures	+4.1%	-2.9%

* Compared to baseline Olympics.

Source: (4).

Back Bay (Boston) Management of Special Event Activities

Unlike the previous three examples, activities such as conventions, major meetings, road races, parades, street fairs and professional athletic events are typical special events which define the vibrancy and attractiveness of any major city. Such activities provide a unique indicator of the success of an urban center to live, work, shop and visit.

The Back Bay is one of Boston's most attractive and historic areas. Today the Back Bay contains a neighborhood with 16,000 residents, one of the city's major concentrations of employment with about 50,000 workers, a major retail center, the city's convention center, nearly 6,000 hotel rooms, and a number of cultural and educational institutions. While this diversity is an important strength, it generates constant activity which often leads to congestion of the transportation system.

The perception of residents was that the diverse and many types of special events held within the Back Bay were a major cause of area congestion. That many special activities occur within the Back Bay was clearly conceded. From national and international meetings held at the convention center and among the area's twelve major hotels to the innumerable number of outdoor road races, walkathons and street fairs that frequently shut down area streets, the number and variety of events were substantial. Yet, because most of these events occurred during the weekends, evenings or periods other than the traditional commuter peak periods, surprisingly little hard information was available to understand the role these events had on overall mobility, and the role of planning to improve the management of the events.

Information Gathering

A major data collection program was initiated to better understand the impact of special events on mobility. Several survey efforts were undertaken and included:

1. A detailed review of city permit records since 1986 to define the characteristics and trends for outdoor events in the Back Bay. Events included road races, walkathons, street fairs, motorcades and parades.
2. A review of the Hynes Convention Authority and major Back Bay hotel schedules and records for past and up-coming major meetings.
3. A survey of the travel characteristics and consumer choice of participants of a major convention held in the Back Bay. A questionnaire survey was conducted for the National League of Cities Convention held at the Hynes Convention Center in December, 1988.
4. A survey of several types of events to determine their potential impact on area mobility using an analysis of variance test to compare the data with non-event days. Automobile travel time and delay surveys were conducted on project area streets during several types of events, including a national convention at the Hynes Center (9,000 participants), a Hynes Center gate show (10,000 attendees) and a walkathon using public sidewalks (2,000 participants).

Survey Results

An extensive database was assembled on special event activities in the Back Bay. The data indicate that the number of indoor and outdoor special events such as conventions, road races, walkathons and street fairs has been steadily increasing during the 1980's in the Back Bay project area. While the partial list of activity in the Back Bay currently includes almost 200 major conventions and 75 large-scale road races and walkathons, most special events do not negatively affect the Back Bay. However, several types of large events are a cause of traffic congestion and reduction of parking availability. In addition, the number of outdoor events requiring street closings has been increasing by ten to fifteen percent each year. As a result, almost twenty-five percent of all weekends currently have three or more major events.

The key survey findings include:

- **Outdoor events can significantly degrade traffic flow on surrounding streets.**

Many of the outdoor events involve several thousand participants and require closing streets for two or more hours. Street closings can make travel in the area difficult when detour routes are not clearly posted or well advertised. This can greatly inconvenience residents, merchants and visitors to the area. At events, road races and walkathons, with more than 2,000 participants, travel times on streets surrounding the event can be reduced by up to 15% (Figure 3).

