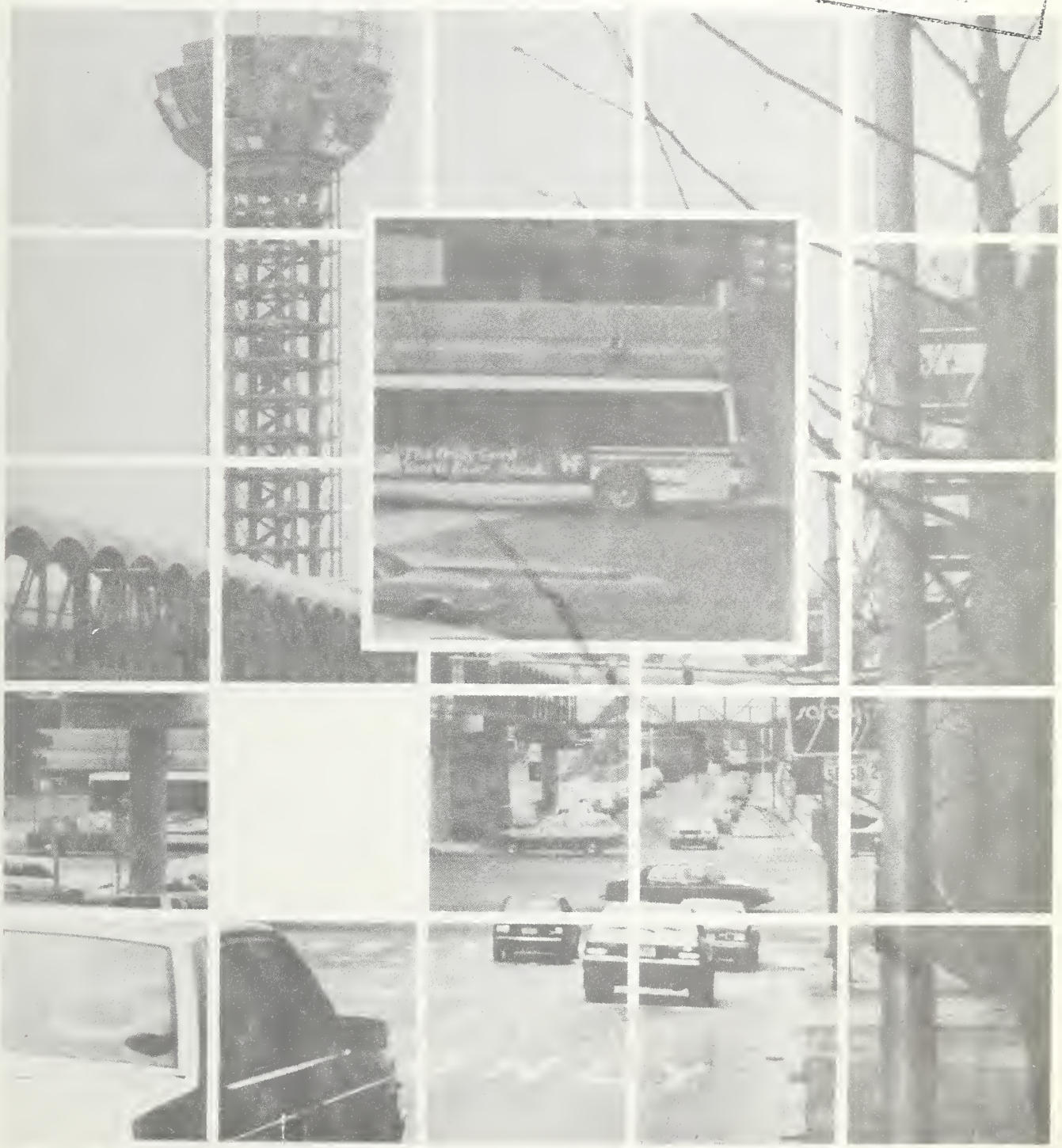
U.S. Department of Transportation

A Closer Look: The 1982 World's Fair Transportation System

Phase II Report

July 1983



A Closer Look: The 1982 World's Fair Transportation System Phase II Report

July 1983

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A CLOSER LOOK:
THE 1982 WORLD'S FAIR TRANSPORTATION SYSTEM
PHASE II REPORT

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EXECUTIVE SUMMARY

Each World's Fair is a unique event. Many of the lessons learned in transportation planning are, however, transferable to other special events. The Urban Mass Transportation Administration (UMTA) sponsored this study to identify and evaluate the experiences of the 1982 World's Fair in Knoxville.

In late 1982, key participants in transportation planning for the Knoxville World's Fair cooperated in the development of an overview analysis of the effort. The work resulted in the 1982 WORLD'S FAIR TRANSPORTATION SYSTEM EVALUATION - Phase I report. The Phase I report was intended as a wide ranging, general analysis of the planning and results for transportation in and around the Fair.

Following the completion of that report the project staff began on the Phase II report, to take advantage of all available data and the time to collect and analyze it. While the purpose is the same--to transfer the experiences here to other special events planners--this Phase II report is much more quantitative than the earlier report. Because of the nature of the process the resulting reports should be used together but yet are not mutually exclusive in their coverage. Generally, however, the information provided here is either new or more detailed than that in the Phase I report.

Topics covered in this report include: the involvement of transportation agencies, planning standards used in designing the transportation system, functional components such as roadways, parking, and buses, regulations pertaining to services, and the effects of the cost of the services. Each of these topics are discussed in depth and conclusions drawn.

Chapter 1 lists lessons learned from the analysis of Phase II. These cover: organization, planning, access, parking, transit, tour and shuttle buses, market forces, and regulations and agreements. Due to the extensive data collection and analysis, there are 45 lessons learned as opposed to the 9 lessons learned in the Phase I report.

FAIR SITE AND ENVIRONS
FIGURE 1-A

FAIR SITE AND ENVIRONS
FIGURE I-B

Chapter One:

INTRODUCTION AND LESSONS-LEARNED

The "Lessons Learned" and overall results of Phase I of this evaluation were relatively general, process and organization-oriented, and based predominantly on experiences related by Fair planners and government officials. The intention of the Phase II analysis was to provide quantified verification or modification of those conclusions and augment them with additional lessons brought to light through further research from a post-Fair perspective. The deeper analysis carried out during Phase II did indeed cover additional and more detailed conclusions, and provide further information on the Phase I conclusions.

As described in the Phase I report this study was commissioned by the Urban Mass Transportation Administration to broaden the Knowledge available on transportation planning and operations for use in future major events. Therefore, a goal throughout this evaluation has been to identify especially those issues and findings that are transferrable to other localities and events, under various circumstances.

DESCRIPTION OF THE PHASE II REPORT

The Phase II evaluation is intended to document and verify or refute the findings of Phase I based on analysis of more complete data. The array of topics covered in this report is somewhat narrower than in Phase I. A limited number of completely new areas are included, as well. For the majority of the report in which similar topics are covered, this report goes much further in data review. As you will see in reading the "Lessons Learned" portion of this chapter, the Phase II evaluation substantiated many of the earlier report's conclusions. In many other cases, however, deeper analysis led to conclusions and/or lessons learned which address considerably different issues or levels of detail than those of the first report.

As planned the report covers a variety of topics. Several different topics were added as we began work and realized that the original outline omitted some important points. The report covers: the relationships between transportation agencies, the parameters used in planning for the Fair, parking, buses, roadway improvements and traffic considerations, regulatory and other legal considerations, business experiences and pricing related impacts.

PARTICIPANTS

The project staff for Phase II was virtually identical to that of the initial effort. Again the Knoxville-Knox County Metropolitan Planning Commission served in the role of project coordinator. Barton-Aschman Associates, Inc., K-TRANS (Knoxville's local transit company), and Keith Thelen (transportation planning coordinator for MPC during Fair planning), served as consultants, contributing various chapters to the report. The major authorship for each chapter is identified in the table of contents.

The most significant difference between Phase I and II in terms of participants is in the use of the project advisory committee. Due to the extremely short time frame allowed for completion of Phase I it was necessary to cull information from those individuals who were actually involved in planning for the Fair. For that purpose, a committee of KIEE, local government officials and private consultants (see Phase I report for details) was formed to represent the major perspectives of those who actually brought about the Fair-related transportation system. Their reported experiences and a series of additional interviews formed the majority of the Phase I report information base. The Phase II evaluation, as described, relied predominantly on the collection and analysis of available data, and as such did not utilize the committee directly.

Interviews, advice and other input by various individuals from the committee are, however, an important part of this report. In particular, thanks go to Ed Keen, formerly with KIEE, for his review and suggestions on Chapter 2, Transportation Agencies. Thanks also are expressed to Tony Dittmeier of UMTA's Region IV for guidance throughout the project and Norm Paulhum at US-DOT Technology Sharing, for support and assistance in printing and distribution of this report. Additionally, Sue Adams, MPC Deputy Executive Director, and Greg Errett, MPC planner, helped in reviewing sections of the draft. Finally, the authors would like to thank the many people interviewed in compiling the wealth of information included here.

PHASE II COMMENTARY ON PHASE I RESULTS

Based on the conclusions drawn in Phase I a series of nine general "Lessons Learned" were formulated. These lessons covered a variety of topics and provided an overview of recommended approaches to these issues. The following discussion gives an indication of the validity of the original lessons based on the

Phase II evaluation. A brief discussion following each of the Phase I lessons indicates whether the Phase II evaluation verifies, refutes or goes no further than the original analysis.

Permit Applications

A cut-off date 90-120 days prior to opening of the Fair should have been established for parking lot, shuttle service and taxi operation permit applications. The early application date and a published listing of the number of services, parking spaces, etc., permitted, would have helped to lessen the speculative fever which rose in the final weeks before opening. No date or efforts to disclose permit information was established because of a feeling that everyone was entitled to a share of the "success" and hence, no restrictions should be imposed. Consequently, there were far too many providers, with the resulting congestion, low revenues, and the social impacts of numerous business failures.

Phase II Result. Chapters 6 and 10 of this report further analyze this issue. The results here confirm that the idea is valid, but identify serious problems in practical application.

Parking

The private sector is typically able to provide an adequate supply of parking facilities. The early cut-off date, described previously, would have helped potential providers better assess the market conditions. KIEE could have avoided getting into the parking lot business to a large degree had there been documentation that adequate parking would be provided. Experiences at the Spokane and Seattle World's Fairs showed private development of adequate parking but KIEE eventually developed its own visitors lots under pressure from people within and outside the organization concerned with the lack of assured, adequate parking facilities.

Phase II Results. Discussion in Chapter 6 of this report verifies this lesson. Further analysis of previous Fairs, as well as Knoxville's experience, indicate that the private sector provided a major portion of needed parking space.

Marketing to Tours

Marketing and facility provision aimed at attracting bus tour promotions had a significant impact on the Fair's attendance totals and pattern. Provision of a tour bus terminal at the north gate and early, aggressive marketing targeted at the tour industry dramatically raised the number of visitors who came via bus, skewed the attendance pattern toward spring and fall rather than summer, and increased national awareness of the Fair at low cost to KIEE due to advertising sponsored by tour groups.

Phase II Results. Chapter 8 of this report verifies and documents that special attention to tour groups increased overall attendance, and affected mode split and attendance patterns with respect to season and time of day.

Transportation Plan Implementation

Implementation of the transportation plan and establishment of a transportation operating staff must be timed to balance necessary staff functions with limited resources to support personnel. Implementation began nine months prior to opening of the World's Fair. At that point the staff was forced to deal with a multitude of brush fires at the expense of some important overall planning and management activities. The large number of critical components to be staffed for a successful Fair, coupled with a limited personnel budget, dictated that all could not be developed to the ideally desired level. The transportation system functioned very well despite the late start up of implementation.

Phase II Results. No significant additional findings as a result of this evaluation.

Determination of Promoter's Role

The promoter must determine as early as possible which functions are legitimately within its sphere or responsibility and capability, and which are not. The decisions to get involved in parking provision and housing reservations were difficult, and in some respects disastrous, in Knoxville. An early determination of the essential roles for the promoter, and an associated effort to delegate or avoid the inappropriate, will improve performance in the chosen roles. This also gives clearer signals to the other potential service providers in the community regarding their roles.

Phase II Results. No significant additional findings as a result of this evaluation, however a parallel argument is made with respect to transportation agencies in Chapter 8.

Cooperation Between Promoter and Transit Company

Negotiations with the local transit company (K-TRANS) could have been improved two ways: (1) by an early determination by KIEE of transit services it would provide, thereby identifying what would be left to K-TRANS, and (2) earlier negotiations between K-TRANS and KIEE, allowing time to reach needed compromises on service contracts. The negotiations which took place were hampered by delayed decisions on service needs and delayed agreement on contract terms.

Phase II Results. No significant additional findings as a result of this evaluation.

Overall Cooperative Atmosphere

Inter and intra organization cooperation in the public and private sectors was absolutely essential to the success of the 1982 World's Fair. All participants were generally directed toward a common objective. Decision making authority was either delegated to or assumed at the staff level to insure prompt attention to actions which could not afford to be delayed by lengthy debate. Because the speed of these decisions often precluded public discussion, the system was sometimes perceived to be secretive.

Phase II Results. Additional discussion in Chapter 2, of decision-making and general procedural characteristics for the Fair versus the traditional approach, verifies the validity of this lesson.

Roadway Improvements

Roadway and interstate improvements must be envisioned very early in planning for a special event to allow the necessary lead time for planning, funding, design and construction. A minimum of six years for interstate and four years for major local road improvements is considered essential.

Phase II Results. Chapter 5 describes in detail the various roadway facilities and traffic changes made. This evaluation further substantiates the importance of long lead times.

Pedestrians

Pedestrian movement and safety were maximized by: (1) separation of pedestrian from vehicle access points, (2) design of pedestrian access so that large crowds would not have to cross major thoroughfares, and (3) supplementing signals with police traffic control during peak periods. The segregation of pedestrian from vehicle access also improved vehicular traffic flow around the 1982 World's Fair site.

Phase II Results. No significant further lessons resulted from the Phase II evaluation but details of pedestrian related capital expenditures are identified in Chapter 5.

LESSONS-LEARNED FROM THE PHASE II ANALYSIS

As in the first phase report, specific conclusions drawn in various chapters have been massaged here to formulate broader lessons. In some instances specific conclusions from several chapters are conceptually similar and have been combined into one general lesson.

Included with each are page number references to discussion of the topic in the text. These refer the interested reader to the appropriate section to foster an understanding of the lesson in context. The list of lessons-learned is divided into topical sub groups.

ORGANIZATION

* To be most effective, transportation agencies and organizations involved with a major event should limit their activities to those areas considered to be the agency's strengths. (See also pp: 17, 18, 20, 21,23,24)

* There must be a forging of public and private leadership that can get the job done by maximizing the strengths of each, in instances where responsibilities do not clearly fall in the realm of either group. (See also pp: 15-21, 23, 24)

* A transit system representative should be included on the event's traffic planning committee. (See also pp: 81, 82)

* A central clearinghouse for all transportation information should be made available to visitors of the event. (See also pp: 186-189)

PLANNING

* The purpose of transportation services was to create adequate, economical access to the event. Viewed in that context, losses the Fair incurred outside the gates may well have been offset by adding spending inside. (See also pp: 223, 228)

* Site and transportation system design should be based on the estimated 80th and 90th percentile day's attendance instead of peak day of week or month percentage. (See also pp: 35, 36, 54)

* Variations in total attendance, mode split, gate use and demand for transportation services were experienced based on season, day of week, and time of day. (See pp: 25-34,41,45,54,201,203,206)

* Attendance and gate volume information from the Knoxville Fair is comparable to previous recent World's Fair and so may be used for planning purposes. (See also pp: 26,33,34,36,37,41-44,54)

* The levels of both revenues and expenses for the transportation system at the World's Fair were lower than had been forecast even as late as June of 1982. (See also pp: 223-225)

* In Knoxville, as with other recent fairs, the site location adjacent to the downtown area created a need to consider Fair parking and other transportation facilities in relation to their CBD counterparts. (See also pp: 103-110,115,117,118,120,121,123,124)

ACCESS

* Good access was provided to the Knoxville Fair as a result of four major actions: (1) major road improvements made in the area, (2) an over supply of parking (3) smaller than expected number of visitors travelling by car coupled with a higher than expected vehicle occupancy rate and, (4) multi gate access system which segregated types of ingress and egress. (See also Chapter 4)

ROADWAYS AND TRAFFIC

* Planning and implementation of transportation services for a major event differs from routine transportation services in that the importance of the event elevates the activities to a high priority in the mind of business and community leaders, and the opening date of the event becomes a critical benchmark, a condition not experienced in routine projects. (See also pp: 17, 19, 20, 22, 23)

* Almost all the major roadway improvements made for the Knoxville World's Fair will have residual benefits. Many of these projects were already included in long range plans, however the presence of the World's Fair accelerated their implementation. (See also pp: 69, 76, 79, 80, 81, 100)

* Analysis of traffic during and after the Fair reveals that the specific hourly and daily distribution characteristics of the traffic patterns which developed helped to avoid the serious congestion which some anticipated. Fair related traffic peaks were noticeably different from local traffic peaks. (See also pp: 87, 92, 98, 100, 101)

* The existence of four visitor gates probably spread traffic which would have been more concentrated if fewer gates were available. (See also pp: 55, 56, 101)

PARKING

* The impact on entrepreneurs of the announced $6.00 official parking fee and the City's decision to not control the number of parking lots to be developed led to a surplus of World's Fair parking spaces. (See also p. 123)

* While it is clear that the "official" parking fee was above the equalibrium price, it is not clear that a lower announced price would have encouraged as much parking development as was required. (See also pp: 105, 219, 227, 228)

* Numerous entrepreneurs, like KIEE itself, considered the cost of developing and operating their propcsed lots carefully but were unaware of the extent to which others were making similar plans. (See also p. 220)

* As with fairs in Seattle, San Antonio, and Spokane, remote parking lots proved unattractive to visitors and employees in Knoxville. (See also pp: 111, 113, 123)

* Post Fair parking rates in the downtown area appear to have stabilized at about ten percent above the pre-Fair level for monthly parking and 25 percent higher for hourly rates. (See also pp: 117, 118, 120, 123, 124)

* Development of parking facilities for the Fair resulted in the creation of several new permanent parking facilities in the downtown area and near the University. (See also: 115, 116, 118, 119)

TRANSIT, TOUR AND SHUTTLE BUSES

* Provision of off-street parking facilities for tour and shuttle bus loading and unloading is imperative. The size and type of facilities is dependent on the trade-off between needs of the terminal and the alternative land uses. Terminals should be located adjacent to visitor gates. (See also pp: 131, 135, 138, 141, 144, 151, 153-157)

* The distribution of bus terminals at the three different visitor gates helped to reduce congestion. (See also p: 144)

* An active marketing program to attract tours to the World's Fair resulted in an unusually high percentage of visitors arriving by tour bus. (See also pp: 145, 157)

* For planning purposes the high volume of tour buses that arrived in Knoxville during the spring and fall months can be expected at other major events in the south. This is due to the large number of older visitors on tours wishing to avoid the hot weather and high attendance of the mid-summer period. (See also pp: 145, 147, 157)

* The Knoxville experience showed that the demand for shuttle bus service was related more to a per-bed measure than to the total number of lodging units reserved. (See also pp: 126, 127, 144)

* Shuttle bus service for remote lots was over-supplied, since the level of shuttle service was tied to an over-estimated need for parking facilities. (See also pp: 137, 138, 141)

* Given auto occupancy rates and bus operating costs, it appears unlikely that any price for shuttle bus service from outlying areas could have enabled operators to break even. (See also pp: 229, 230)

* There is a small market segment with relatively inelastic demand, for whom shuttle bus service will be a viable choice at virtually any price. (See also p. 231)

* Demographic characteristics of riders on various transit routes will affect demand for service during a special event, so adjustments should be on a route basis rather than for the entire system. (See also pp: 162-164, 175)

* Substantial farebox and ticket revenues for regular route transit service were experienced during the Fair, with up to 100 percent increases on a few routes and a decrease on only one route. (See also pp: 175, 179)

* Regular route patronage remained above pre-Fair levels after the Fair, although express-route ridership decreased during and after the Fair. (See also pp: 175, 176, 179)

* Patronage increases during a special event will decay over a period of about 90 days after the event. (See also p: 179)

* Special transportation services for elderly and handicapped visitors must be considered early in the planning process. (See also p: 194)

MARKET FORCES

* The operations of different transportation services were interrelated. Since in many cases various modes, parking facilities, and other services were complementary to or substitutes for one another, the price and availability of one affected the demand for another. (See also pp: 207, 225, 228, 230)

* Transportation service operations which expanded existing business on an as-needed basis where generally more successful than those which were begun explicitly for the Fair. (See also pp: 202,204,206)

* Visibility was generally more important to the success of the transportation services than quality, price, convenience, and other service characteristics. Since out-of-town visitors were unfamiliar with the alternatives, the most obvious services tended to be most heavily patronized. (See also pp: 107, 110, 198, 199, 202, 203, 204, 206, 207)

REGULATIONS AND AGREEMENTS

* The nature of special events dictates that special agreements and ordinances be enacted to provide for successful, effective transportation services. (See also pp: 209, 217)

* The special regulations and agreements pertaining to Fair transportation in Knoxville were adhered to, generated few complaints, and were considered effective. (See also pp: 209,217)

* Regulatory agencies must be willing to modify normal procedures in order to effectively handle a large volume of applications for temporary operating authority for a special event. (See also pp: 144, 213, 217)

* Regulatory agencies charged with granting operating authorization must allow sufficient time for business start-up when developing their timetable for decisions on licensing. (See also p. 144)

* The inability to predict market size was a fundamental problem in the regulation of transportation services. As such, it is probably not appropriate to suggest a stronger role for the regulatory body other than vigorous enforcement of criteria for fitness to provide service. (See also pp: 143, 144)

* Although not easily accomplished, the over supply of parking might have been reduced by earlier disclosure of the number of permitted lots. (See also p. 124)

* The provision of shuttle services by private non-Fair operators limited KIEE control over quality of service, treatment of passengers, and changes in service (such as termination of service). (See also p. 143)

* Due to the unpredictability of demand for transportation services, cancellation clauses based on insufficient demand are justified in contracts. (See also pp: 138, 143, 144, 181, 215, 217)

Chapter Two:

TRANSPORTATION AGENCIES

INTRODUCTION

This chapter provides an overview of how transportation agencies functioned during the World's Fair. General information on how existing agencies adapted to the World's Fair and how Knoxville's experience may be used by transportation agencies in other cities is offered.