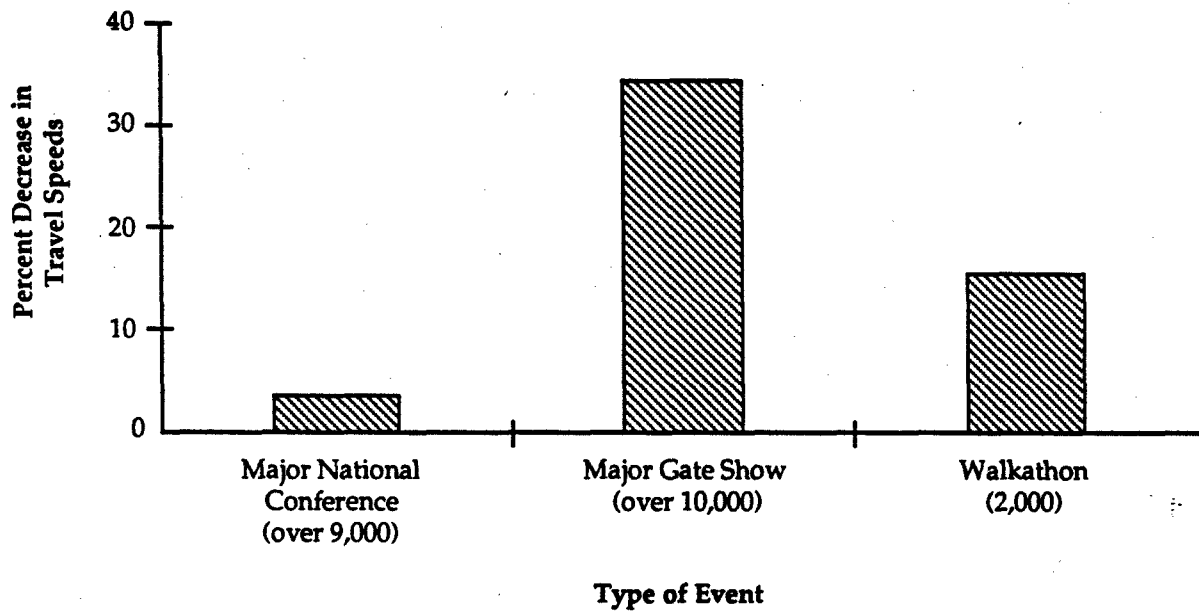
- **Indoor gate shows and staging activity at the convention center can significantly degrade traffic conditions on surrounding streets.**

Surveys indicate that gate shows (for example, boat, auto or home improvement shows) at the convention center attract large volumes of local residents who arrive by auto. This increases roadway travel times by 35% (Figure 3). Truck staging on such major arterials as Boylston Street and other streets in the Back Bay further reduces traffic flow and on-street parking by a significant number of spaces

- **Indoor national and international conventions have little impact on area-wide traffic conditions.**

The surveys show that major "non-local" conventions generate substantial pedestrian activity but little affect on vehicular mobility. While isolated bus and charter bus queuing does lead to localized congestion, very few convention participants use an automobile during their visit.

Figure 3. Average Reduction in Travel Speeds on Local Streets Caused by Major Events



Developed Management Plan

Despite the sometimes inconvenience and disruption to the area, most residents and merchants agreed that special events enhance the attractiveness of the area overall and support the local economy by attracting large number of consumers. Therefore, programs were developed to reduce the impact of special events through improved management. These changes would balance community concerns about disruption with the rights for assembly. The following four programs illustrate the intent of the management plan.

- 1. Improve the city's permitting regulations.** When requesting a permit for an outdoor activity, event sponsors are required to provide a traffic detour plan for approval by the commissioner. Event sponsors must notify local residents, businesses, and media of their upcoming event no less than two weeks prior to the event. The event sponsor is required to distribute transportation information to its participants.

The city has developed a standard list of residential, business and media outlets for use by an event sponsor to be made available when permits are requested. The city also has prepared and makes available reproducible transportation information kits that event sponsors can distribute to participants. The material lists and promotes transit services that can be used to access the area and identifies off-street parking facilities that can be used.

The city also is investigating the use of other outlets to improve public notification. The Cable Access Channel is a possible means to provide updated daily information for neighborhood groups, business associations and local residents.

- 2. Improve control over large annual outdoor events.** Annual events with more than 2,000 participants require a written request for the permit no less than one month prior to the event. These events are required to use a designated route that avoids congested roadways or streets within residential communities.
- 3. Improve control over the number of events that occur in a single weekend.** The Transportation Commissioner has the discretion to limit the number of events that occur in a particular area, such as the Back Bay, during a weekend.
- 4. Develop a Transportation Management Program for the Convention Center.** The developed management plan recommends that a full time Transportation Coordinator be employed by the Convention Center. The transportation coordinator's duties should include: developing and implementing a truck mobilization and staging plan; establishing remote site parking facilities for truck and bus operations; developing mobility assistance programs and literature for all scheduled events; and coordinating programs with the transit authority (MBTA) to facilitate transit use by event participants. Event sponsors would transmit transportation information kits to all convention participants. These kits could include special MBTA system maps and information to obtain "Boston Passports," the MBTA three day and seven day passes.