This chapter is organized as follows. The first section describes "the setting", which is background data on the environment in which the World's Fair took place. Next, is a brief description of the transportation agencies and their general responsibilities. The third section draws contrasts between the setting and traditional procedures that are carried out by transportation agencies. These contrasts are important because they provide some insight as to how existing agencies can more effectively contribute to a major event. The fourth section categorizes the roles played by different agencies during a major event. These roles are suggested as a way for agencies in other cities to maximize their contribution to a major event. Finally, some differences are pointed out between providing transit services and providing highway facilities for a major event.

THE SETTING FOR FAIR-RELATED TRANSPORTATION ACTIVITIES

The 1982 World's Fair was originally conceived in 1974 by individuals within the business and governmental community who wished to revitalize the downtown area. The Fair was seen as a means for redeveloping vacant and dilapidated downtown areas and also as a means for attracting businesses to the downtown area.

Once it was determined that hosting a World's Fair was possible and that it was a desirable undertaking, it was necessary to secure the support of key individuals within the business and political community. Two types of support were needed. Broad based support by influential community leaders was needed to promote and support the Fair. Secondly, very strong and influential leadership was needed to assume responsibility for gaining a concensus of support despite any political and economic obstacles which might arise. This leadership had to have influence and power that transcended entrenched bureaucracies and small scale or parochial power bases. Without this strong leadership the World's Fair would not have

occurred. A key element in the process of gathering support for the Fair among business and governmental leaders was the assumption of a leadership role for undertaking and implementing the Fair by a small core of individuals.

The individuals who assumed the leadership role for implementing the Fair had to be capable of cooperating with and influencing State and National leaders in a variety of ways. The first and most obvious need was to obtain approval for the Fair from financial institutions and the city. For example, it was necessary to secure commitments from banks for loans for the Fair. It was also necessary to secure commitments for financial backing from local government. The third responsibility of Fair leadership was to secure political support at the national, state, and local level. This meant that Fair leadership had to have a strong influence politically at many levels, as well as the ties and knowledge needed to operate within financial circles. Therefore, it is apparent that those who took a leadership role for implementing the 1982 World's Fair had to operate outside of the traditional governmental process. A separate and powerful entity was necessary to make the World's Fair a reality. This entity (the Knoxville International Energy Exposition---KIEE) strongly, though indirectly, impacted transportation agencies.

Before discussing the effects of having a second power base, a related but different type of phenomenon should be mentioned. This can be characterized as the opposing or skeptical element within the community. Whenever a new and unknown venture is about to be undertaken, it is natural for fear and skepticism to be felt by the average person. This fear and skepticism manifested itself through substantial controversy about the Fair within the community. Since the skepticism and negative reactions of many local citizens was consistently aired at public meetings and in the press, many political and business leaders did not wish to associate themselves directly with the Fair. Direct association with the Fair during the period of intense controversy was seen as a political or public relations liability. This controversy was a frustration to the complete formation of a strong and unified partnership between KIEE and political leaders. Therefore, KIEE and the traditional governmental structure, which were two distinct centers of influence and power, at times worked toward different objectives.

It should be pointed out here that many of the same people who saw the Fair as somewhat of a personal public image liability also saw it as a means to make a positive impact on the community. The publicity, prestige, and monetary benefits in having 11,000,000 visitors to a community are obvious. In addition, the residual on site values of a World's Fair can be quite positive.

This was the environment in which transportation agencies functioned while preparing for the World's Fair.

KIEE was established as an independent corporation for financial and legal reasons, since under U.S. law the public sector can not sponsor a fair. Its functional and political independence was necessitated by the environment just described, as well. This independence had an effect on transportation planning and implementation. Two centers of influence had to be dealt with by the transportation agencies--one outside of the traditional process, and the traditional process itself (including political bodies). Because two centers of power existed, gaps in responsibility existed, decision-making was fragmented, and questions of who had authority and decision-making responsibility were many times not clearly resolved.

TRANSPORTATION ORGANIZATIONS AND GENERAL RESPONSIBILITIES

There are several reasons for outlining the participation of federal, state, and local agencies involved in providing transportation facilities and services related to the Fair. First, it illustrates the large number of agencies involved in planning, administering, and providing transportation facilities and services. Secondly, it provides an overview of the large number of duties of those agencies along with the procedures and processes required to implement a project.

Because of time constraints, the importance of the event, and the influence asserted by influential outsiders, traditional transportation procedures cannot easily serve the needs of a major event. The highly decentralized, methodical, and participatory decision making process traditionally used to plan and implement transportation services is not well suited to responding to the conditions of a major event such as a World's Fair. What is needed in some situations is a centralized power structure capable of making binding and expeditious decisions.

A listing of the transportation agencies involved in providing transportation facilities and services along with a brief description of their responsibilities is provided in Table 2-1.

TABLE 2-1: TRANSPORTATION AGENCIES AND FUNCTIONS

AGENCY	FUNCTION
Federal Government [Federal Highway Administration (FHWA) and Urban Mass Transit Administration (UMTA)]	*Fund transportation projects (90% Interstate Highways, 50-75% State Highways, 80% transit capital assistance, 50% transit operating assistance). *Review planning, conduct administration and approval process. *Implement national policies.
Tennessee Department of Transportation (TDOT)- Headquarters Office	*Approve and fund road construction programs. *Fund transit capital and operating costs. *Administer federal highway programs.
TDOT - Knoxville Regional Office	*Provide maintenance and operation of state roads. *Coordinate planning with local engineering departments and county highway departments.
Knoxville City Engineering Department	*Administer and operate City related highway projects. *Participate in planning and design of state and federal highway projects impacting local area.
Knoxville/Knox County Metropolitan Planning Commission	*Collect data. *Analyze data. *Prepare general system plans. *Administer requirements imposed by state and federal government.
K-TRANS	*Provide city transit service.
Knoxville Department of Transportation Services	*Jurisdiction over K-TRANS, taxi service, service to the elderly and handicapped and other intra-city public transportation services.
Knox County Department of Highways	*Construct road improvements within Knox County but outside city limits.

CONTRASTING THE WORLD'S FAIR ENVIRONMENT AND TRADITIONAL PROCEDURES

The World's Fair was a major national, state, and local event, with peak crowds expected to be over 100,000 people per day, over a six month period. As such, transportation related facilities and services took on an unusual importance. The image of both the city and state would be affected by visitor satisfaction with such things as transportation and housing services as well as their safety and comfort at the Fair. The number of repeat visitors would also be influenced by word of mouth descriptions and media publicity on the Fair itself, as well as related facilities and services. In addition, the number of mid-summer and late summer visitors would also be affected by the above.

Contributing to the success of the Fair was an important objective of the city, and in many ways the state. This included the provision of transportation facilities and services. Transportation support and services therefore, became a high priority within the state and municipality. This is a departure from normal conditions where transportation projects are only one of the many services provided by national, state, and local government. Because of the magnitude and importance of the event, and the corresponding image of the city and state in providing for the World's Fair, transportation facilities were elevated above their usual position within the group of services offered by government. This meant that external forces governed or strongly influenced the provision of facilities and services rather than the usual situation where transportation agencies alone directed the course of projects.

The second contrast between the Fair and traditional procedures was the opening date of the Fair, which served as a strong external influence. Normally time constraints do not strictly govern transportation planning and implementation. However, the need to have adequate transportation facilities in place by opening day on May 1, 1982, added a sense of urgency to the work on transportation facilities and plans for service. This crucial time constraint is not typically present in routine transportation planning and implementation.

The third major contrast was the direct interest and occasionally active role played by business and community leaders. In order to insure completion of transportation projects by opening date, and because loans for the World's Fair were tied to the timely completion of highway projects, business and community leaders had a strong interest in transportation projects. Therefore they exerted their influence through the upper levels of state and national government. This is also somewhat of a departure from traditional transportation decision making patterns. Normally, the staff of transportation agencies generates what are considered to be reasonable solutions to a problem and submits them to the higher

levels of the departments and government for their approval. However, in the case of the World's Fair, the influence of business and community leaders was felt from the top down. The directors of departments and key governmental leaders took an active interest in completion of key projects and exerted this influence at the higher levels of government and transportation related agencies.

Another contrast with traditional procedures was that limiting involvement by agencies and groups was both desirable and necessary to expedite preparations for the Fair. Involvement was generally limited to implementing agencies directly responsible for building or operating the Fair and support facilities. For example, the staff of the Metropolitan Planning Commission did not participate in a large share of the meetings that involved planning and operations for the World's Fair. The same is true of certain state and federal departments, various authorities, commissions, the regional planning agency, etc. Although involvement of these groups is very desirable for traditional transportation planning and implementation, it would not have been effective in this case. Involvement of a large number of groups is extremely time consuming and increases the need of group concensus for a final decision. The "process" was less important than the product under these conditions.

It should also be pointed out that one of the biggest problems in providing transportation facilities and services were those situations where established agencies could not effectively respond to the unique needs of a major event. For example, the Tennessee Public Service Commission failed to become actively involved in service issues within their jurisdiction, while K-TRANS wished to play a more active role but could not because of limited service boundaries. Other examples of authority and responsibility gaps included parking and miscellaneous service providers. The point here is that traditional agencies served the Fair well within their traditional, functional limits. However many situations arose which were beyond the traditional limits of clear responsibility and authority. In these cases expeditious decisions were not made, were made by default, or made by other organizations.

THE SPECIFIC ROLES OF TRANSPORTATION AGENCIES

The roles of transportation agencies are broadly categorized below to more specifically define the functions of agencies during a major event. Once their appropriate role is understood, each agency can concentrate on making its maximum contribution. While the following description is an oversimplification, it is intended to suggest that each agency can best contribute by using its specific strengths in pursuit of a defined mission.

The following categories are used to broadly describe the roles of specific agencies for the World's Fair.

1) External Policy Control

   a. FHWA
   b. UMTA
   c. TDOT-Nashville

2) Peripheral Support

   a. TDOT-Nashville
   b. MPC

3) Implementation and Operations

   a. Knoxville Dept. of Engineering
   b. TDOT-Nashville and Regional Office
   c. K-TRANS
   d. Police Department
   e. KIEE Transportation Services Division

4) Regulatory

   a. City Council
   b. Tennessee Public Service Commission
   c. Knoxville Department of Public Transportation Services
   d. Police Department

5) Primary Service Recipients and Affected Providers

   a. Fair attendees
   b. Taxi Cab operators
   c. Tour Bus operators
   d. Private Shuttle Bus operators
   e. Miscellaneous transportation providers (e.g. helicopter rides and boat rides)
   f. The community in general

Agencies responsible for external policy control cannot be expected to initiate actions to benefit the local community during a major event. They do not know exactly what the local needs will be when hosting a major event. This points out the need for early and coordinated efforts at the local level to identify specific transportation needs. Until specific needs are identified, federal and state agencies cannot be expected to make constructive contributions to the local area. This implies that the local community agree upon their highest priority needs and submit requests for assistance to federal and state agencies early.

Peripheral support agencies are those which provide data collection and analysis work for implementation. Those agencies must take the initiative early if they are to provide constructive contributions toward transportation services during a major event. There is a limited amount of time for detailed studies, broad agency and citizen involvement, lengthy approval processes and the reaching of a concensus on any issue. Planning and peripheral support agencies can best contribute by limiting their efforts to projects that will directly impact implementation and operation. This can be done by offering help directly to the operating and implementation agencies and/or undertaking very compressed studies that suggest specific courses of action on specific issues. Peripheral support agencies must either have funding readily available for such studies or be able to secure that funding within a very short period of time.

The agencies responsible for operation and implementation will carry the greatest responsibilities during the course of the major event as well as during preparations for the event. As the opening day for the major event draws near, these agencies will have to assume greater decision making responsibility. There will not be enough time for those involved with the event to concern themselves with transportation related issues except on an emergency basis. Furthermore, the time required to obtain approvals and satisfy traditional processes might postpone decisions and action until after the event is over. Therefore, the responsibility for making final decisions will be with those who actually carry out the work.

Agencies involved in regulating various transportation services during a major event have an extremely difficult time in handling the various requests that come before them. Since a major event will probably happen only once in the lifetime of all but the largest cities, regulatory agencies often have difficulty anticipating the nature of requests they will face. Furthermore, there is the problem of jurisdictional boundaries which leave gaps and overlaps in the decision process. In addition, there are often no ordinances or statutes to handle the unique character of peripheral transportation services during a major event (e.g., temporary parking lots, shuttle buses, atypical modes). It may be in this area where planning agencies can contribute most of providing a rational approach to handling the various regulatory problems.

One approach to anticipating the needs generated by a major event is to start with the service recipients and potential transportation providers. By listing the groups in this category and listing their transportation needs, some general conclusions can be drawn about the transportation needs they will generate. By identifying service recipients and their needs, the local planning and support agencies can start to organize the required responses of agencies who will be providing transportation facilities and support.

The single, most important factor that determined the success of transportation agencies in preparing for the World's Fair was the attitude of the people who staffed the agencies. The importance of having positive, cooperative attitudes, and a sense of common purpose cannot be overemphasized. Fortunately, Knoxville was in a position where, with few exceptions, the individuals involved were dedicated to the success of the World's Fair.

SUMMARY AND CONCLUSIONS

The environment for providing transportation facilities and services for the World's Fair had the following characteristics: 1) strong support by influential community leaders was needed to bring the Fair to reality; 2) assumption of a leadership role by politically influential and financially knowledgeable individuals to overcome obstacles and transcend smaller power bases; and 3) community opposition contributing to the apparent separation between KIEE and local government. Because of this transportation agencies had to deal with two power centers--one outside of the traditional process, plus the process itself. Thus, there were frequent authority and responsibility gaps and decision-making strayed from the typical path.

There are two important differences between carrying out routine transportation planning and implementation, and the needs of this type of major event:

1. The importance of the event elevates transportation services to a high priority in the minds of business and community leaders. This can be a great benefit if the needs of the major event are identified early. Leaders at the higher political and departmental levels can be called upon to authorize funds and programs that are needed to adequately provide transportation services and facilities.

2. The opening date of the major event significantly affects the way in which agencies must operate. Time limitations mean that transportation agencies must operate in a decisive and expeditious manner. Broad group concensus and lengthy decision processes are not practical under these circumstances. Therefore, departments must be prepared to delegate substantial decision-making authority to operating personnel and those at the functional levels of the organizational chart.

*The roles of transportation agencies should be limited to those areas considered agency "strengths".

- External policy agencies need unified and early input from the local area on what their specific needs are for the major event.

- Peripheral support departments can best contribute by limiting their efforts to projects that will directly impact implementation and operations. They must take the initiative early and offer help to operating and regulatory agencies.

- Operating agencies must be given or assume substantial decision-making authority. Regulatory agencies should attempt to close regulatory gaps and they should take the initiative early in identifying the unique needs of the event.

- In determining the success of transportation agencies in preparing for a major event, the importance of a cooperative attitude and a sense of common purpose and timeliness by their management and staffs should be emphasized.

*Although there was an apparent overall distinction between KIEE and local government in many respects, there was close cooperation on critical issues in which both parties saw an opportunity for gain.

*There must be a forging of public and private leadership that can get the job done by maximizing the strengths of each, in instances where the responsibility does not clearly fall in the realm of either group.

Chapter Three:

TRANSPORTATION PLANNING DESIGN PARAMETERS

INTRODUCTION

The access, terminal, parking, and gate facilities for a World's Fair are designed on the basis of several parameters. These include:

-- design day attendance

-- mode split

-- hourly inbound and outbound volumes

-- on-site accumulation

-- gate distribution

This chapter provides the statistical information from The 1982 World's Fair, as well as selected data from other World's Fairs, used to determine the appropriate design parameters. The methods for estimating each parameter for The 1982 World's Fair are also reviewed, including the level of accuracy. Conclusions and recommendations for future design parameter estimates are provided where possible.

ATTENDANCE PATTERNS

Total Attendance

The 1982 World's Fair attracted 11.1 million visitors over 184 days. Several economic feasibility studies and updates conducted during the six years preceding the fair generated planning estimates. The final estimate was for an attendance of 11 million. The most optimistic estimate had been for about 13 million, so all estimates were within the same order of magnitude.

While it is beyond the scope of this report to describe how economic feasibility studies for World's Fairs are performed, total attendance estimates are based on (1) the type of attraction, (2) past experience with market penetration for similar events, (3) population distribution within the area of influence, and (4) other local factors which may affect attendance.

Transportation system planning for the fair accepted total attendance as a basic assumption. Given the total attendance and fair duration, an average day attendance of about 60,000 could be determined.

Daily Variations

Daily attendance ranged from 23,000 to 102,800. The variations from day to day and month to month were substantial and, while following a general pattern, were not predictable on a day-to-day basis. This is consistent with daily patterns for other World's Fairs. Figure 3-A illustrates the daily pattern for the 1982 World's Fair.

There was no consistency between fairs relative to the peak days. Spokane's two highest days were Opening and Closing days. Seattle's two highest days were the last Saturday and Sunday of the fair, although the next two highest days were non-holiday Saturdays in September and October. Opening Day at Seattle was one percent below average. Knoxville's two highest days were Saturdays in mid-May and mid-October. Opening Day in Knoxville was actually about 10 percent above average and closing Saturday and Sunday were in the 15-20 highest day range. Low attendance days were equally inconsistent, although most were in September.

Variations By Day of Week

Day of week variations were much more predictable. Table 3-1 shows such variations for not only the 1982 World's Fair in Knoxville, but also for World's Fairs in Seattle (1962), Montreal (1967), San Antonio (1968), Spokane (1974), and Osaka (1970). The Seattle, San Antonio and Spokane fairs were similar in order of magnitude of attendance, drawing about 9.6, 6.4 and 5.1 million visitors, respectively. The Montreal Fair drew about 50 million, and Osaka drew over 60 million visitors and was subject to attendance patterns generated in a different cultural setting.

The peak day of the week for all North American fairs has been Saturday, drawing 17 to 19 percent of the weekly attendance. This averages about 25 percent above the average day. Tuesday was the peak weekday in both Seattle and Knoxville, with about 15 percent of weekly attendance - about five percent above the average day. However, Spokane experienced a flat weekday pattern with Monday, Tuesday, Wednesday, and Friday all at the same level, and Thursday only slightly less. Thursday was the low day at all fairs, at 12 percent of average weekly attendance (about 15 percent below average day). Overall, weekdays generated about two-thirds of the weekly attendance at Seattle, Montreal, Spokane, and Knoxville. San Antonio's weekday attendance was well below those of other fairs.

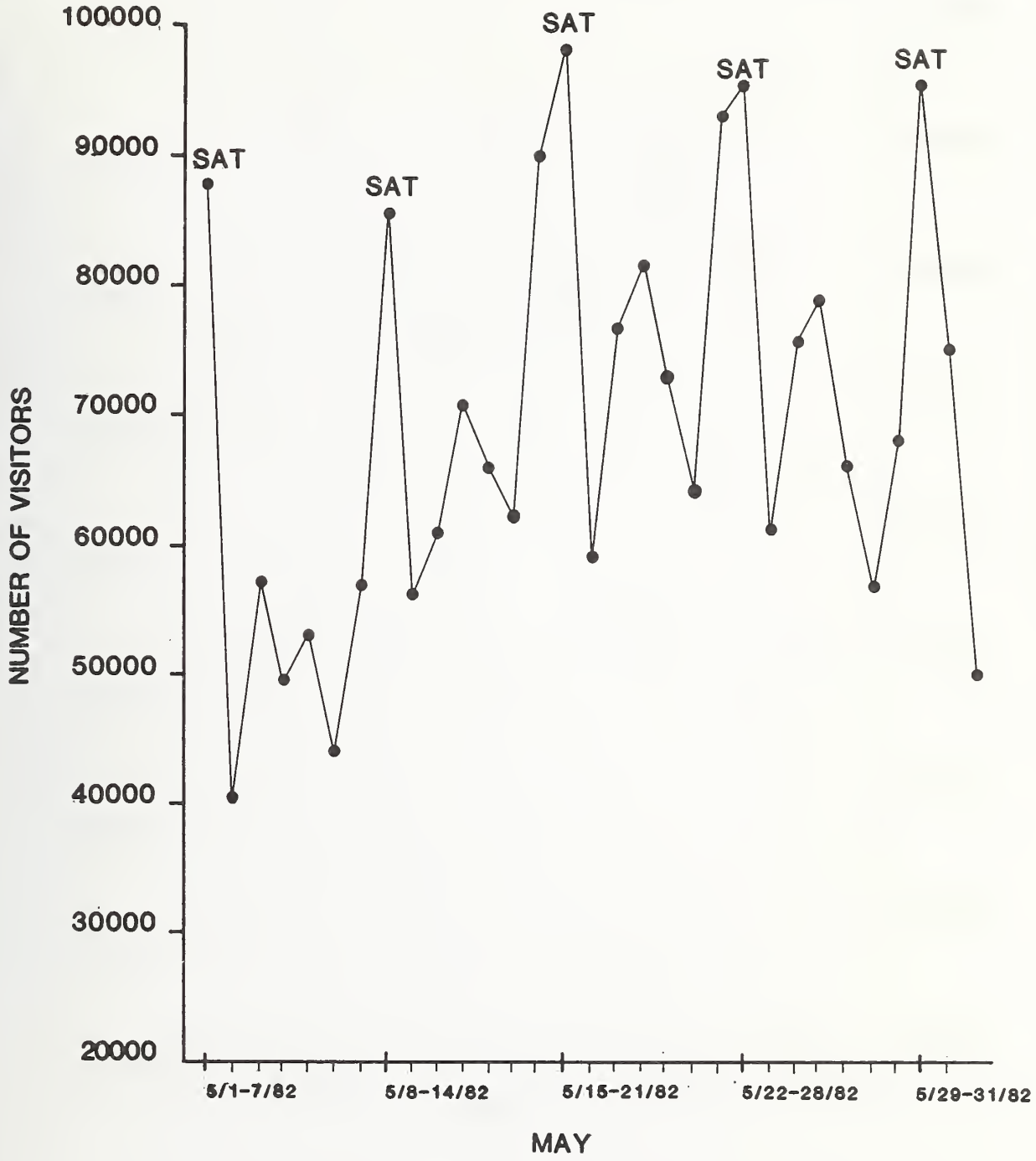

FIGURE 3-A
DAILY ATTENDANCE VARIATION

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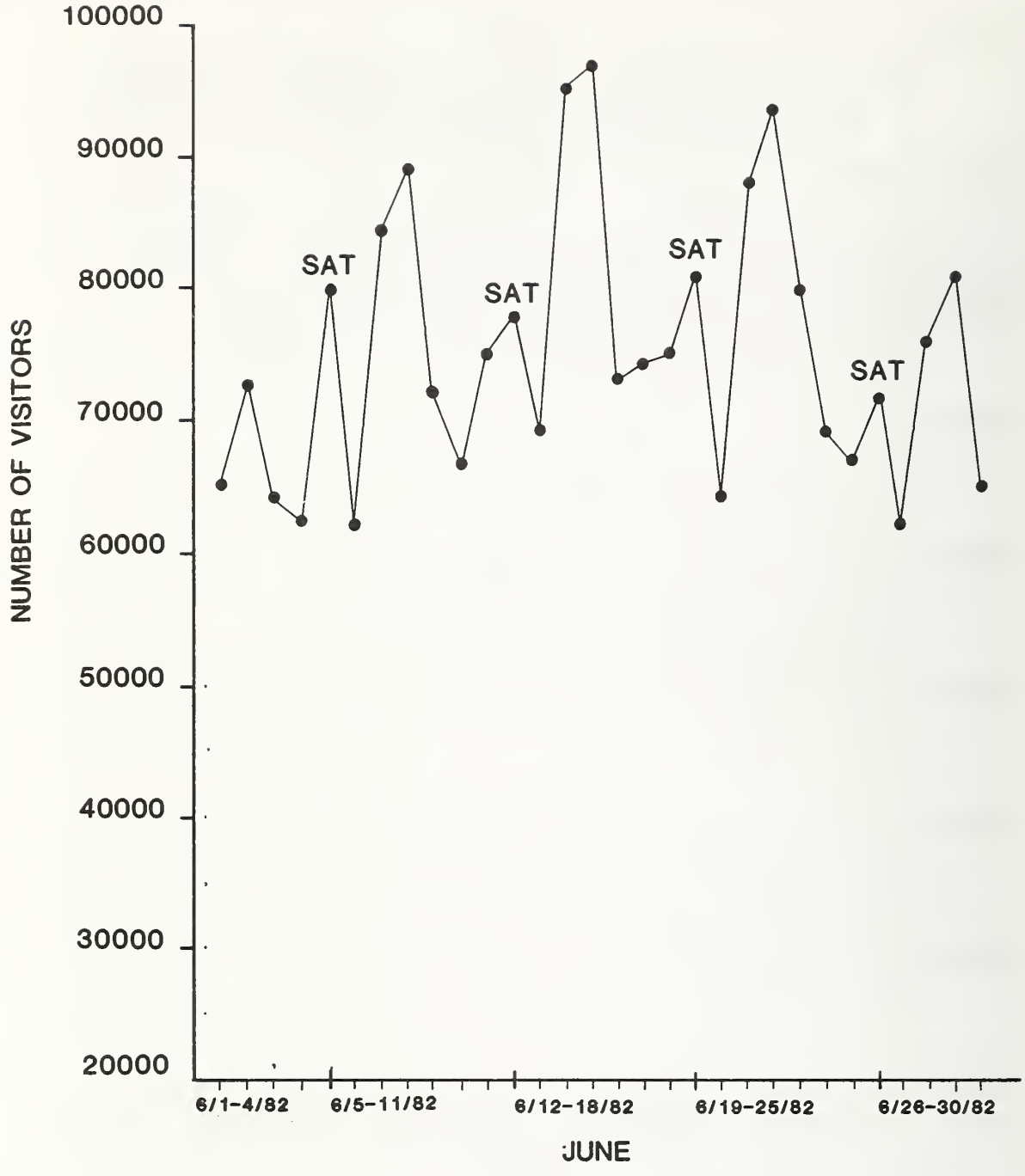

FIGURE 3-A
DAILY ATTENDANCE VARIATION

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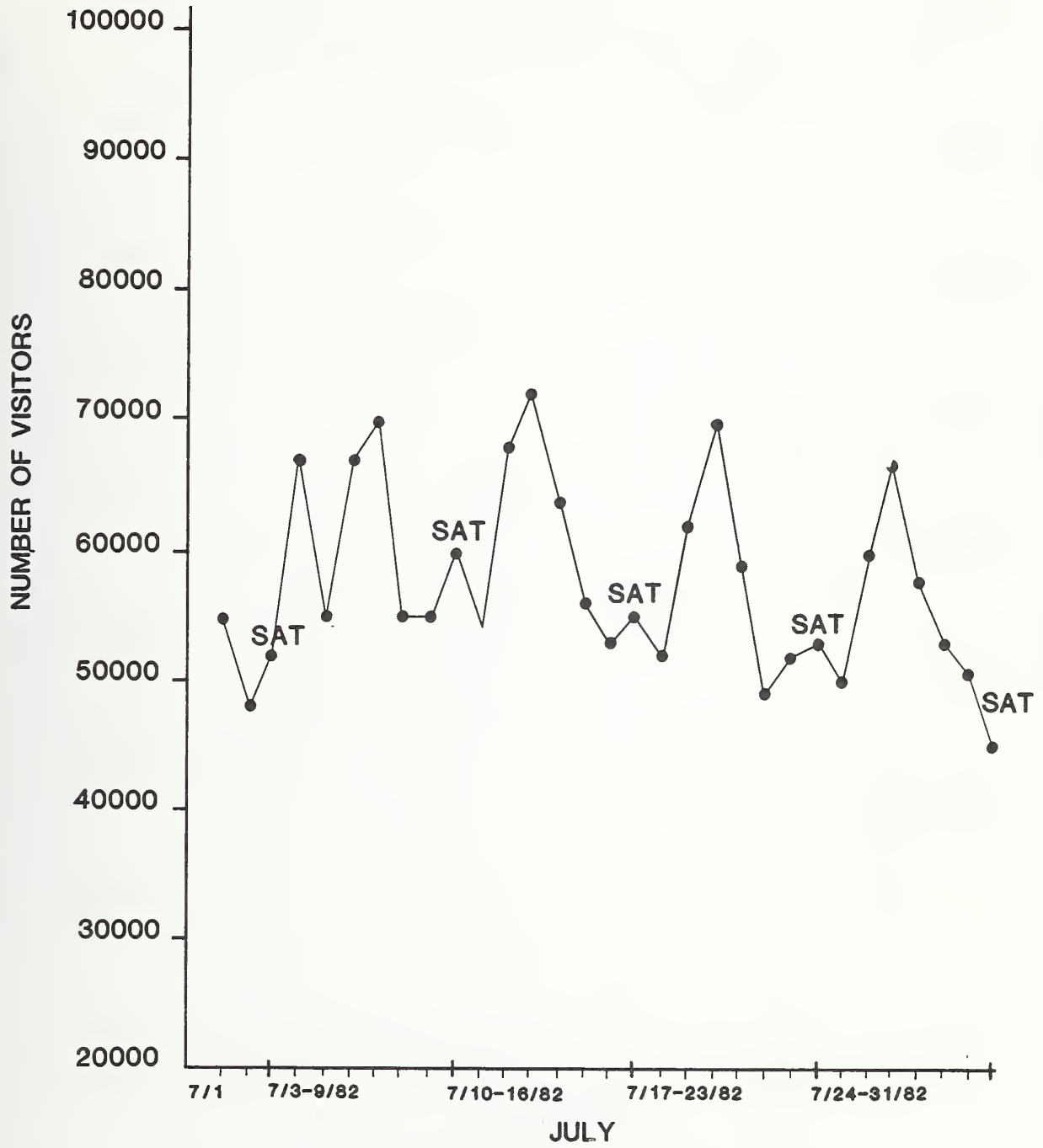

FIGURE 3-A
DAILY ATTENDANCE VARIATIONS

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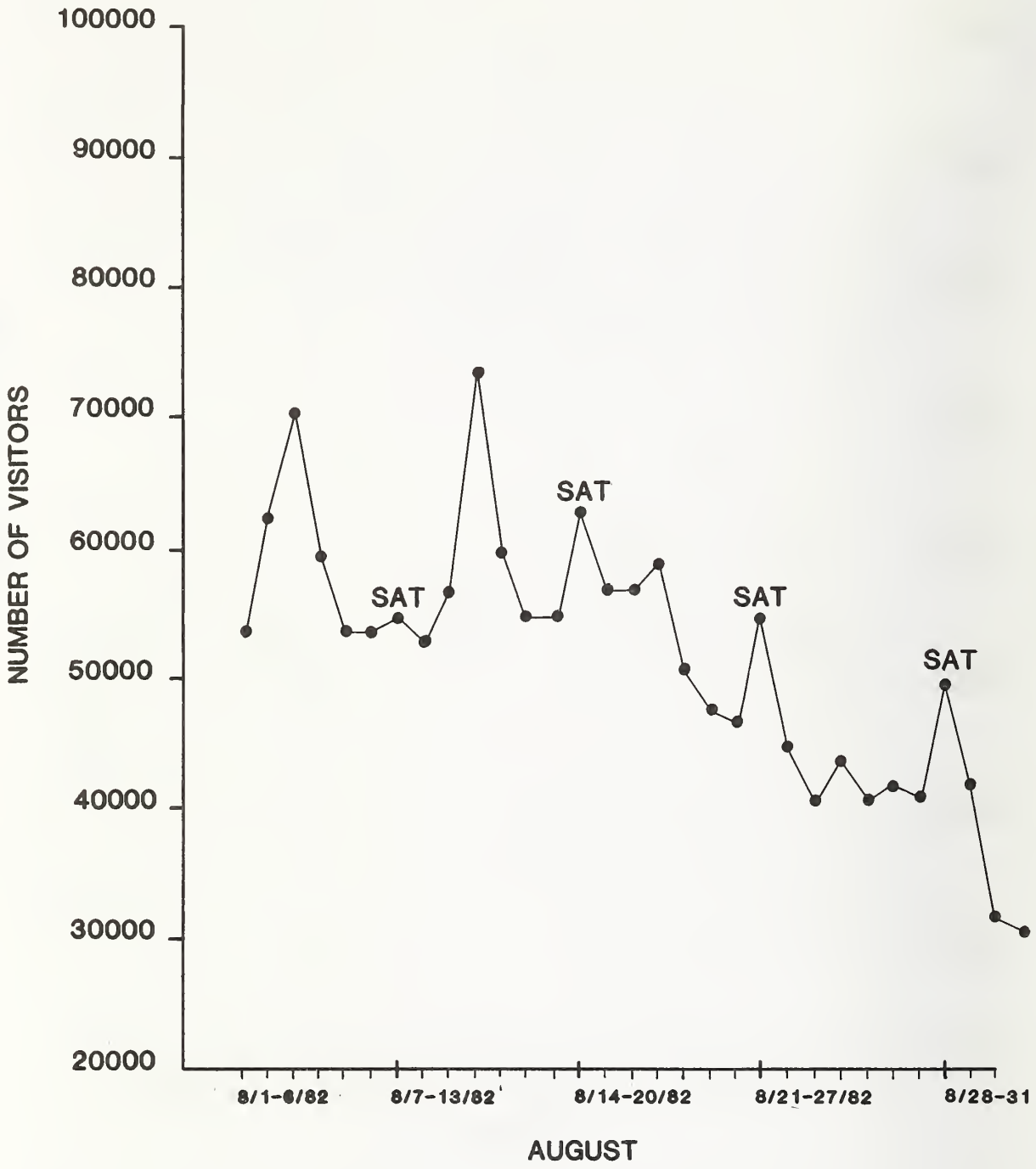

FIGURE 3-A
DAILY ATTENDANCE VARIATIONS

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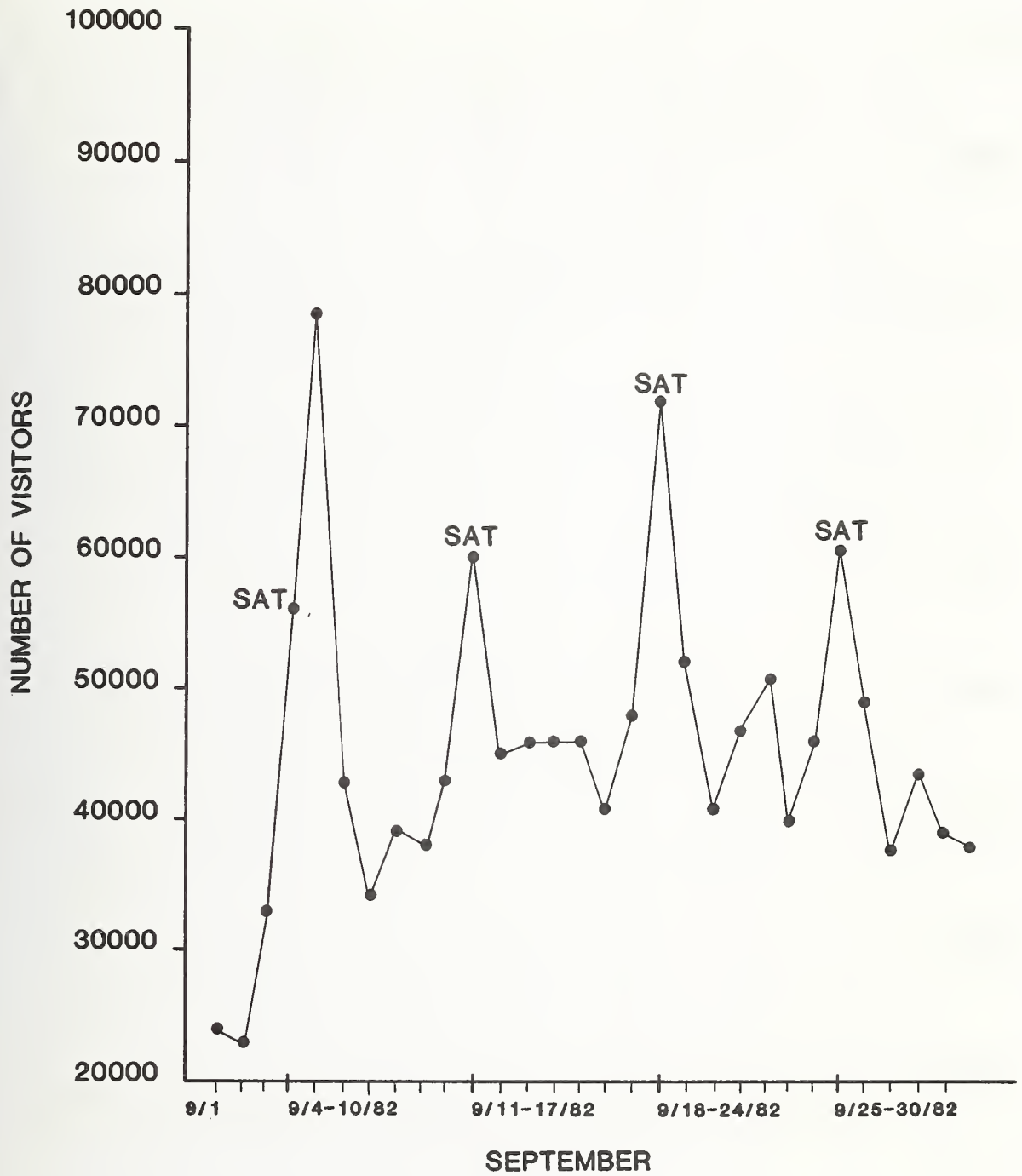