Boston, Massachusetts Southeast Expressway Reconstruction

Freeways and expressways require periodic reconstruction in addition to routine maintenance. Increasingly, the policy is to keep these facilities open for travel during the construction period. Some construction operations can be scheduled for off-peak travel periods. In nearly all cases though, there are significant lengths of time when the road must operate at reduced levels of capacity. The kinds of planning and techniques utilized are remarkably similar to those used for other special events. The reconstruction of Boston's Southeast Expressway over a two year period, from 1984 to 1985, represents just one example where major highway construction has been successfully completed without resulting in the serious traffic congestion problems that were feared by many.

The Southeast Expressway is 8.3 miles in length and serves as the primary highway connector between Boston's southshore region and the downtown. It carried an excess of 160,000 vehicles on a daily basis in 1983. At the north, it connects with the Central Artery in downtown Boston. To the south, it connects with the end of the Route 128 circumferential highway and continues as Route 3 to Cape Cod.

Agency Coordination

A multi-agency task force was created to address all construction-related problems and operations. This task force was initiated during the planning phase and continued throughout the duration of construction. As enforcement would be critical and the road was under multiple jurisdictions, state, regional, and local police were involved.

Three basic conclusions guided the task force's decision-making:

- No single alternate transportation option would be sufficient;
- Travellers should be provided with options from which a choice could be made; and
- Funding for transportation management, transit alternatives, enforcement, incident management, and public information would have to constitute a legitimate and significant portion of the construction cost.

Roadway Configuration

The Southeast Expressway operates as an eight-lane divided facility, with four lanes in each direction. During reconstruction the roadway was separated into four, two-lane sections, with each lane pair separated by Jersey-barriers extending the length of the project. In this way, two lanes were re-constructed at a time with the remaining six lanes open for traffic. The central pair of lanes were reversible so that the peak travel direction always had four lanes of operation with the remaining two lanes serving the off-peak direction. The central two lanes also operated as long distance express lanes with restricted access and egress; local traffic was restricted to the outside pair of lanes. In addition, truck use was prohibited from the express lanes.

Public Transportation Services

Significantly expanded public transportation services were operated, including:

- Increased commuter rail service in the form of express trains and more frequent service;
- Increased commuter boat operations;
- Increased private bus service;
- Increased public bus service; and
- Expanded promotion of ridesharing services.

In addition, 1,500 new park-and-ride spaces were created. 1,000 of these served bus and ridesharing staging areas, and 500 were at commuter rail stations.

Public Information

A central element of the entire reconstruction program was an aggressive public information and community relations program involving transit service providers as well as the Massachusetts Department of Public Works. Activities included news releases, brochures, promotion of a variable work hours program, and a community relations task force to work with community groups and negotiate solutions to problems.

Traffic Control and Police Enforcement

Four specific actions were taken to maintain an efficient flow of traffic both on the expressway and on alternate routes:

- Additional police details on all roads affected by the reconstruction;
- Establishment of an emergency response or incident management team;
- Screening of construction activities to eliminate slowdowns resulting from driver curiosity; and
- Increased local aid to impacted communities.

Results

Traffic generally flowed more smoothly during construction than during the pre-construction period, with virtually all interests agreeing that the project was successful in accomplishing its objectives. Between 5,000 and 9,000 vehicles per day were diverted during the first year, most of which were off-peak trips. Morning peak direction volumes were actually higher during each of the two project years than they were before reconstruction. Second year total volumes were roughly equivalent to pre-construction levels.

Peak period travel times on the expressway were lower during the first year, and increased somewhat during the second year in correspondence with the higher second year volumes – traffic volumes on the alternate routes actually increased by more than the 9,000 vehicles per day during the first year.

Rail transit ridership was correlated with peak period traffic volumes on the expressway. During the first year, transit ridership remained relatively constant. Ridership, however, increased by 6.8 percent during the second year as the highway level-of-service declined. Park-and-ride usage was up by roughly 8 percent, in part caused by shifts from ad hoc locations to the new facilities. Commuter boat ridership increased by 90 passengers per day in the first year and 300 passengers in the second year. Commuter rail usage increased an average of 400 riders per day. Results of the increased private express bus service were mixed, and ridesharing results were disappointing. Auto occupancies on the expressway actually declined.

In summary, four basic factors contributed to the success of the Southeast Expressway Reconstruction Traffic Management Program:

- Development and execution of a comprehensive, corridor wide plan for both construction site and off-site locations;
- Extensive public information and media usage;
- Flexible mitigation strategies that could be adapted to changing situations; and
- Use of a multi-agency coordinating task force.