FIGURE 3-A
DAILY ATTENDANCE VARIATIONS

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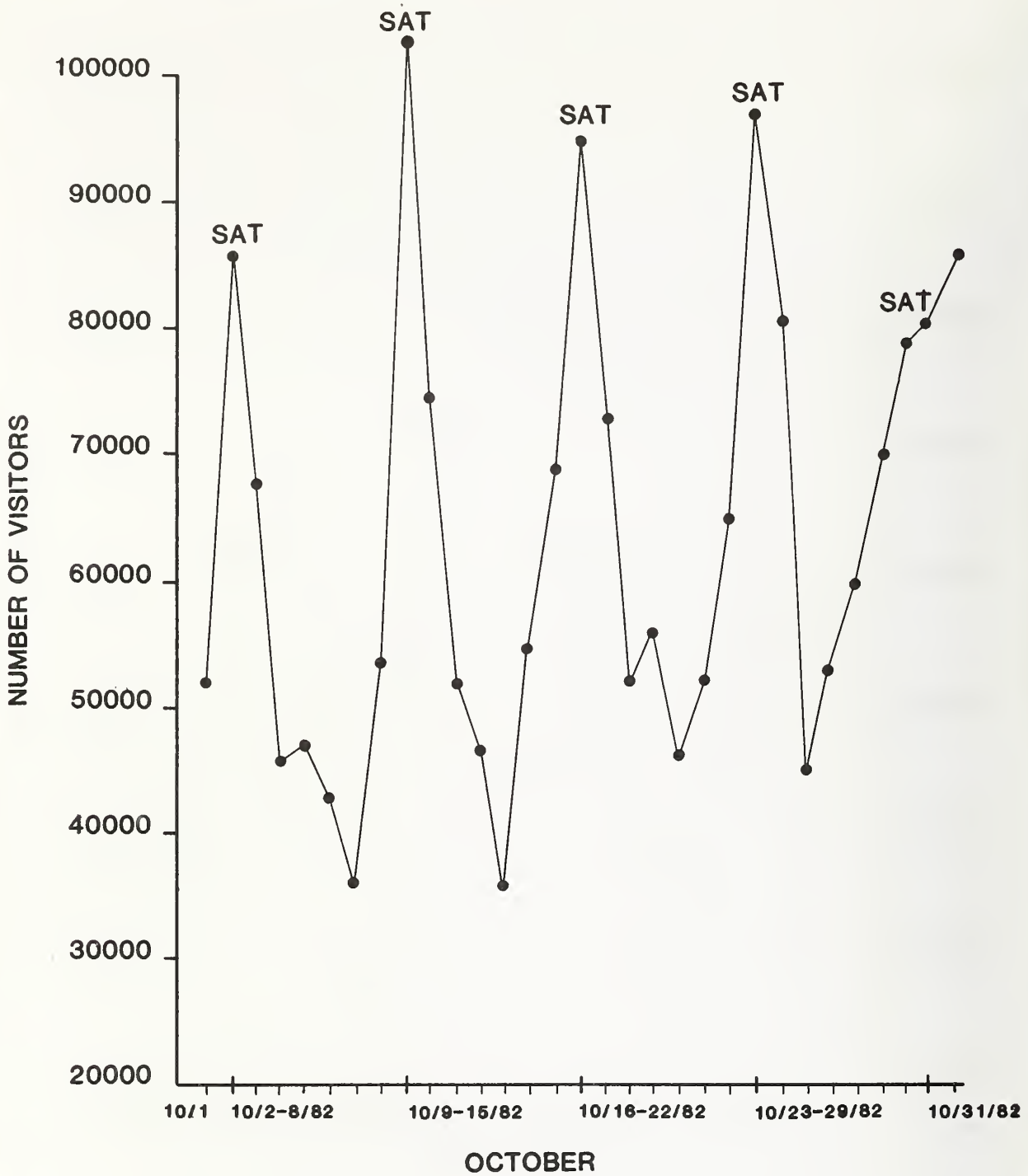


FIGURE 3-A
DAILY ATTENDANCE VARIATIONS

Table 3-1 shows the composite distribution for the U.S. fairs listed. With relatively minor variations, these patterns were consistent from week to week at the Knoxville fair. Nearly all of the ten highest attendance days occurred on Saturdays and Tuesdays.

Monthly Variations

Table 3-2 shows attendance variations by month. No two fairs have experienced close similarities in monthly variations. However, with the exception of the Knoxville fair, all have started slowly, peaked during the summer (August high month), dipped in September, and finished stronger in October.

The Knoxville fair had May, June, and October as peak months, with its low in August, Spokane's low was also in August. A major factor contributing to the May-June peak in Knoxville was the heavy influx of tour groups often amounting to over 15,000 persons daily. Those numbers dropped by 50 percent or more during the summer. Since this was the first U.S. World's Fair to heavily market to tour operators, such a peak would not be expected for fairs without an equally agressive tour marketing effort.

TABLE 3-1: ATTENDANCE VARIATIONS BY DAY-OF-WEEK

	PERCENT OF TOTAL WEEKLY ATTENDANCE						
Day	1962 Seattle	1967 Montreal	1968 San Antonio	1970 Osaka	1974 Spokane	1982 Knox-ville	U.S. Compo-site
Monday	13%	13%	11%	14%	13%	14%	13%
Tuesday	15%	14%	12%	12%	13%	15%	14%
Wednesday	13%	14%	12%	13%	13%	14%	13%
Thursday	12%	12%	11%	12%	12%	12%	12%
Friday	13%	13%	13%	14%	13%	14%	13%
Saturday	18%	17%	21%	17%	19%	17%	18%
Sunday	16%	17%	20%	18%	17%	14%	17%

SOURCE: Barton-Aschman Associates, Inc.

TABLE 3-2: ATTENDANCE VARIATIONS BY MONTH

	PERCENT OF TOTAL ATTENDANCE						
	Seattle	Montreal	San Antonio[1]	Osaka[2]	Spokane	Knox-ville	U.S. Compo-site (May-Oct.)
April	-	-	10%	14%	-	-	N.A.
May	11%	17%	15%	13%	13%	19%	14%
June	16%	16%	17%	16%	20%	20%	18%
July	19%	19%	19%	12%	21%	16%	19%
August	20%	20%	20%	18%	19%	15%	19%
September	16%	14%	14%	27%	11%	12%	13%
October	18%	13%	5%	-	14%	18%	17%

[1]This fair operated between April 6 and October 6.

[2]Listed by consecutive 30 day periods vs. calendar months since this fair operated between March 15 and September 13.

SOURCE: Barton-Aschman Associates, Inc.

Design Days

Figure 3-B shows the distributions of daily attendance for the Knoxville, Seattle, San Antonio, Osaka, Montreal, and Spokane fairs. With the exception of the few peak days, the distributions are very similar.

In Knoxville, the transportation system was designed for the 90th percentile day, based on attendance distributions for Seattle and Spokane. Spokane was designed for what was expected to be the 95th percentile day. Since facilities must be designed for a certain level of activity, and the specific attendance patterns are not predictable, it is customary to select a design day attendance which will adequately accommodate all but the highest attendance days.

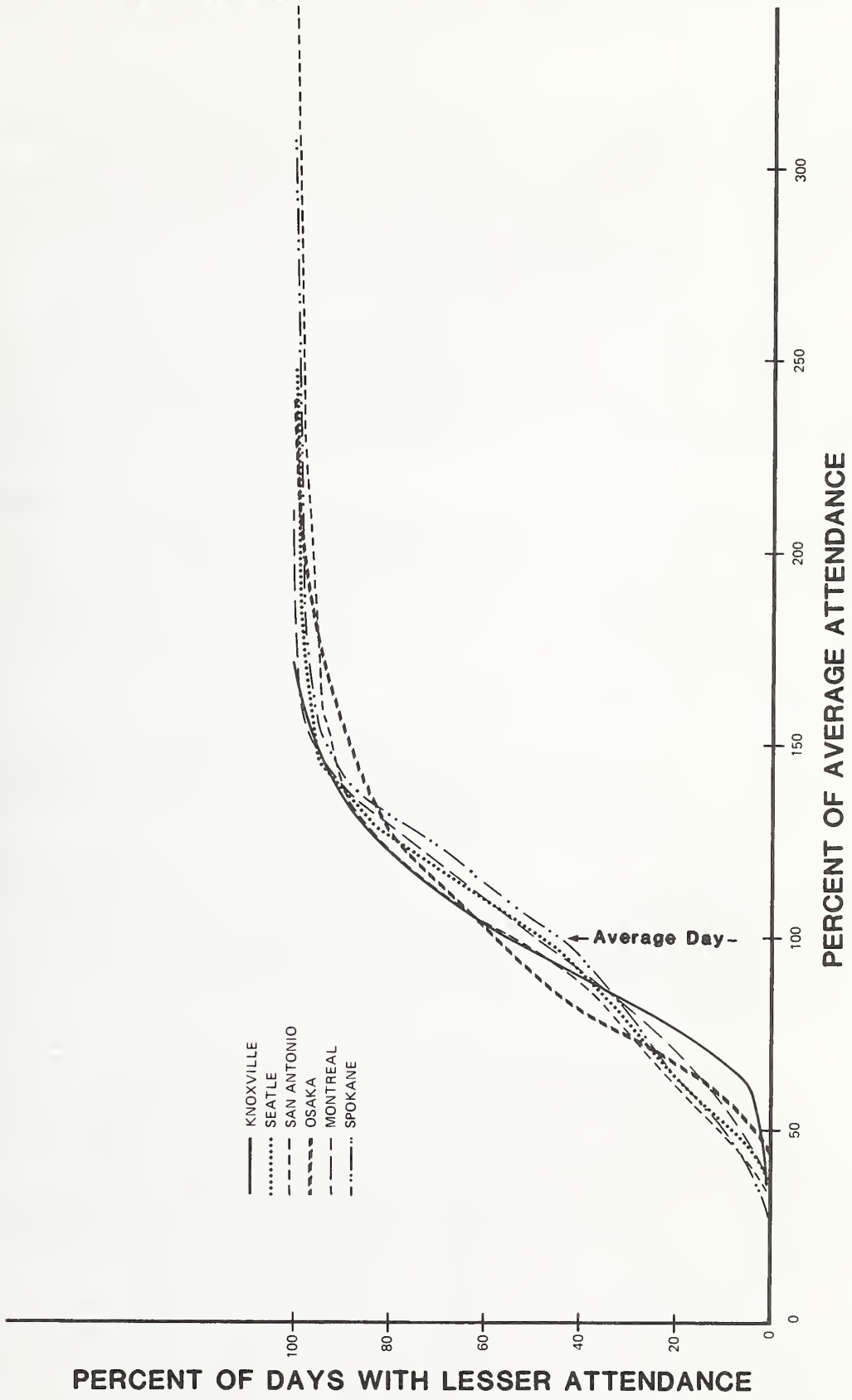


FIGURE 3-B
CUMULATIVE DISTRIBUTION OF ATTENDANCE

As is readily apparent from the distributions in Figure 3-B, there is a break in the curve near the 90th percentile. Above that level, a small percentile increase represented very few days and relatively large increases in attendance. As such it becomes very expensive to meet the additional facility needs, particularly in light of the few times they will be needed.

Economics controlled the choice of design day level for the on-site improvements. Because of the cost and difficulty of acquiring additional land, planning for the site in Knoxville was intended to meet 80th percentile daily attendance levels. Knoxville's transportation system, however, was designed for 90th percentile daily attendance.

Table 3-3 shows the peak, 90th and 80th percentile daily attendance for the Seattle, Montreal, San Antonio, Osaka, Spokane and Knoxville fairs as a percentage of average daily attendance. The percentage by which peak days exceeded average days varied substantially. The highest at each fair was a Saturday. Peak weekdays were 60 to 80 percent above average. The relationships of the 90th and 80th percentile days to average days are consistent for Knoxville, Seattle, and Spokane.

The estimate of the 90th percentile day for Knoxville was quite accurate. The projection was 80,000, based on 11 million total attendance, while the actual 90th percentile day was about 83,000 reflecting the 11.1 million total attendance.

Because all of the U.S. fair sites studied were in or immediately adjacent to downtown, weekday vs. weekend conditions represent a significant difference. In Knoxville, the Fair site was also flanked by the University of Tennessee, so there was even a difference between weekday conditions during regular sessions and the summer period.

There is a major difference between comparable weekdays and weekend days, although design weekdays and total days are similar. It is advantageous to fair transportation designers for downtown sites to use the 80th or 90th percentile weekday estimates. It should be recognized that there will still be a number of peak days on weekends when the weekday system will not be adequate, even after allowing for capacity convertible from weekday CBD use to weekend fair use.

TABLE 3-3: ATTENDANCE PLANNING AND DESIGN DAY STATISTICS

	PERCENT OF AVERAGE DAY ATTENDANCE							
	Seattle	Montreal	San Antonio	Osaka	Spokane	Knoxville	North American Average	Recommended for Planning
Peak Attendance								
Day	246%	208%	352%	239%	462%	170%	293%	-[1]
Weekday	180%	175%	154%	196%	160%	160%	167%	160%
Weekend Day	246%	208%	349%	239%	462%	170%	293%	-
90th Percentile								
Day	136%	139%	148%	165%	131%	138%	135%	138%
Weekday	131%	134%	115%	160%	131%	130%	131%	130%
Weekend Day	146%	155%	225%	187%	164%	158%	156%	160%
80th Percentile								
Day	123%	127%	123%	122%	121%	121%	122%	122%
Weekday	120%	122%	100%	120%	122%	116%	119%	120%
Weekend Day	141%	135%	158%	135%	145%	134%	140%	145%

[1]Varies according to average daily attendance.

SOURCE: Barton-Aschman Associates, Inc.

Weather Impact on Attendance

The 1982 World's Fair experienced only five days of heavy rains during the morning or afternoon, with few lasting more than two hours. Attendance on each of the five days was comparable to the same day of the previous and following weeks. At least for the 1982 Fair, rain had no major impact on daily attendance.

During extended heavy rains in the afternoons, many people left the Fair early, but the great majority sought cover until rains ended. The only impact rain may have had was to skew inbound and outbound flows to earlier or later times. Significant amounts of rain never fell all day during the Knoxville fair. This may be why no impacts were noted.

Temperature may have played a greater role. There were insufficient shaded and cooled areas on the site. The site also had little air movement due to its valley floor location. Hence, heat built up to the point that it became uncomfortable for many on hot days. This could be overcome by providing more shaded areas and better air circulation (including in bus terminals). The site development team has stated that this would be done if they were to design the Knoxville Fair again.

ENTRY AND EXIT VOLUME CHARACTERISTICS

Fair entry and exit gates need to be sized to meet peak hour volumes. Entry and exit volume characteristics for The 1982 World's Fair were examined for the peak weekday (Tuesday) and weekend day (Saturday).

Figures 3-C and 3-D illustrate the inbound and outbound patterns, respectively. The patterns for Tuesday and Saturday are shown and both are very similar. Entry peaks occur between 10 A.M. and 11 A.M., with 23 (Saturday) and 25 (weekday) percent of the daily attendance entering. Inbound volumes drop off rapidly after noon.

Exits increase gradually starting at noon, reaching a plateau of 9 to 10 percent per hour at about 6 P.M. until closing at 10 P.M., then peaking at 24 to 26 percent during the hour following closing (10 P.M.). For late closings, the total outbound volumes between 10 P.M. and 1 A.M. were only about 10 percent higher than the 10-11 P.M. hour on early closing nights. As with inbound volume patterns, exit volumes for Tuesday and Saturday are distributed very similarly.

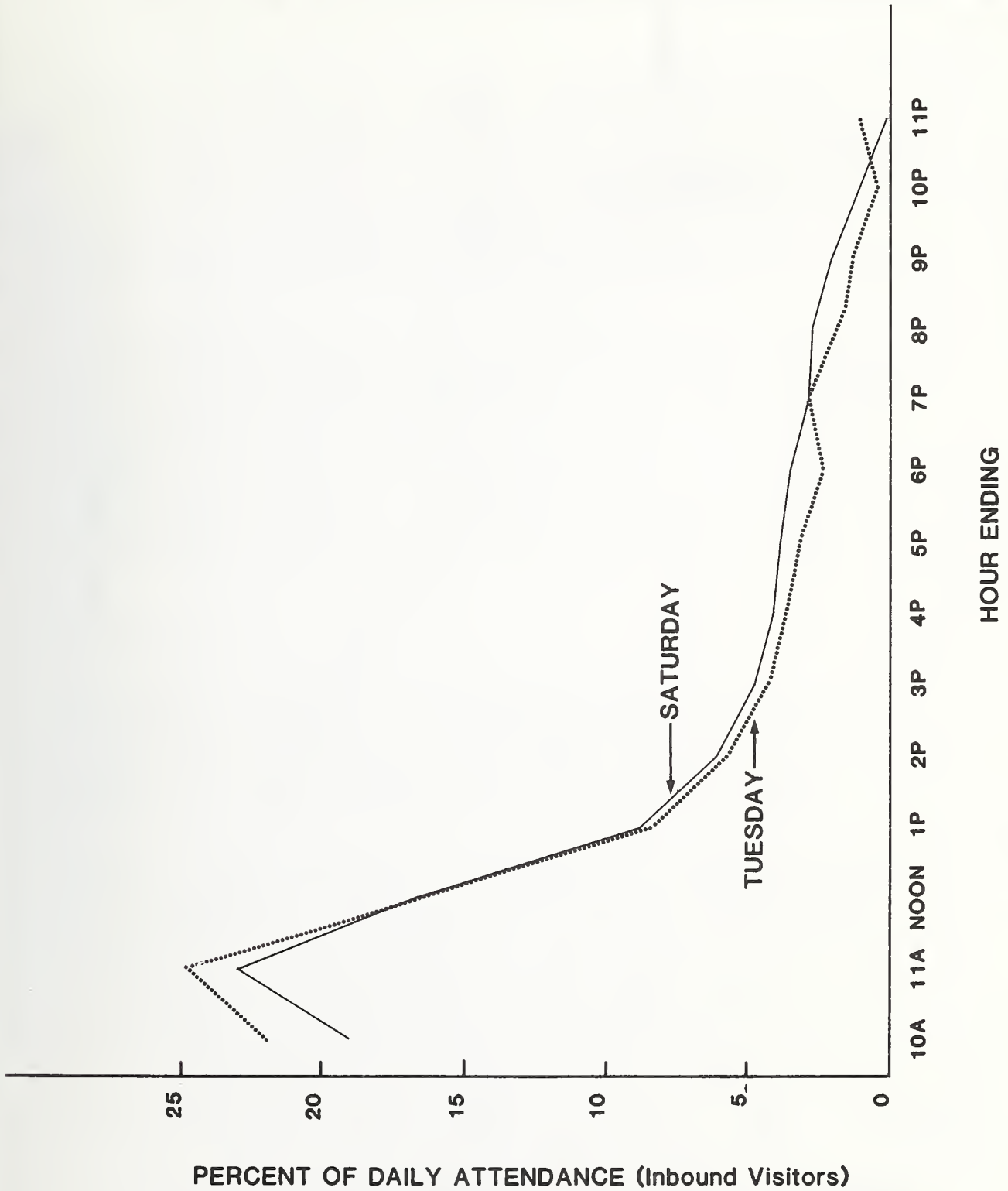


FIGURE 3-C
INBOUND VISITOR PATTERN

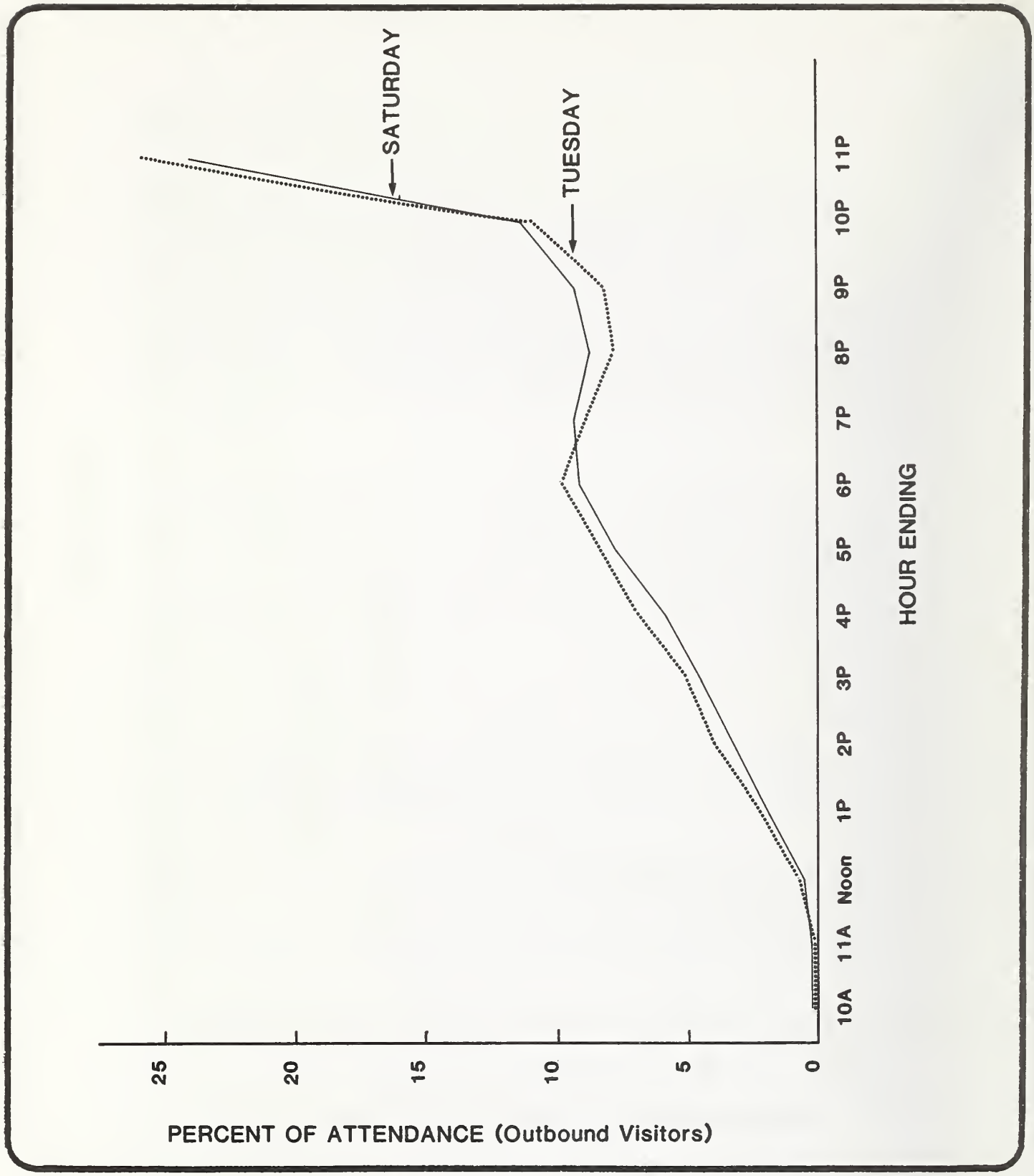


FIGURE 3-D
OUTBOUND VISITOR PATTERN

Figures 3-E and 3-F show cumulative entry and exit volume distributions for Saturdays for Knoxville and Osaka, the only other World's Fair to have registering outbound turnstiles. The cumulative inbound distributions for Knoxville are similar to the spring season pattern at Osaka. The summer in Osaka had an evening peak from 6 to 7 P.M.; otherwise the summer pattern is similar to Knoxville. The outbound cumulative curves are very similar. Based on this, the Knoxville hourly patterns do appear to be usable for estimating hourly volume distributions.

Theme parks and the State Fair of Texas were used in planning hourly gate capacities for the Knoxville fair. Table 3-4 shows the projected and actual hourly distributions. The inbound theme park based estimates were not far off. However, the state fair inbound and outbound estimates were not representative of World's Fair patterns. Nevertheless, all were reasonably close on the peak hour volume in each direction. It can be concluded that the peak hour volume magnitudes may well be determined from several sources. The actual time of day when the peak will occur is not as easily determined, except from World's Fair data (Figures 3-E, 3-F).

GATE SPLITS

The number of gates at recent World's Fairs has varied; Knoxville had four. As Figure 3-G illustrates, the peak hour and daily gate volumes were not evenly distributed among the gates. Daily splits ranged from 10 and 39 percent, while peak hour splits showed an even wider spread -- between 10 and 50 percent of the hourly volume.

Attempts were made during early Knoxville planning stages to spread the volumes to meet capacity constraints at each gate -- particularly the east gate. This was done by increasing or decreasing planned parking spaces near gates and locating bus terminals or parking areas at particular gates. While this was a good exercise, site and financial constraints ultimately played a bigger part in determining parking and terminal locations than did the desired volume distribution. Nevertheless, the decision to have four gates and the relative magnitude of volumes at each, was planned.

The procedure used was as follows:

1. Estimate volumes by primary mode of arrival (walk, drive, shuttle bus, local bus, tour bus, taxi, etc.)

2. Determine sources of walking visitors; distribute projected volume to each area; estimate number which will enter each gate.

TABLE 3-4: 1982 WORLD'S FAIR HOURLY VOLUME PLANNING ESTIMATES

HOUR	INBOUND				OUTBOUND		
	THEME PARKS				THEME PARK		
	EARLY ESTIMATE[1]	FINAL ESTIMATE[2]	STATE FAIR OF TEXAS[1]	ACTUAL[2]	EARLY ESTIMATE[1]	STATE FAIR OF TEXAS[1]	ACTUAL[2]
-10 A.M.	0%	21%	0%	19%	0%	0%	0%
10-11	22%	19%	26%	23%	0%	0%	0%
11-12	20%	18%	23%	17%	0%	0%	1%
12-1 P.M.	13%	11%	17%	9%	0%	1%	2%
1-2	10%	6%	15%	6%	0%	1%	3%
2-3	5%	4%	5%	5%	0%	2%	5%
3-4	5%	3%	3%	4%	1%	4%	6%
4-5	5%	2%	2%	4%	4%	7%	8%
5-6	5%		3%	4%	5%	6%	9%
6-7	10%		4%	3%	10%	5%	9%
7-8	5%	16%	1%	3%	10%	5%	9%
8-9			1%	2%	20%	8%	9%
9-10			0%	1%	20%	21%	13%
10-11	0%	___	0%	1%		23%	
11-12			0%	0%	30%	11%	26%
12-			0%	0%		6%	

[1]Modified to meet projected average stay of 8 hours over 10 A.M.-12 Midnight operating day.

[2]Saturday.

SOURCES: Management Resources, Inc.; Barton-Aschman Associates, Inc.

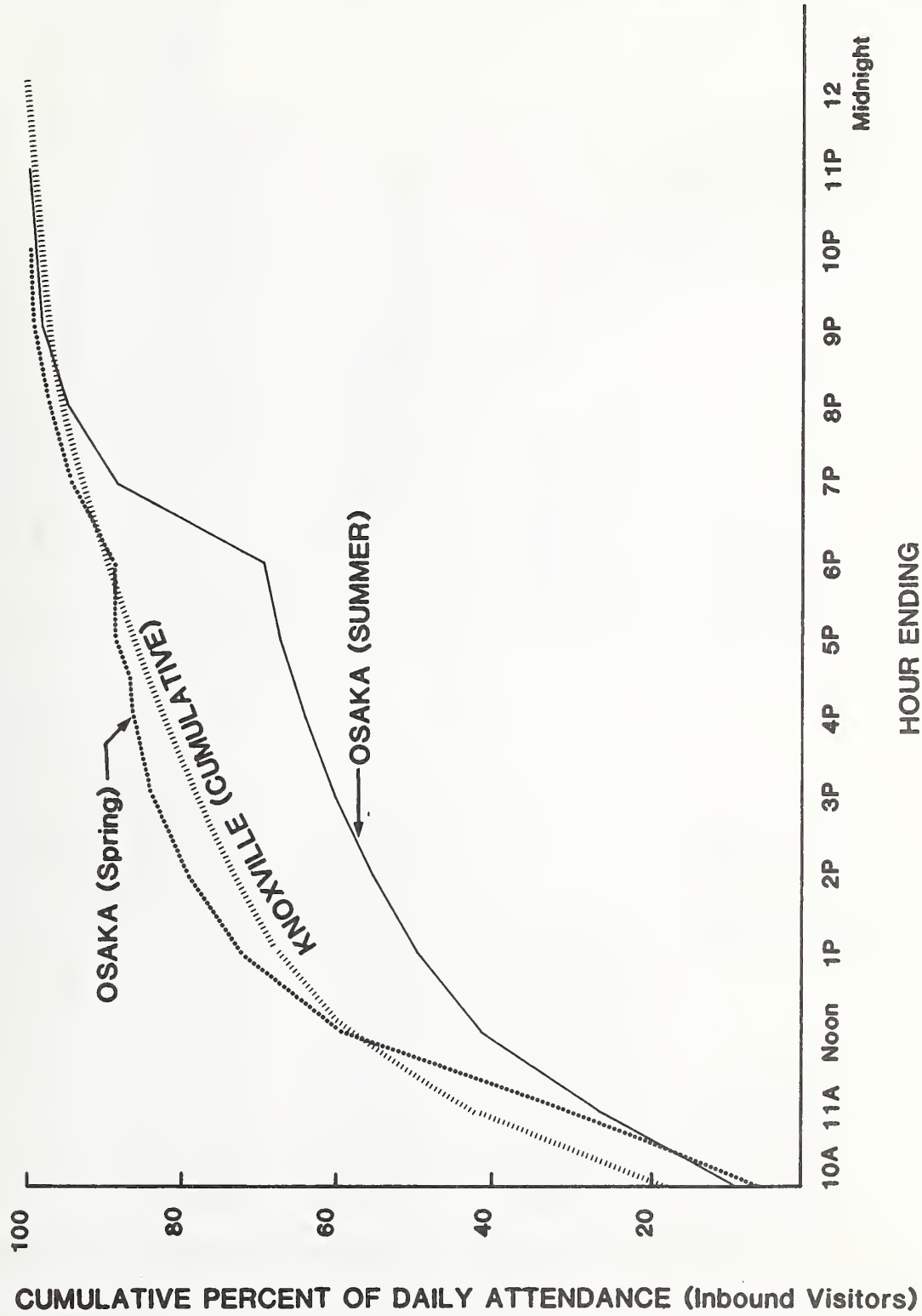


FIGURE 3-E

COMPARISON OF KNOXVILLE AND OSAKA INBOUND VISITOR PATTERNS

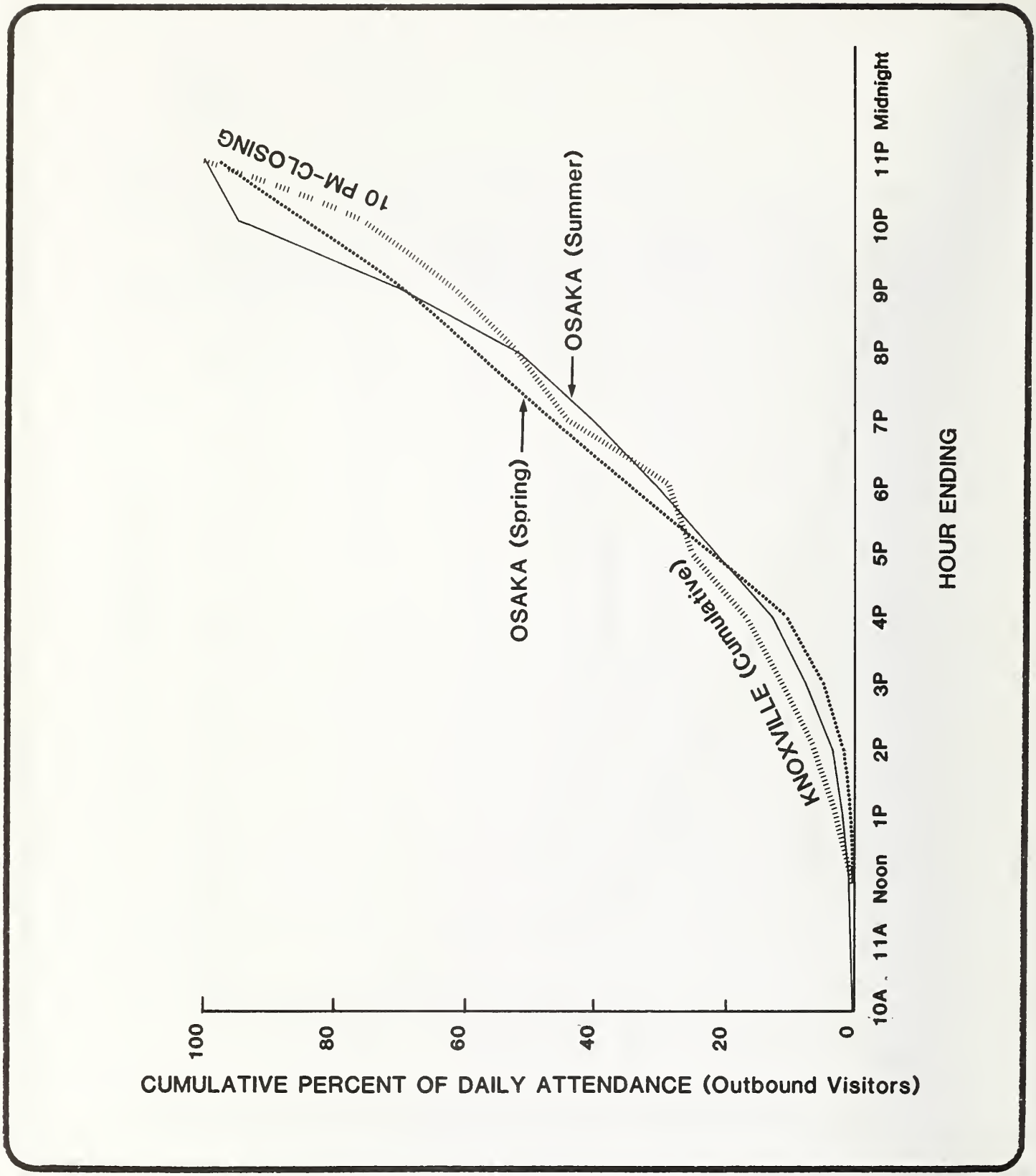
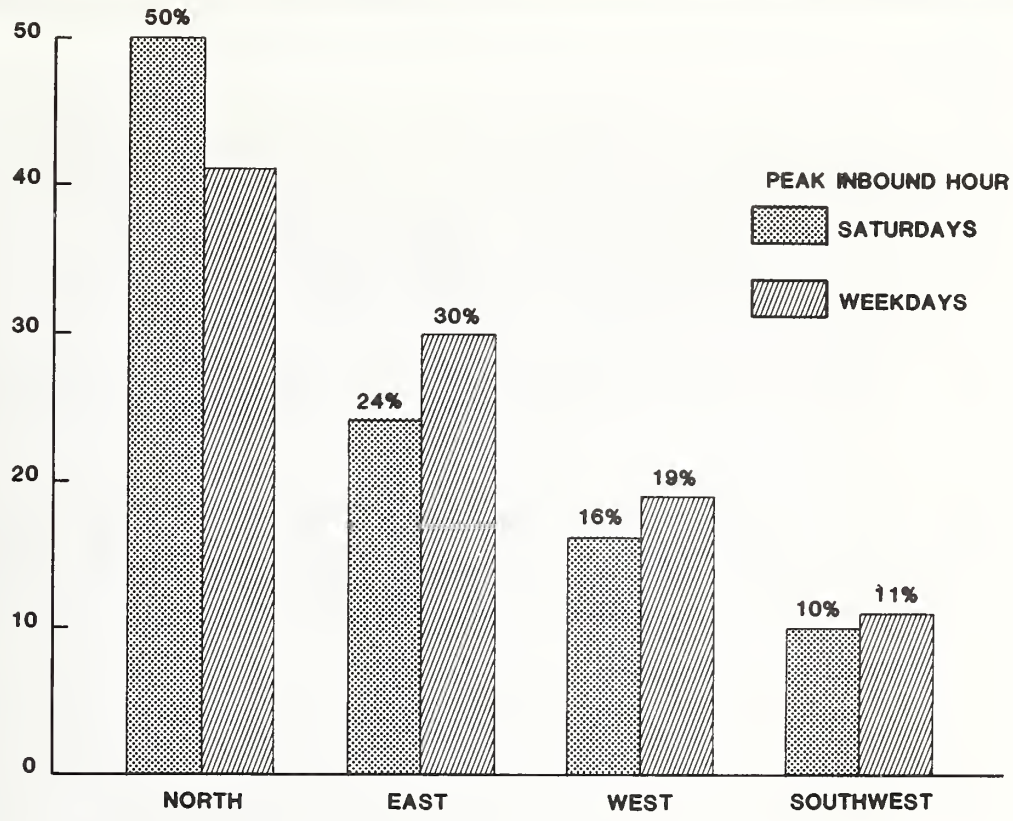


FIGURE 3-F
COMPARISON OF KNOXVILLE AND OSAKA OUTBOUND VISITOR PATTERNS



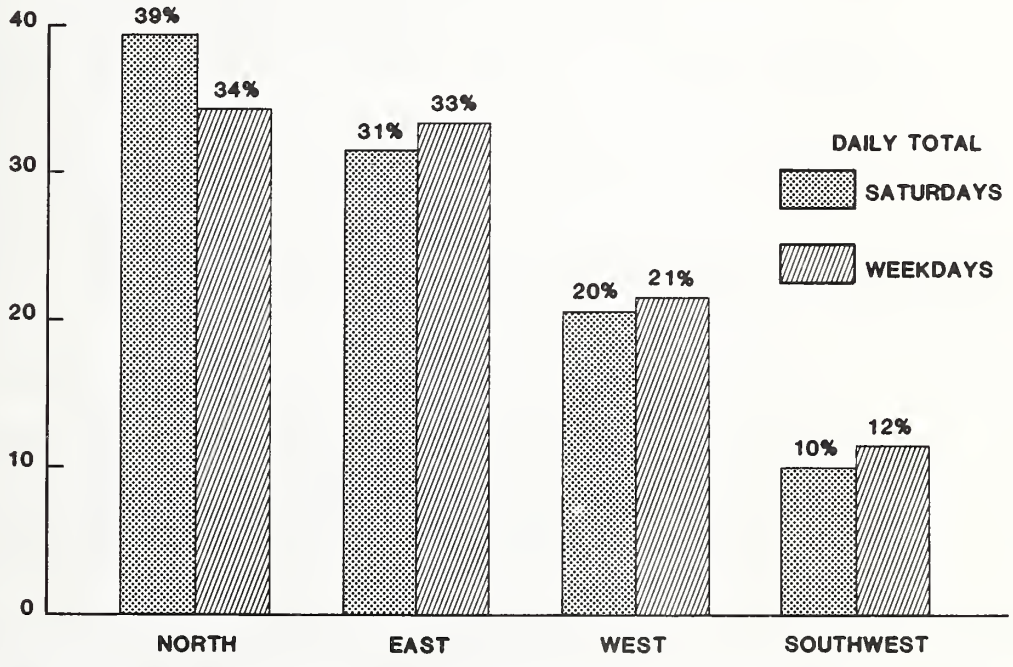


FIGURE 3-G
PEAK HOUR AND DAILY GATE VOLUMES

3. From economic feasibility study and population (census) data, determine arriving visitor population distribution by approach route; determine probable parking location from each approach route, adjusting to reflect any parking space capacity limitations; determine access gate for each lot; and estimate number to enter each gate.

4. Identify gate(s) where shuttle bus stops will be located; estimate shuttled visitors to enter those gates.

5. Identify gates were local bus stops will be located (near); from distribution of Fair visitors within local transit service area, estimate patronage by route; estimate number to enter each gate based on where each route will serve each gate.

6. Identify gate were tour buses will unload; determine number of visitors to enter gate.

7. Taxi and other volumes may be so low as not to affect gate distribution. If they need to be estimated, determine distribution of visitors by geographic location; determine approach routes and gates most likely to be used; estimate number of visitors to use each gate.

8. Sum volume (or percentages) by gate.

This procedure will yield daily gate volume splits. Peak hour volumes must be estimated by using hourly distributions projected for visitors arriving by each mode.

At the Knoxville Fair, the most severe peaking of inbound volumes was generated by tour buses which used a terminal at the North Gate. This gate operated at capacity many days starting at 9:30-9:45 A.M. Most buses arrived (or tried to) at about 10 A.M. Had both the gate and terminal capacities not constrained arrival patterns, it is possible that the peak hour percentage at the gate might have been several percent higher (inbound North Gate capacity was 12,000 per hour; as many as 25,000 or more were brought in tour buses as close to the 10 A.M. opening time as possible).

ON-SITE ACCUMULATION AND DURATION OF STAY

The estimate of on-site accumulation is the base for determining site size and quantity of facilities and parking space needs. These are based on maximum accumulation during the day.