■ Program Impacts

Travel Impacts and Vehicle Emissions

Evaluation studies, as demonstrated by the five case examples, have consistently shown that a broad based and aggressive set of transportation management initiatives can reduce the number of total regional vehicular trips, thereby reducing congestion and travel time delays. As a result of the actions taken, the feared traffic impacts did not materialize.

The New York City Transit Authority has found that it regularly accommodates special event crowds on its rail transit system, often without the need to add special service. For example, the 5-6 million spectators for Operation Desert Storm's Welcome Home parade were handled in this manner. Key to success is carefully coordinated planning involving the Authority's operations, police, and marketing departments. Implementation of the resulting plan is supported by an aggressive marketing and public information program involving newspaper ads, fliers, on-train posters, mailings, and

other promotional materials. The Authority found that even regular transit users may be hesitant to utilize a new route to a new location. This resistance is overcome by providing good information in advance of the special event. Such an approach has been successful for Central Park concerts, parades, fireworks, special athletic events, and large conventions.

From an air pollution perspective, many special events occur during the summer ozone season and may even start on a Friday afternoon, overlapping the normal Friday evening peak period. Reductions in trips and vehicle miles of travel, changes in the time of travel, and increases in vehicle operating speed will all contribute to lower levels of vehicle emissions than otherwise would occur.

Travel Markets Affected

If the special event peak travel occurs during uncongested weekday and weekend hours, the effect on existing travel markets in the city and region will be minimal. Organizers of special events need to take responsibility for ensuring that all motorists are made aware through either routine or specially designed channels of communication of any delays which will be associated with an event. The City of Cincinnati, for example, has developed and constructed a freeway surveillance and control system on Interstates 75 and 71 to inform travelers of congestion associated with activities at that City's Riverfront Stadium. The system, once in place, has found more frequent usage as part of ongoing traffic surveillance and incident management programs operated by the City. Through electronic surveillance systems, dedicated radio channels, traffic reports on commercial radio, or other means, motorists not destined for the special event may modify their travel behavior to avoid compounding event-related congestion.

Expected Capital and Operating Costs

Capital cost estimates of infrastructure improvements needed to support special events obviously vary with the size of the event and the site. In Vancouver and Knoxville, planned capital investments were accelerated and others were made solely with the needs of the special event in mind. Unless a special event is of substantial duration, costly capital improvements are rarely justified.

Sources of financing for capital improvements associated with special events are often the subject of special negotiation. Because the responsibility for undertaking the event is typically assigned to a special agency or organization, funding off-site transportation improvements can be more difficult, giving the competing demands on that organization's capital.

Operating costs associated with implementing transportation management measures typically are shared by the agency responsible for the special event and other units of government, as appropriate. Organizations sponsoring special events, however, are

increasingly being asked to cover their "full share" of marginal costs associated with nearly all special events.

Other Impacts

The long-term impacts to a community of improvements implemented as part of a special event are generally beneficial. Special events are frequently the occasion for implementing programs, techniques or even specific capital improvements which have lasting value to a city or region. In addition to improvements made at the site of large special events, communities frequently benefit from improvements such as the Cincinnati traffic surveillance system or Seattle's monorail, which has operated for nearly 30 years between the site of the World's Fair and downtown Seattle. Thus, the long-term impacts of improvements implemented as part of planning for special events is generally beneficial.

On the other hand, inadequately planned special events may impose either short-term or long-term consequences on adjacent areas, particularly if those areas are residential in character. Noise and congestion are frequent by-products of special events and repeated impacts of these kinds without careful mitigation can cause long-term declines in the quality of life and economic value of areas adjacent to special event sites.

Areas of Uncertainty

The uncertainties associated with planning and conducting special events include those associated with unique local conditions, overall attendance estimates and attendees' travel behavior patterns.

Regarding unique local conditions, it is essential that planning for special events recognize any topographic, transportation, or other constraints which may affect transportation planning for the event. Generally, these are identified in the earliest planning stages of the project.

Attendance estimates frequently are the source of substantial uncertainty. While evidence indicates that carefully planned special events can accommodate levels of attendance in excess of those expected without generating unacceptable levels of congestion, the uncertainty of underpredicting design day attendance can lead to insufficient attention to the spectrum of transportation and related management measures required to minimize the impacts of the increased travel demand.

Lastly, there is uncertainty regarding the willingness of attendees to respond in planned ways to the array of transportation services and management measures implemented as part of an event. For example, while in some cases (e.g., Knoxville) remote parking was not as popular as expected, Vancouver indicates that this is not always the case. The successful park-and-ride program implemented by Expo 86 exceeded all expectations and substantially modified the demand for on-site parking, with attendant congestion

and emission consequences. The experience with public transportation services is similar. For example, planners for the Los Angeles Olympics planned for a mode split of 65% in buses to the Coliseum area. While this objective was not achieved, the mode split was high enough to not pose unmanageable problems.

■ Implementation

Planning For Implementation

Special events are by definition unusual, if not unique. While Table 1 identified the elements of planning appropriate to special events, this planning must be undertaken with the knowledge that one of a kind, temporary events pose special challenges for transportation and air quality. For the numerous special events which are of shorter duration, an occasional nature, or lesser intensity than large scale Olympics and World Fairs, it is not reasonable to consider hastening specific capital infrastructure improvements in order to mitigate congestion. Instead, emphasis should be placed on transportation management options and careful pre-event planning.

Based on available experience, the following guidelines are suggested with respect to the particular mix of transportation options to be provided:

- Special events should be located only where regular transit service is, or can easily be made, available for access to the site.
- Existing special event and recreational facilities should be required to support transit use, including shuttle services from transit stations. Free transit passes should be included in the price of admission to an event or activity, and provided along with special event tickets. The schedules and route maps for regular transit or special shuttles should be included.
- Free transit service should be provided for localized areas on special event days, such as parades or street fairs. Special event organizers should be required to provide special shuttle buses from outlying areas to reduce major traffic congestion problems.
- Special event shuttle service routing should include major transit stops, hotel districts, and large parking areas such as regional shopping centers or park-and-ride lots that are convenient, safe and well-lit.
- Organizers should schedule special events during off-peak travel periods whenever possible. If an event must be scheduled at or near a congested travel period, then extra shuttle, transit, and other travel demand management measures should be provided by the event organizers.

- Limited, inconvenient or time-consuming parking at the event site may help to encourage the use of shuttle and transit services for recurring events. Relatively high fees for parking may discourage some people from driving; however, this will depend on the cost of the event.
- Provision of priority lanes for buses, shuttles and carpools on streets and roadways near special event sites may help move more persons faster, and thus reduce congestion produced by these events. Special lanes for high occupancy vehicles that allow faster access to parking or the facility entrance are a possible means of providing additional time savings for users.
- Event organizers should broadcast information on the projected traffic delays near the special event site so that motorists who are not attending the event may modify their travel routes to avoid compounding the congestion.
- Charging the organizers of special events the full share of the marginal costs associated with the event could help to encourage the use of alternative modes of travel to the facility. Congestion impact fees could be used to support improved transit service or construction of bus/HOV lanes near the site, and to provide free shuttle service for special events.

Good planning is essential to provide the best possible estimates of the characteristics of the travel behavior to be associated with the event and the particular mix of transportation services that should be provided. This includes the numbers of visitors, their origins, the likely duration of stay and the most likely means of travel.

Bochner and Exnicios developed a series of guidelines for minimizing the transportation (and, thus, air quality) impacts of special events. As summarized in Table 3, (supplemented by observations from Rice and others), these guidelines consist of a cross-section of planning, parking, transit, and facilities operations techniques. For those events which have been the subject of special planning, transportation impacts have indeed been managed well.

In their paper on Vancouver, Rice and Levy identify four overriding factors which explain observed travel behavior and traffic conditions at special events.

First, careful planning and prediction of the level and distribution of visitor attendance is important. This is not only crucial from the perspective of marketing and financial feasibility, but from a perspective of adequate transportation planning as well.

Secondly, sufficient flexibility and capacity generally exists in the urban transportation infrastructure to accommodate major increases in travel demand associated with special events if this capacity is combined with careful planning and transportation management measures. For example, peak hours of special events can be timed so that they do not overlap with normal peak hour flow on busy metropolitan transportation corridors. Furthermore, well placed parking with adequate accessibility to the site of the event is important. The Los Angeles case study clearly shows the validity of this conclusion.