The maximum accumalation is strongly related to the average duration of stay on site. Unfortunately, the average stay is dependent on many factors which are themselves difficult to quantify. These include quality of exhibits, variation and number of attractions, entertainment, food service, rest facilities, amount of seating, protection from heat, and pricing. Since it is virtually impossible to determine the adequacy of each of these prior to the event, duration of stay must be assumed based only on general feel.

Visitors

The 1982 World's Fair had average durations of stay of 6.7 hours on Tuesdays and 6.6 hours on Saturdays. The Osaka fair averaged 5.7 hours on Saturdays (Table 3-5). The Montreal fair averaged 5.5 hours.

TABLE 3-5: AVERAGE DURATION OF STAY

Fair	Tuesdays	Saturdays	Average Day
Knoxville	6.7 hours	6.6 hours	-
Montreal	-	-	5.5 hours
Osaka	-	5.1[1]	-

[1]Based on very limited data.

SOURCE: Barton-Aschman Associates, Inc.

The Knoxville fair peak days on-site visitor accumulation curves are shown on Figure 3-H. Peak accumulations were 70 percent on Tuesdays, at 2 P.M., and 67 percent on Saturdays at 3 P.M. Osaka's Saturday peak was about 65 percent, but was for a much larger total attendance figure (64 million visitors).

Accumulation planning for the Knoxville fair was based on an 8 hour average stay, which was estimated as part of the economic feasibility study. Based on the 8 hour figure, the estimated maximum visitor accumulation was 82.5 percent. This was much higher than actually occurred. Based on other information, including a Spokane estimate of 7 hours average duration and a Montreal range of 5 to 6 hours, it appears that an average duration of 6 to 7 hours would be a reasonable estimate to use for World's Fairs.

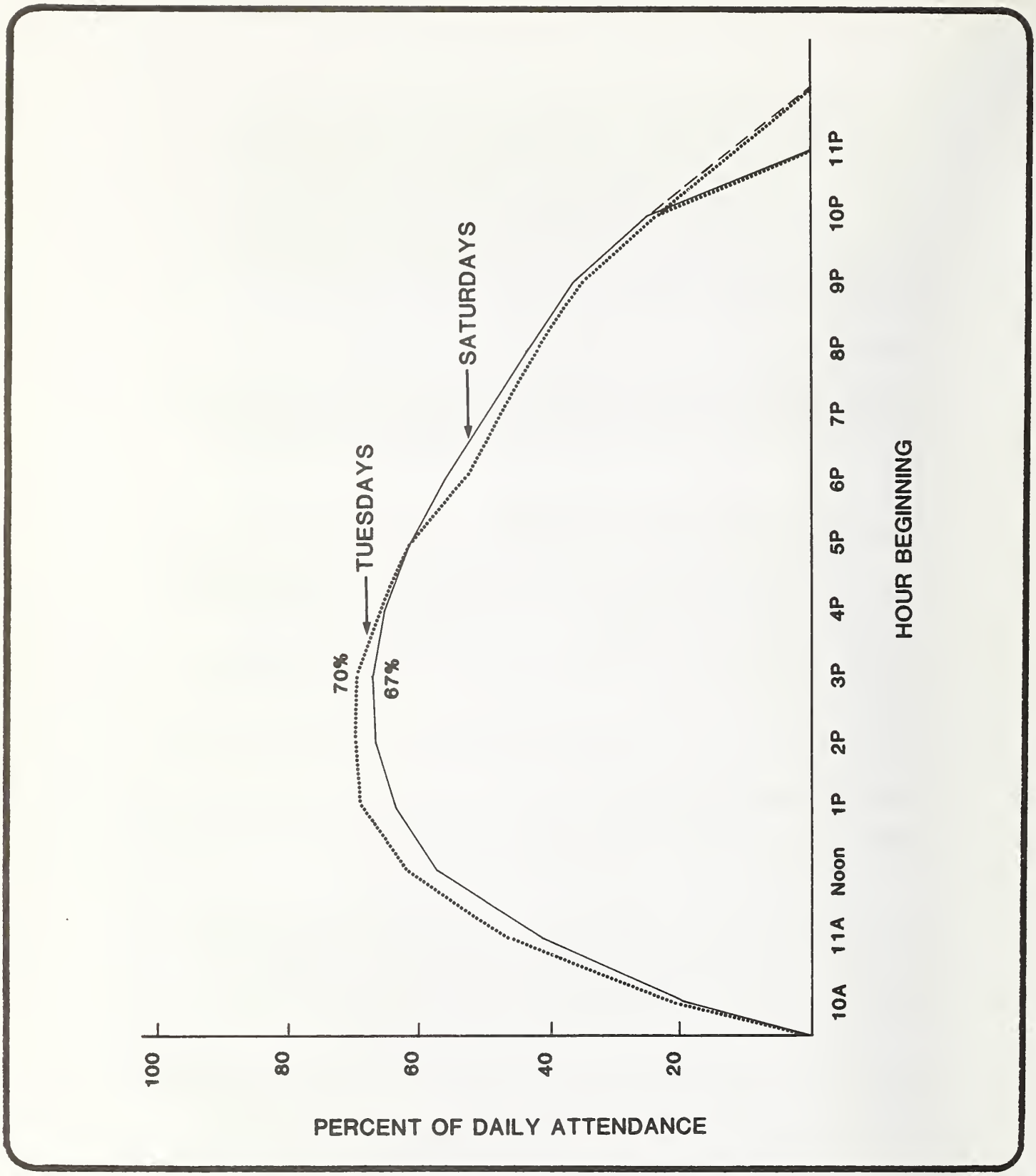


FIGURE 3-H.
ON-SITE VISITOR ACCUMULATION

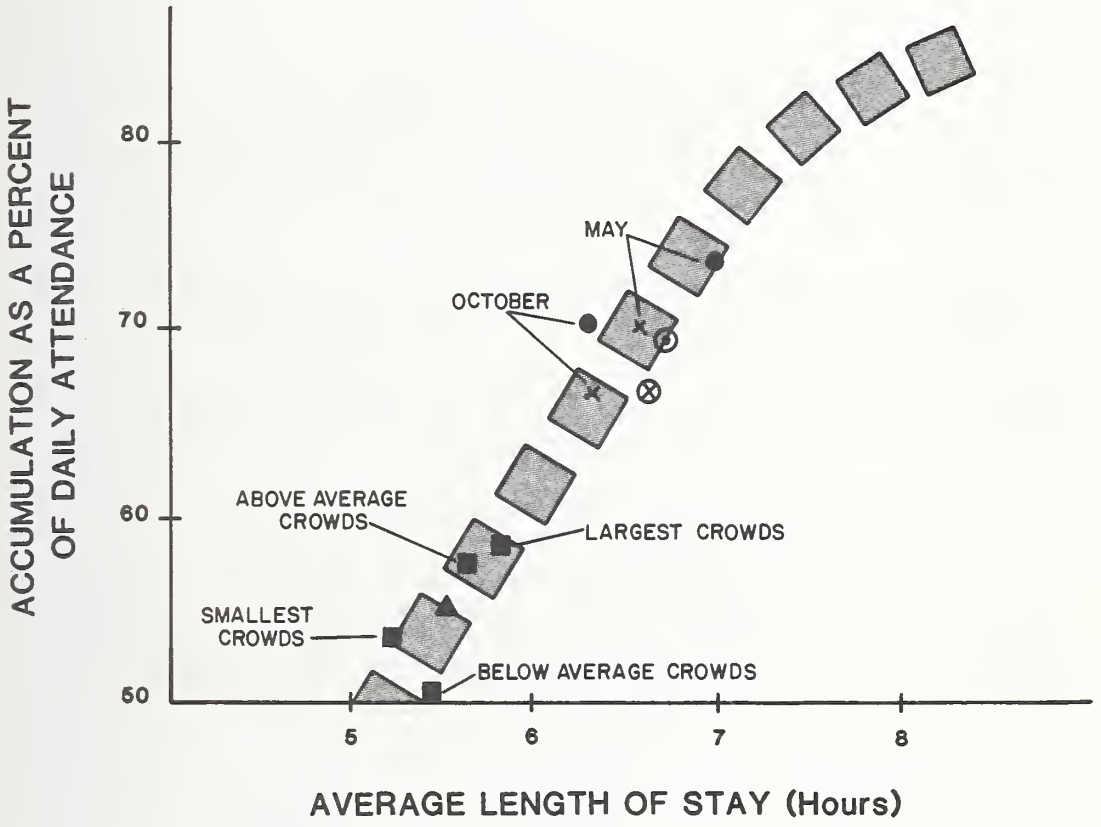


FIGURE 3-I
MAXIMUM ON-SITE VISITOR ACCUMULATION
AS A FUNCTION OF LENGTH OF STAY

- ● KNOXVILLE WEEKDAY
- × KNOXVILLE SATURDAY
- ⊗⊙ KNOXVILLE AVERAGES
- ■ MONTREAL
- ▲ PROBABLE AVERAGE FOR MONTREAL

The duration of stay has no planning value for the transportation system other than to generate an estimate of maximum accumulation. Figure 3-I provides a possible tool for estimating the maximum accumulation planning figure. Generally, 65 to 70 percent would cover the expected range, with 75 percent being a very safe (high) estimate. The figure used will directly affect development costs; use of 75 percent instead of 68 percent will increase total development costs by about 10 percent.

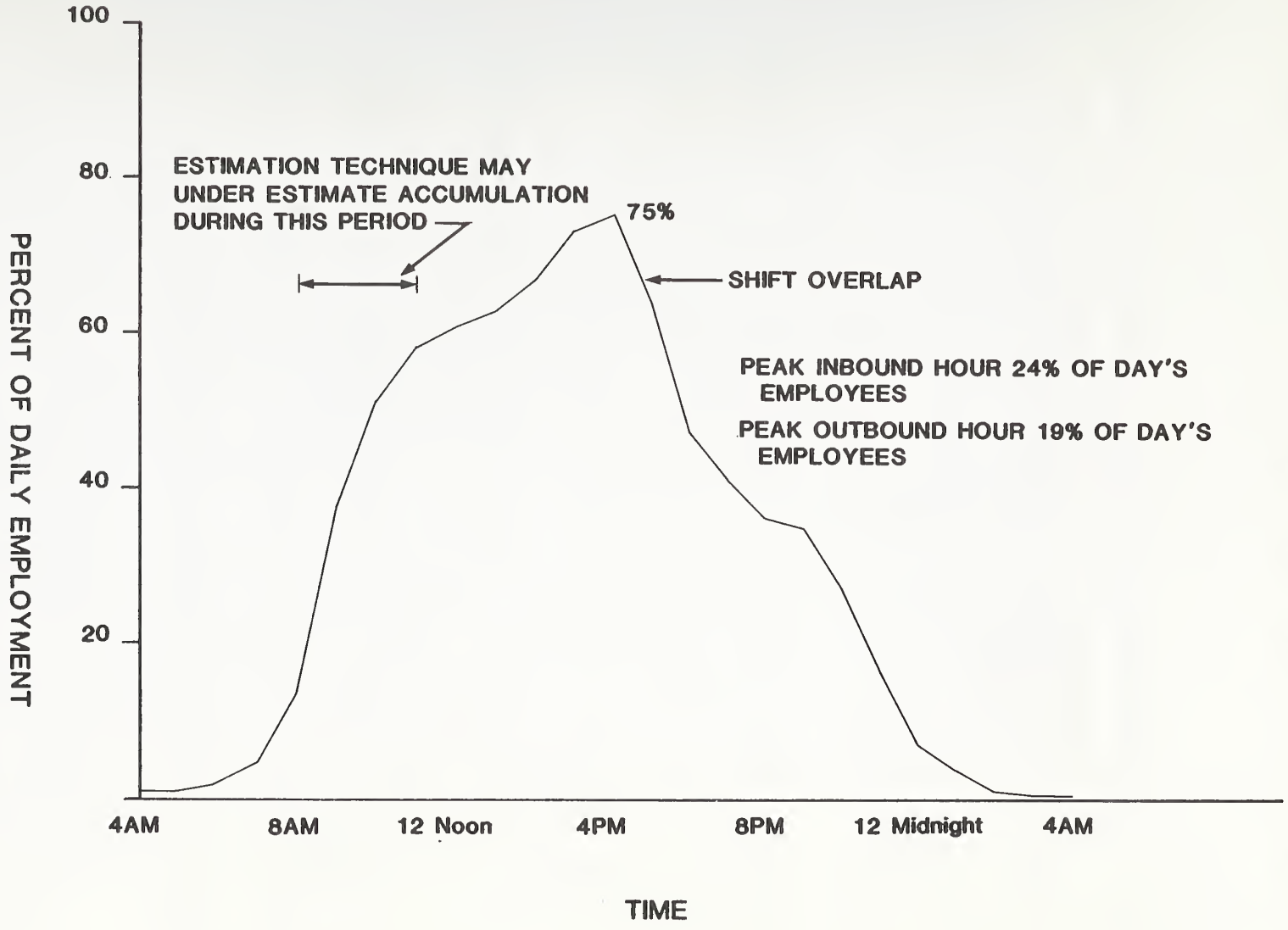
Employees

Little data is available on employee arrival, departure, and accumulation patterns. Any records available were kept by individual employers. While employees used special turnstiles or gates, these were also used by complimentary ticket holders, season's pass holders, etc.

On-site peak employee accumulations were estimated by contacting a few large employers and asking them to "guesstimate" their peak accumulations several months before the fair opened. Since scheduling had not started, most employers had little idea, but the information gathered indicated that maximum accumulation might be about 80 percent of daily (not total) employment.

Only very limited data, amounting to about one percent of the Knoxville Fair employees, is available. It does, however, represent a cross-section of most employees. Figure 3-J shows the estimated on-site accumulation pattern based on employee parking lot arrival and departure times. This curve indicates a 75 percent maximum accumulation of daily employment. Daily employment can be expected to be 75 to 80 percent of total employment.

FIGURE 3-J
ESTIMATED EMPLOYEE ON-SITE ACCUMULATION



SOURCE: Employee parking lot shuttle bus volumes

MODE SPLIT

Visitors

The mode split of arriving visitors is very dependent on the amount of tour bus, shuttle bus, and local bus service to be provided. The 1982 World's Fair had major tour bus volumes, amounting to 18 percent of total attendance. Other fairs have had very small percentages. There was only limited use of the abundant shuttle bus services over the course of the Fair due to wide availability of convenient parking at a cost lower than two round trip bus fares. Other fairs have had little shuttle bus activity. Local bus service has been available to all World's Fair sites.

As shown in Table 3-6, mode split at The 1982 World's Fair was different in May and June than the following four months. It also was different on the peak days of Saturdays and Tuesdays. Tour bus volumes dropped off near the end of June, and remained relatively stable, as a percentage of total attendance, through the July to September period. Shuttle buses provided an extremely high level of service during the first days of the fair. Service quickly decreased with lower demand levels, leveling off by mid-summer. Local bus usage was lower than originally expected, but was relatively stable, as were the taxi and walking modes of access.

It should be noted that the figures in Table 3-6 are estimates only. Surveys necessary to accurately determine mode split were not conducted. However, daily counts of tour buses, selected counts of shuttle bus passengers, and changes in local bus usage provided a basis for estimating use of those modes. Walk estimates were based on variations in gate volumes at the West and Southwest gates under varying conditions plus an estimate of East and North Gate walk-ins. The taxi/limousine estimate is a guess based on observations of taxi operations; this estimate may even be high. The remainder was attributed to personal vehicles, substantiated with a lot occupancy count in May. The estimates in Table 3-6 are consistent with visitor interview results which were compiled in a way that is not directly usable for transportation purposes.

TABLE 3-6: ESTIMATED 1982 WORLD'S FAIR VISITOR MODE SPLIT

Mode	May-June Tuesday	May-June Saturday	July-October Tuesday	July-October Saturday	Total
Personal Vehicle	59%	53%	66%	66%	64%
Tour Bus	19%	30%	17%	21%	18%
Shuttle Bus[1]	11%	5%	6%	2%	7%
Local Scheduled Fixed Route Bus	2%	3%	2%	2%	2%
Taxi, Limousine, etc.	1%	1%	1%	1%	1%
Walk	8%	8%	8%	8%	8%
	100%	100%	100%	100%	100%

[1]Excludes shuttle buses from remote (½-1½ miles) official World's Fair parking lots.

Based on past experience, it is not likely that the May-June percentage of tour bus riders will be much higher at future World's Fairs. The management of The 1982 World's Fair aggressively pursued tour group business, and hired marketing staff which were very experienced and highly regarded in tour operator circles.

It is very possible that the combination of shuttle and local bus percentages can be exceeded in the future. More crowded parking and/or traffic conditions, more local bus service to visitor lodging locations, and more effective and efficient (and less competitive) shuttle service could increase the local shuttle share. Taxi/limousine access will be quite limited under any circumstances in almost any city. Walk-ins will be very dependent on the amount of lodgings within walking distance. Parking prices ($4-$10) in Knoxville do not appar to have deterred many people from driving, since their other possible choices, except for local bus, would have been more costly and no more convenient.

CONCLUSIONS

The attendance and gate volume information presented in this chapter provide a good basis for estimating transportation system design parameters for future World's Fairs. On-site accumulation data is very limited due to the absence of registering turnstiles at all but one previous World's Fairs (World's Fair managers have trusted their abilities to "judge" on-site accumulations for labor and entertainment scheduling rather than counting). Theme parks and state fairs appear to have somewhat different attendance patterns.

Gate volume splits can be estimated based on mode splits; available modal loading locations, and directions of approach, constrained by capacity availability. However, daily or monthly variations of mode split may well change gate splits (and percent of daily volume during peak hours). If adequate capacity cannot be provided at a given gate, it is desirable to shift some facilities for serving transportation vehicles to another gate where sufficient capacity can be developed.

Finally, site and transportation system design should be based on the estimated 80th or 90th percentile day's attendance (which figure depends on financial and/or physical capabilities), not on peak day of week percentage or peak month percentage as is commonly done in economic feasibility studies. This will provide more predictable results.

Chapter Four:

ACCESS TO THE FAIR

The 1982 World's Fair site was located in a valley on the west side of downtown Knoxville. Most of the site was developed on a former railroad yard. While close to the CBD and crossed by several streets, the site initially had somewhat limited accessibility on two of its four sides.

Visitors were expected to arrive in personal vehicles, local buses, tour buses, shuttle buses, taxis, and on foot. Adequate vehicular and gate access had to be developed. Employees were expected to come to the fair by personal vehicle, local bus, and on foot. They also had to be accommodated in the access system, although not necessarily through the same gates. Service and delivery vehicles also had to be provided access to the fair. To the extent possible, this was to be separated from the other access systems.

The access system consisted of the approach road system, nearby local bus route segments, parking and terminal facilities including passenger loading zones, and gate areas. The Phase 1 report describes the roadway access plan; it is not repeated here. Figure 4-A does recap access routes and parking concentrations.

TRANSIT ACCESS

K-TRANS provided service to the Fair via nine routes. No routes were changed for the Fair, but service was increased by adding additional sections (extra buses to increase capacity) as warranted, and hours extended to cover Fair operating hours. Existing bus stops were located at two of the Fair's four gates (see Figure 4-B). Chapter 9 describes K-TRANS Service more completely.

GATES

Prior to the Knoxville Fair, it was feared that the road system serving the Fair would become very congested, since problems already occurred during local peak periods. The most obvious gate location was on the most congested area approach route and had limited nearby parking. Other locations were similar in nature with limited access potential.

It was decided early in the planning process that several gates would be needed. In the end, it was determined that limited gate accessibility and capacity necessitated four visitor gates, an

employee gate (employees could also use visitor gates), and a service/delivery vehicle gate. These six gates were to be spread around the site to take advantage of existing or developable approach routes, potential parking areas, and site potential to provide exciting visitor entry to the Fair. Figures 4-A and 4-B show the location of each gate, major approach routes, and major parking concentrations. Also shown is the on-site warehouse and employee check-in building.

Visitor Gate Distribution

It was desirable to spread the gate volumes as evenly as possible for several reasons:

- Access roadway capacity was expected to be limited near each gate.

- Potential parking areas were limited at some of the gate locations.

- Major volumes of visitor circulation were desired for all parts of the Fair site; the site configuration and topography made this difficult to achieve with only one or two access points.

To this end, plans were prepared to assign certain access modes to each gate to achieve a desirable distribution. Table 4-1 shows this assignment. In addition to the desired gate volume distribution, these assignments were based on the ability to provide the necessary access and parking or terminal facilities nearby.

The mode split estimates were not sufficiently detailed or accurate estimate gate volumes. As a result, the actual daily gate distribution was different than had been projected, although the orders of magnitude on a daily basis were similar.

Little was known about peaking characteristics by mode. Peaking forecasts were not accurate, but were used only in developing gate capacity requirements (turnstiles, queuing area). Information on hourly variations by mode presented in Chapter 3 was not available for previous fairs due to the limited data available. The lack of data is due in part to the short term nature of the events. which sponsors could not justify the cost to collect data for others' benefit.

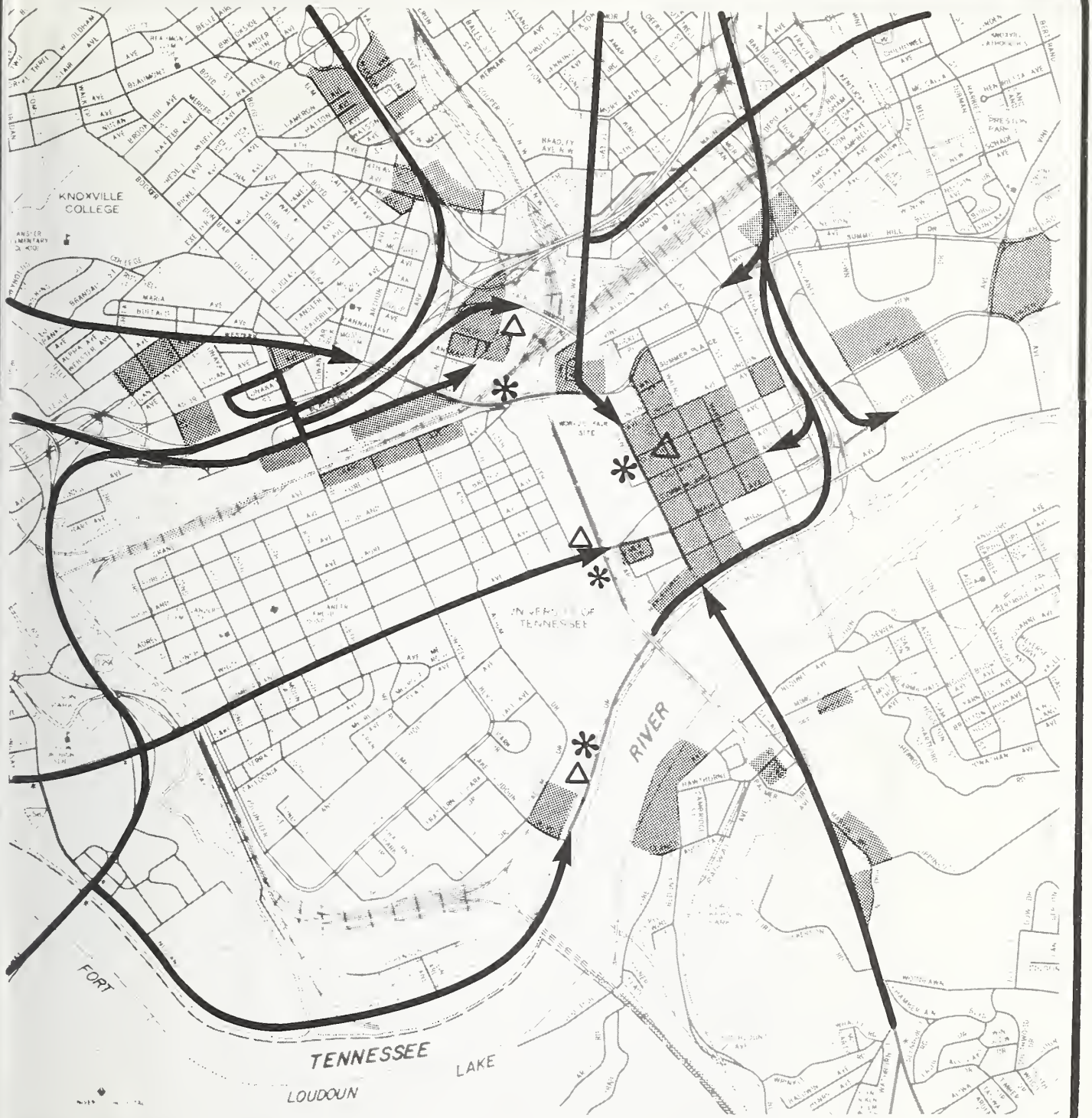


FIGURE 4-A

ACCESS ROUTES AND FACILITIES

* FAIR GATES

MAJOR PARKING CONCENTRATION

△ TOUR / SHUTTLE BUS TERMINAL OR STOPS

MAJOR VEHICULAR ACCESS ROUTE

FIGURE 4-B

SITE ACCESS FACILITIES

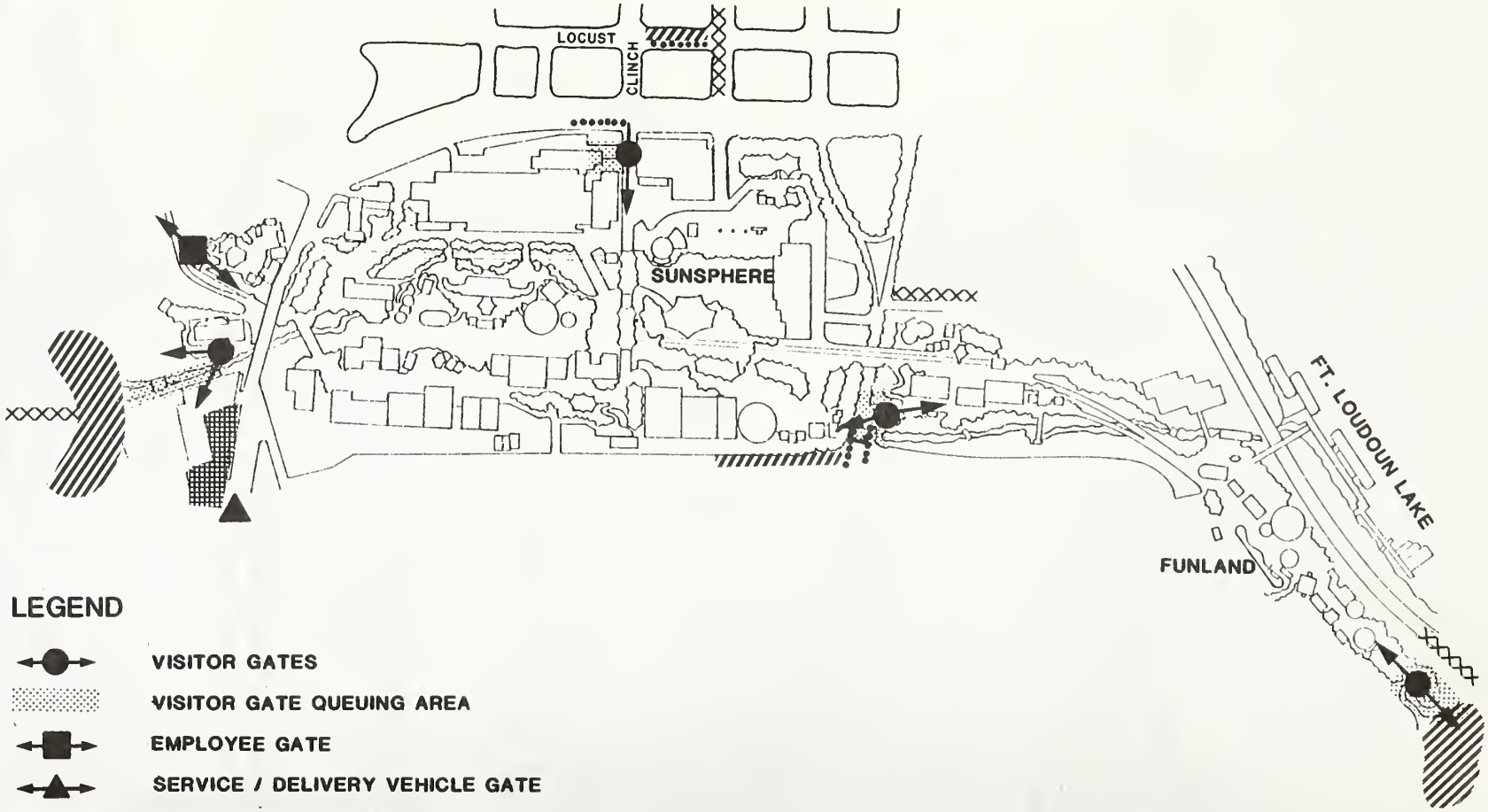


TABLE 4-1: VISITOR GATES AND MODES OF ACCESS

GATE	ANTICIPATED ACCESS MODE: PERSONAL VEHICLE	LOCAL TRANSIT	TOUR BUS	SHUTTLE BUS	TAXI/ LIMO	WALK	PERCENT ATTENDANCE: PROJECTED	ACTUAL
North	*		*				30	36%
East	X	*		X	*	*	44	32
West	●	X		●	*	*	13	21
Southwest	X			*		●	13	11
Anticipated Mode Split	65%	10%	15%	5%		5%		
Actual Mode Split	63%	2%	18%	3%	1%	8%		

* - Major concentration

X - Significant concentration

● - Minor concentration

SOURCE: Barton-Aschman Associates, Inc.

Access Provisions. Each visitor gate contained ticket booths and turnstiles. The booths were placed away from the turnstiles to avoid conflicts between any gate queues and people waiting and circulating around the ticket booths. Most turnstiles handled two-way movement. This reversible feature permitted a lower total number of turnstiles to accommodate inbound and outbound peaks. All turnstiles had built-in counters to enable volumes and trends to be monitored. Just inside the turnstiles there was a clear area for visitors to reorganize their groups and proceed. At some gates this clear area was limited and congestion developed at the turnstiles. While crowd control personnel were able to minimize these problems, a better solution would have been to provide more space and no sharp turns in the gate departure area. Separate turnstiles were provided for employees, pass holders, and other special types of admissions. A swinging gate was provided for wheelchair access at each gate.

Results

Only the North visitor gate operated at or above capacity with any great frequency. This gate had to accommodate tour bus volume peaks starting at 10 A.M. During May, when tour bus volumes were at their highest, queues reaching over 1,000 people developed and remained for up to an hour. This occurred for two reasons, in addition to underestimating the tour bus split:

- Nearly all tour operators wanted to arrive at 10 A.M. The desired peaking would have absorbed all available capacity of the terminal in which the buses unloaded and/or the gates, whichever was lower.

- The tour bus terminal capacity, which had been anticipated to be 180 unloading buses per hour, was increased to 275 buses hourly by modifying the operating procedures. This higher terminal capacity could by itself generate enough visitors to absorb all North Gate capacity. The several thousand parking spaces near the North Gate also generated up to two thousand inbound visitors hourly. Hence, the capacities of the access system exceeded the capacity of the turnstiles.

Over a period of time, three changes occurred which reduced this problem to a manageable level: (1) gates were opened at 9:30 A.M. to handle early arrivals and reduce the initial queue, (2) tour operators realized not everyone could arrive at the same time and many rescheduled their arrival times to the 11 A.M. - 12 noon period, and (3) tour bus volumes dropped somewhat from their early peaks.

Observed Inbound Turnstile Capacity

The turnstiles used were double-loaded; that is, each machine had an entry gate on each side. In between the turnstiles were railings to separate and guide visitors through the turnstiles. Ticket takers stood inside the turnstiles, out of the way of pedestrian flows, collecting tickets as people passed through the turnstiles.

Table 4-2 shows the highest hourly volumes on several days when queuing occurred at the North Gate. Under queuing pressure, these volumes passed through the turnstiles, providing the basis for a capacity determination. Based on these volumes, it appears that about 600 inbound persons per turnstile can be processed hourly, under constant queue conditions, with closely spaced double turnstiles. However, a planning figure of about 425 to 450 hourly inbound persons per turnstile (of this type) is an appropriate design level. Outbound volumes need fewer turnstiles since tickets are not collected, but no counts are available for saturated conditions.

TABLE 4-2: NORTH GATE INBOUND MAXIMUM RECORDED TURNSTILE VOLUMES

HIGHEST HOURLY VOLUMES	AVAILABLE TURNSTILES	VOLUME/ HOUR/ TURNSTILES
12,684	19	668
11,962	19	630
11,552	19	608
11,082	19	583
11,077	19	583

Employees Gate

A special gate was provided for employees near the building where most on-site employees of the fair corporation worked. This gate was needed so other gates could be closed down outside operating hours. Site planners also intended to separate employees from visitors during peak periods to avoid further accentuating the peaks. The employee gate was patrolled by fair security staff, with employee identification badges being used to gain entry. The employee gate was located at the far north end of the Fair site. While convenient to the KIEE employee check-in location, it was far from many of the exhibitors' and concessionaires' employee check-in areas. Because of this the employee gate was not widely used. A major remote employee parking facility was provided with shuttle bus service to the employee gate. Several on-site employees lobbied to have the employee shuttle pick up and drop off employees at the more centrally located East Gate.

In hindsight, if an employee gate was actually needed, a more central location would have been no more difficult to patrol. The actual operating benefits of the employee gate, as used in Knoxville, were not evident.

Service/Delivery Vehicle Gate

The service/delivery vehicle gate was also located at the north end of the site (see Figure 4-B). It was not necessary for these vehicles to enter the Fair site itself; all deliveries were made to the warehouse and moved from there to specific locations late at night when the Fair was closed. In practice, the employee gate was used for some deliveries outside of Fair hours. This arrangement worked well and no conflicts arose between service/delivery vehicles and other fair functions, including vehicular or pedestrian access to other gates.

DISTRIBUTION OF PATRONS BY GATE

Projections

Estimates of gate usage were based on the anticipated distribution of visitor trip origin locations. Since few visitors from beyond 100 to 150 miles were expected to visit for one day only, it was assumed that all visitors would come from "local" residences or lodgings.

The economic feasibility studies provided estimates of market penetration. From these, it was then necessary to identify the locations and magnitudes of the available lodgings and residences. Once this was done, approach routes and parking locations were used to convert the distribution of trip origins to parking locations for those who drove, and bus stop locations for those riding transit of one kind or another. This then provided the basis for estimating gate distribution. Precise estimates were not possible due to the large number of assumptions necessary. However, it was hoped that these figures would provide an order of magnitude estimate usable for general sizing of gates, and also parking areas.

Actual Experience

As shown in Table 4-3, the projected distribution was not too close to what actually occurred. Part of the difference can be explained by (1) higher tour bus ridership (to the North Gate) than expected, and (2) more CBD and North Gate area parking spaces and fewer University of Tennessee parking spaces than expected. The North and East Gates were the busiest gates as expected.

The only adverse impact of the distribution estimate was peak (inbound) period queuing at the North Gate. While that gate accommodated as many as 12,000 inbound persons an hour, the heavy tour bus activity described earlier caused significant queues to develop as the terminal capacity exceeded the gate capacity.

TABLE 4-3: PROJECTED AND ACTUAL GATE VISITOR DISTRIBUTION

	PERCENT OF DAILY VISITORS		
	FINAL	ACTUAL	
GATE	PROJECTION	TUESDAY	SATURDAY
North	30%	34%	39%
East	44	33	31
West	13	21	20
Southwest	13	12	10
Total	100%	100%	100%

SOURCE: Barton-Aschman Associates, Inc.

Changes By Season

The Fair had three basic seasons: spring (May, June), summer (July, August), and fall (September, October). Attendance and mode split varied significantly by season, resulting in changes in gate distribution. Table 4-4 shows the distributions for the three seasons.

The tour bus activity (North Gate) peaked in May and early June, dropped during the summer, and increased somewhat in the fall. Shuttle bus volumes fell steadily from the beginning, reducing Southwest Gate volumes over time. The 800 space parking lot next to the Southwest Gate, used in daytime by the University of Tennessee in the spring and fall, was available for Fair use during the summer. A small increase in parking near the West Gate occurred during the summer, since University of Tennessee dormitories were rented out for summer seminar programs increasing West Gate volumes. The East Gate conditions were affected only by K-TRANS ridership and mode split (local visitors parking).

As shown in Table 4-4, changes by season can be significant. These changes point toward providing enough capacity flexibility, under a multi-gate scheme, to permit shifts in distribution.

TABLE 4-4: CHANGES IN GATE DISTRIBUTION BY SEASON

	PERCENT OF DAILY VISITORS BY GATE				
DAY/SEASON	NORTH	EAST	WEST	SOUTHWEST	TOTAL
Weekday					
May-June	32%	33%	21%	14%	100%
July-August	29	35	22	14	100
Sept.-Oct.	37	36	21	6	100
Saturday					
May-June	42	28	18	12	100
July-August	37	31	22	10	100
Sept.-Oct.	36	37	20	7	100

SOURCE: Barton-Aschman Associates, Inc.

INFORMATION SYSTEMS

Four basic types of information systems were utilized to assist visitors' access:

- roadway trailblazer signing (see Phase I Report, p. 59-65).
- color coding of gates
- directional signage inside the Fair
- transportation pamphlets (see Phase I Report, p. 163-166)

Trailblazer signing brought visitors to parking lots. Bus drivers, taxi drivers, and other professional service drivers were expected to know their way, either through local familiarity or brochures mailed directly to them. No special signs brought visitors from lots to gates. This caused a problem for some, but did not generate many complaints.

The pamphlets also helped provide directions to parking areas, but not to gates (intentionally). This was done to discourage "cruising" for parking or sightseeing near gates and minimize the corresponding traffic congestion.

Gates were each decorated in a bright color (yellow, blue, green, red). This was supposed to help identify the gate to visitors and help them remember where to exit. However, interior signing did not provide directions to gates by name, direction, or color. Consequently, some value was lost since the visitor had to go to an information booth (several provided - near gates) to find out where a particular gate was located. Directional signage was placed on site, but was not very prominent. There appeared to be great need for more signing only to gates and restrooms.

VEHICLE OCCUPANCY

Visitors

Based on experience at other special events, non-bus vehicle occupancy was projected to be about 3.5-3.6. The lower figure was used to provide a conservative base for planning.

Only limited surveys were made of vehicle occupancies during the Fair. Relatively extensive data for remote parking lots (which attracted mainly out-of-town and out-of-state visitors unfamiliar with the area) showed an average of about 3.9 persons per vehicle. Since local families and friends came in smaller groups (and did

not park in remote lots), it is estimated that the overall average occupancy for personal vehicles was probably closer to 3.75 (vehicle occupancies experienced at Seattle were estimated to range between 3.6 and 4.0).

In terms of parking requirements, this higher figure had the affect of reducing the actual need by some seven percent. With the vast oversupply of parking, it made little difference in Knoxville.

Employees

Only limited data was collected for employee parking. Counts at the remote employee lot averaged 1.14 persons per vehicle compared to an expected 2.0. This was even lower than the 1.39 average counted during morning rush hours in downtown Knoxville.

It is possible that employees who sought parking closer to the Fair, in more expensive and/or less plentiful areas, may have ridden in larger groups. No data were collected to substantiate this assumption, however.

CONCLUSIONS

Access to The 1982 World's Fair was very good. Certainly, major roadway improvements (discussed in Chapter 5) had a significant positive impact, as did the over supply of parking. A smaller than projected percentage of people driving personal vehicles was an additional benefit.

Four visitor gates were used to spread access traffic and compensate for limited gate capacity at some locations. Projections of gate usage were based on several assumptions; accuracy was only adequate for "order of magnitude" use. In addition, gate distribution, which was sensitive to changes in mode split and parking availability, varied by season. Hence, if a multi-gate access approach is to be utilized, capacity should be provided at each gate to accommodate fluctuations in distribution or a means of adjusting the distribution should be devised. In addition, gates handling tour and shuttle buses should be designed to accommodate short, sharp peaks, and their capacities should at least equal those of the bus terminal or parking facilities to unload visitors.

A separate employee gate will probably not be fully utilized unless centrally located relative to all bus stops and employee parking facilities (official and unofficial), and most employee check-in areas. A poor location in either respect will result in employees using visitor gates.

An effective information system is necessary to direct visitors to parking areas and gates. Such systems should emphasize parking area rather than gate locations to discourage "cruising" past gates.

Visitor vehicle occupancies are likely to be higher than for other events. Seattle's 3.6-4.0 and Knoxville's 3.75 for visitors point to using higher than the 3.25 used in planning for the Seattle fair and the 3.5 used for the fairs in San Antonio and Knoxville.

Chapter Five:

ROADWAY AND TRAFFIC CONSIDERATIONS

During the planning stages of the 1982 World's Fair, many citizens and government officials feared that the Fair would cause six months of constant traffic congestion. This fear was based on the projected 60,000+ people per day that would attend the Fair compounded by the fact that Knoxville's Interstate Highway and street system had been inadequate to meet traffic needs even without the presence of such an event. Further, the traffic problems that occur in conjunction with University of Tennessee home football games led many people to equate the World's Fair with six months of similar traffic congestion. These perceptions strongly motivated Fair organizers and City and State officials to take an aggressive posture in implementing planned roadway improvements prior to the opening of the Fair. Fair planners strove to provide good access to the Fair and its terminal and parking facilities while maintaining good levels of service on central area streets. As it turned out, the roadway improvements were well planned and were aided by the traffic patterns that materialized during the Fair. Both of these subjects will be dealt with in this chapter.

ROADWAY PROJECTS IMPLEMENTED FOR THE WORLD'S FAIR

Since it is not the intent of Phase II to duplicate information previously presented, the reader is referred to the Phase I report for general information on this subject. This section will present details on much of the same information.

Table 5-1 lists the various roadway improvements and projects that were planned and implemented for the Fair; these are located on Figure 5-A. In some cases, the projects were part of the long range transportation plan for the Knoxville area but were advanced in scheduling for the Fair (see Phase I, page 57). The Fair had a positive impact on the overall transportation system in that Knoxville received several large-scale road improvements in a short span of time that will continue to operate efficiently well into the future. Table 5-1 attempts to quantify the scheduling, cost, and approximate increase in capacity effected by the projects. Also included are general comments concerning what the projects were expected to do and reflections on their resulting operation.

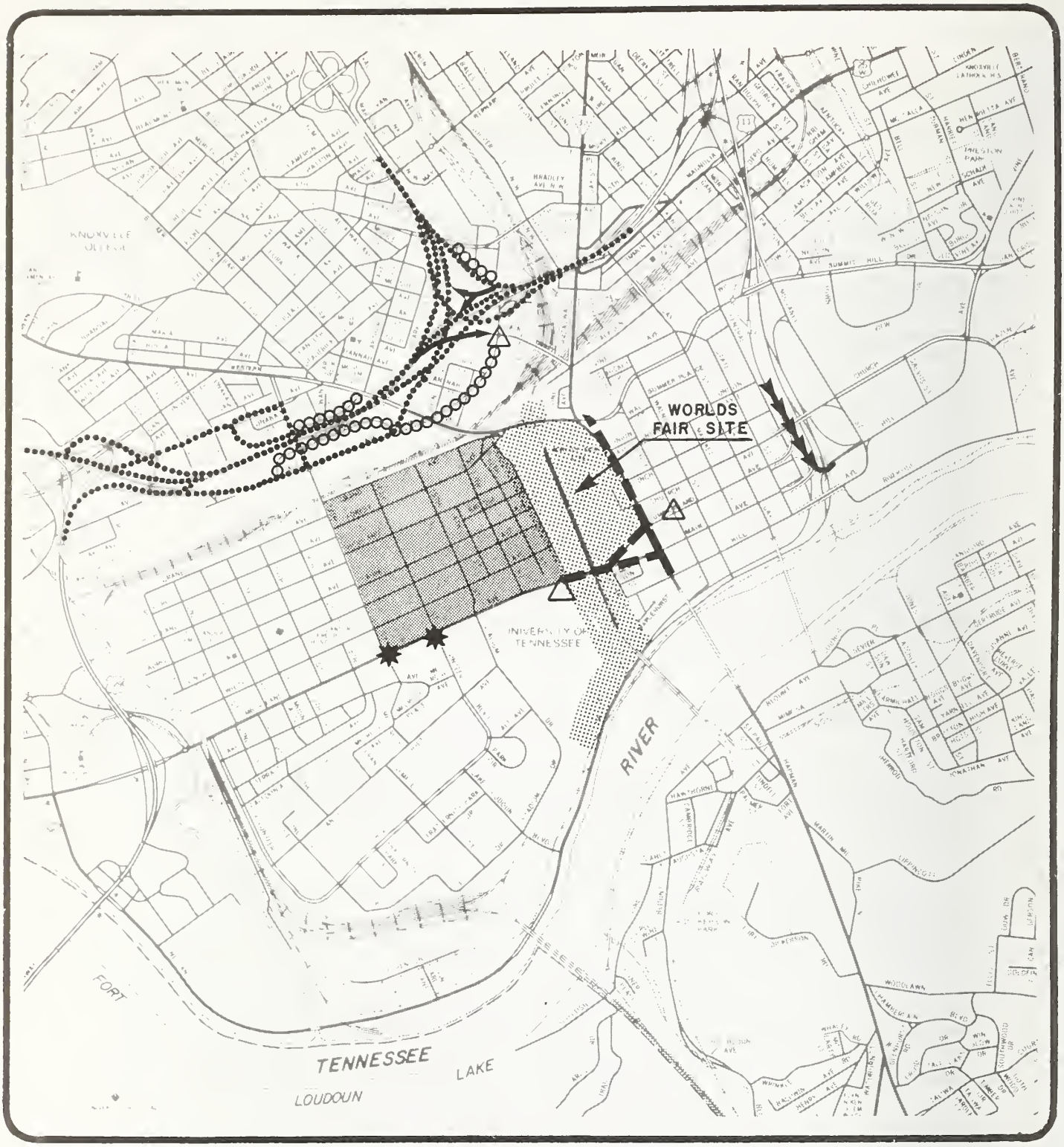


FIGURE 5-A

LOCAL ROADWAY IMPROVEMENTS

- •••••••• INTERSTATE HIGHWAY CONSTRUCTION & RECONSTRUCTION
- ▬ ▬ ▬ WIDENING & RECONSTRUCTION OF ARTERIAL STREETS
- OOOO NEW ROAD
- ◀▬▬ TEMPORARY FREEWAY RAMP
- ✸ INTERSECTION IMPROVEMENT
- △ NEW CBD SIGNAL
- ▒▒▒ EAST FT. SANDERS 1-WAY STREET SYSTEM

TABLE 5-1: SUMMARY OF TRANSPORTATION PROJECTS IMPLEMENTED FOR THE WORLD'S FAIR

ROADWAY/ PROJECT	DESCRIPTION	SCHEDULING START	SCHEDULING END	SCHEDULING COST	ACTUAL IMPACT EXPECTED IMPACT RELATED TO FAIR	ACTUAL IMPACT INCREASE IN CAPACITY	ACTUAL IMPACT COMMENTS
1. I-640	Construction of 6 lane bypass route around central city.	10-77	4-82	State $115 million (includes interchanges)	Remove through I-75 traffic from central area; provide alternative for through I-40 traffic.	(new route)	Although completed before Fair, I-640 will have long range benefits to area; worked well during the Fair; handled all through trucks during Fair.
2. I-40	Widening to 4-5 lanes each direction between I-275 and Alcoa Highway; redesign of interchanges between I-275 and Alcoa Highway; construct Dale/ Ailor one-way pair as a frontage road for the interstate.	11-79	4-82	State $57 million	Increase freeway capacity. Reduce conflicts at interchange due to short weaving sections.	3500-5250 vph (one direction, mainline only)	Worked well during the Fair. Total number of interstate accidents reduced.
3. I-40	Widening to 3 lanes each direction between Alcoa Highway and Papermill Road.	11-79	4-82	State $6 million	Increase freeway capacity.	1750 vph (one direction)	Worked well during the Fair.
4. Temporary Interstate Ramps	Addition to entrance ramps to I-275 North and I-40 West and exit ramp from I-40 East.	10-81	3-82	Included in item (2)	Increase access to Fair and CBD; distribute traffic over larger area.		Valuable additions to interstate system that will continue to function well into the future; much Fair-related traffic used them.
5. Temporary Ramp from Business	Addition to exit ramp from Business Loop to Hill Avenue.		N/A		Provide access to Coliseum Parking Area.		Used during Fair; probably reduced accidents; removed after Fair.

TABLE 5-1: SUMMARY OF TRANSPORTATION PROJECTS IMPLEMENTED FOR THE WORLD'S FAIR (CONT.)

ROADWAY/ PROJECT	DESCRIPTION	SCHEDULING START	SCHEDULING END	SCHEDULING COST	ACTUAL IMPACT EXPECTED IMPACT RELATED TO FAIR	ACTUAL IMPACT INCREASE IN CAPACITY	COMMENTS
6. Henley Street	Widen to 3 basic lanes each direction with a median; addition of exclusive left turn and dual left turn lanes at intersections.	9-80	10-81	$1,613,000	Increase capacity; limit driveway access; increase pedestrian safety; improve main entrance appearance.		Worked well during the Fair even with drastic increases in volumes. Reduced total accidents; median provided refuge for pedestrian crossing; acquisition of ROW for east side of Fair, which was also used to widen Henley, greatly helped in the completion of this project.
7. Blackstock Avenue	Construct new roadway from Dale Avenue to Oak Street.	11-81	5-82	State $102,000	Improve access to north gate (tour bus terminal).	(new route)	Essential for tour bus access; residual use as a frontage road.
8. Cumberland and Main Avenues	Realign and reconstruct between Henley and 11th Streets; add a Texas U-turn.	9-80	10-81	Cost included under item 6	Provide adequate site for U.S. Pavilion; reduce separation of north and south sections of Fair site.	N/A	Reduced travel time along the Cumberland/Main one way pair. Better connection for pedestrians between the UT main campus and CBD since an industrial slum was removed.
9. Cumberland Avenue/16th Street	Widen Cumberland on west side of intersection to provide left turn storage for east bound vehicles.	7-81	10-81	State $47,000	Increase roadway, capacity; reduce accidents.	600 vph	Provided some of the necessary capacity increase for the Fair. This allowed prohibition or left turns at 17th which assists in reducing travel time along the corridor.

TABLE 5-1: SUMMARY OF TRANSPORTATION PROJECTS IMPLEMENTED FOR THE WORLD'S FAIR (CONT.)

ROADWAY/ PROJECT	DESCRIPTION	SCHEDULING START	SCHEDULING END	SCHEDULING COST	ACTUAL IMPACT EXPECTED IMPACT RELATED TO FAIR	ACTUAL IMPACT INCREASE IN CAPACITY	COMMENTS
10. Cumberland Avenue/17th Street	Prohibit left turns from both approaches to Cumberland Avenue.				Increase roadway capacity. Reduce accidents.	600 vph	Reduced travel time along Cumberland Avenue.
11. One-way street designations (includes Eastern Fort Sanders, Poplar Street, Heins Street, Tulip Street, Blackstock Avenue and Ramsey Street.	Convert existing two way streets to alternating one-way streets.			N/A	Increase roadway capacity and curb parking potential.		Seemed to work well during the Fair; possibly held down accidents; promoted pedestrian safety.
12. Prohibition of through I-40 trucks.	Require through trucks to use I-640 bypass.	4-82	5-82	$8,000	Increase CBD freeway capacity; decrease truck/automobile conflicts near CBD interchanges. Safety from potential hazardous materials accidents.		Required trucks to travel an extra 4 miles; prohibition ended with Fair.
13. Traffic signal installations	1. Cumberland/Locust 2. Cumberland/11th 3. Blackstock/Oak/ I-40 Exit.				Decrease delays; increase pedestrian safety.		Blackstock/Oak/I-40 Exit signal facilitated tour bus movements. Blackstock/ Oak/I-40 signal removed after Fair. Cumberland/ Locust and Cumberland/11th may be removed depending on World's Fair site development.

TABLE 5-1: SUMMARY OF TRANSPORTATION PROJECTS IMPLEMENTED FOR THE WORLD'S FAIR (CONT.)

ROADWAY/ PROJECT	DESCRIPTION	SCHEDULING START	SCHEDULING END	SCHEDULING COST	ACTUAL IMPACT EXPECTED IMPACT RELATED TO FAIR	ACTUAL IMPACT INCREASE IN CAPACITY	COMMENTS
14. Computerized traffic signal control system.	Coordination of traffic signals adjacent to World's Fair site.	5-79	10-83	Fed/State/City $3,500,000	Decrease delays at signals; promote progressive traffic flow.		Improved air pollution and energy use; travel time was decreased even though the traffic volumes increased on major arterials.
15. CBD street system.	Resurface and replace pavement markings.	10-81	11-81	City $250,000	Improve appearance and driving quality; increase intersection capacity.	Additional left turn capacity and less delay to thru traffic.	Pedestrian crosswalk marked for safety.
16. Replace 500 street name signs; add block address numbers.	---	12-81	3-82	$40,000	Improve appearance and tourists' orientation.	N/A	Primarily on amenity.
17. Install 1400 regulatory and traffic control signs (mostly "Parking/No Parking").	---	2-82	5-82	$42,000	Provide adequate information to motorists.	N/A	Parking regulatory signs were essential to facilitate traffic movement on important access routes.
18. Upgrade street lighting in CBD.	---	6-81	4-82	City $10,000	Increase pedestrian security.	N/A	More efficient lighting sources (high pressure sodium) were installed.
19. CBD Landscaping, Street Furniture and Sidewalk Improvements.	27,000 sq.yds of sidewalk, trees, benches, and trash receptacles.	2-81	4-82	City $375,000	Reduce pedestrian vehicle conflicts; improve appearance.	N/A	Only necessary sidewalk improvements were immediately adjacent to Fair site.

TABLE 5-1: SUMMARY OF TRANSPORTATION PROJECTS IMPLEMENTED FOR THE WORLD'S FAIR (CONT.)

ROADWAY/ PROJECT	DESCRIPTION	SCHEDULING START	SCHEDULING END	SCHEDULING COST	ACTUAL IMPACT EXPECTED IMPACT RELATED TO FAIR	ACTUAL IMPACT INCREASE IN CAPACITY	ACTUAL IMPACT COMMENTS
20. Pedestrian signals at selected locations.		1-81	12-81	City $40,000		N/A	Provide protection for pedestrians.
21. World's Fair trailblazer signing.	Install signs on major approach routes directing tourists to parking areas (over 80 locations).	1-82	4-82	State $60,000 City (includes removal $40,000)	Distribute traffic to various parking area.	N/A	People tended to follow the first trailblazer exit that they encountered; overall very useful, but certain improvements could have made trailblazing work better (see text).
22. New taxi, passenger, bus loading, and no-parking zones.	---	3-82	4-82	City $3,000	Facilitate necessary curb usage.		

Interstate Improvements

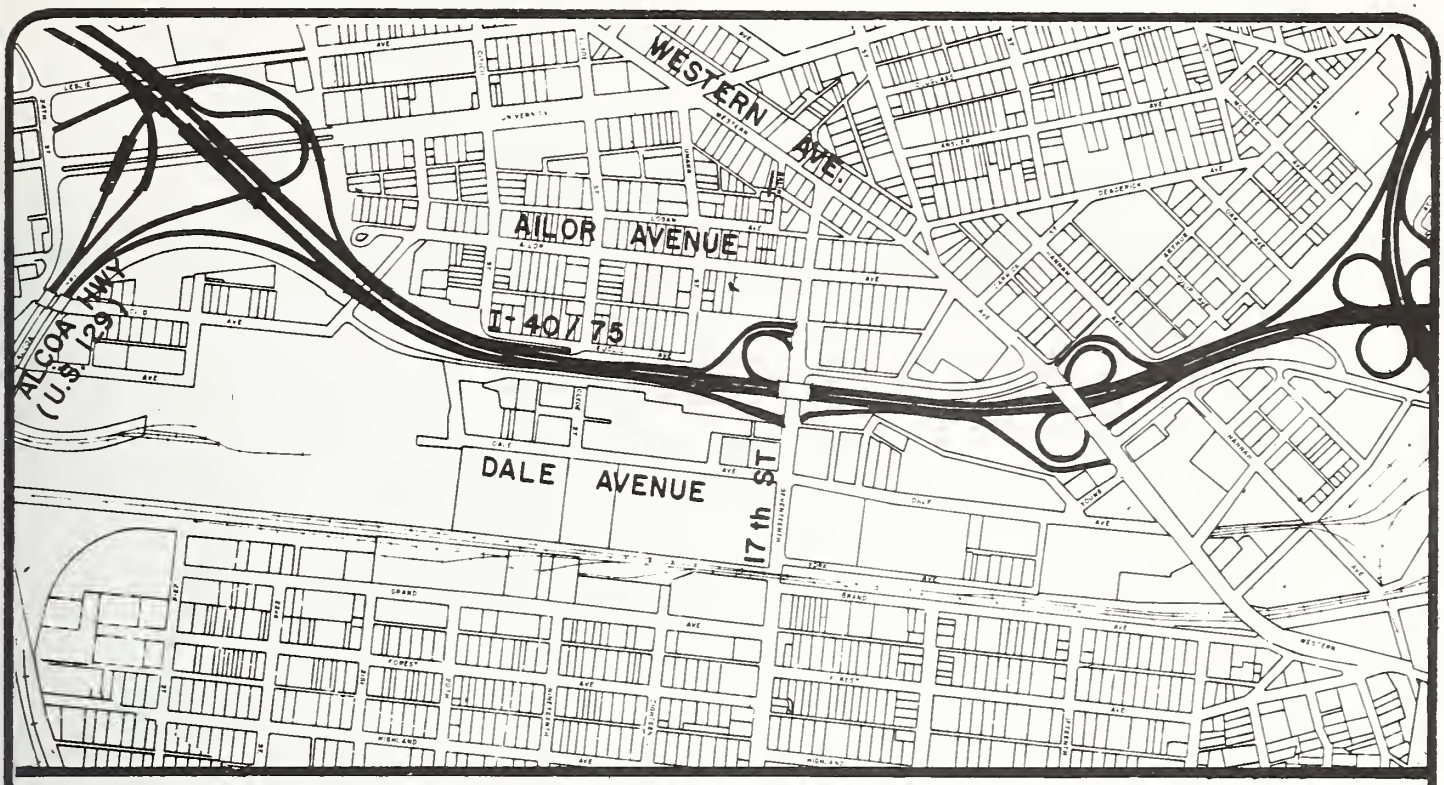
By far the most important set of transportation improvements to occur in conjunction with the World's Fair were those to the interstate system. To understand their significance it is necessary to know what conditions were like prior to the Fair.

When the interstate system was constructed in Knoxville it followed the alignment of an already existing expressway system located on the northern border of the CBD. It was heavily traveled because I-40 (an east-west route) traversed the mid-town area and I-75 (a north-south route) interchanged with I-40 immediately north of the CBD. As both regional and local traffic grew during the late 1960's and 1970's the sections of interstate adjacent to this cloverleaf design interchange experienced frequent and severe traffic congestion. This led to its nickname of "Malfunction Junction."

Even without the World's Fair it was obvious that improvements were necessary, but once the Fair plans were firm it became imperative that the schedule be advanced to accommodate Fair traffic. Improvements to the interstate system were seen to be so vital that the $30 million loan to the World's Fair developer depended on monthly written assurances from the Governor of Tennessee to the banks involved that the construction was proceeding on schedule. If construction had lagged, it is possible that financial backing could have been withdrawn. To expedite the situation, TDOT carefully orchestrated construction with as many as 28 different concurrent contracts.

Figure 5-B shows the CBD section of I-40 before and after improvements were made. Some of the major differences are: the redesign of the I-275/ I-40 interchange (formerly "Malfunction Junction"), the elimination of the Western Avenue interchange, the incorporation of Dale and Ailor Avenues as a one-way pair of frontage roads, and the redesign of the Alcoa Highway interchange.

The addition of Blackstock Avenue had a specific use during the Fair as an access point to the tour bus terminal and north parking lot and is now functioning as a frontage road to the temporary interstate ramps. These ramps were constructed to provide access to the CBD area during the Fair because it was not possible to build the final I-275/I-40 interchange design with several ramps tieing directly into Henley Street before the Fair opened. The ramps were not designed to FHWA standards but were allowed to be constructed as "temporary" ramps. They will remain until the final design is implemented.



BEFORE

AFTER

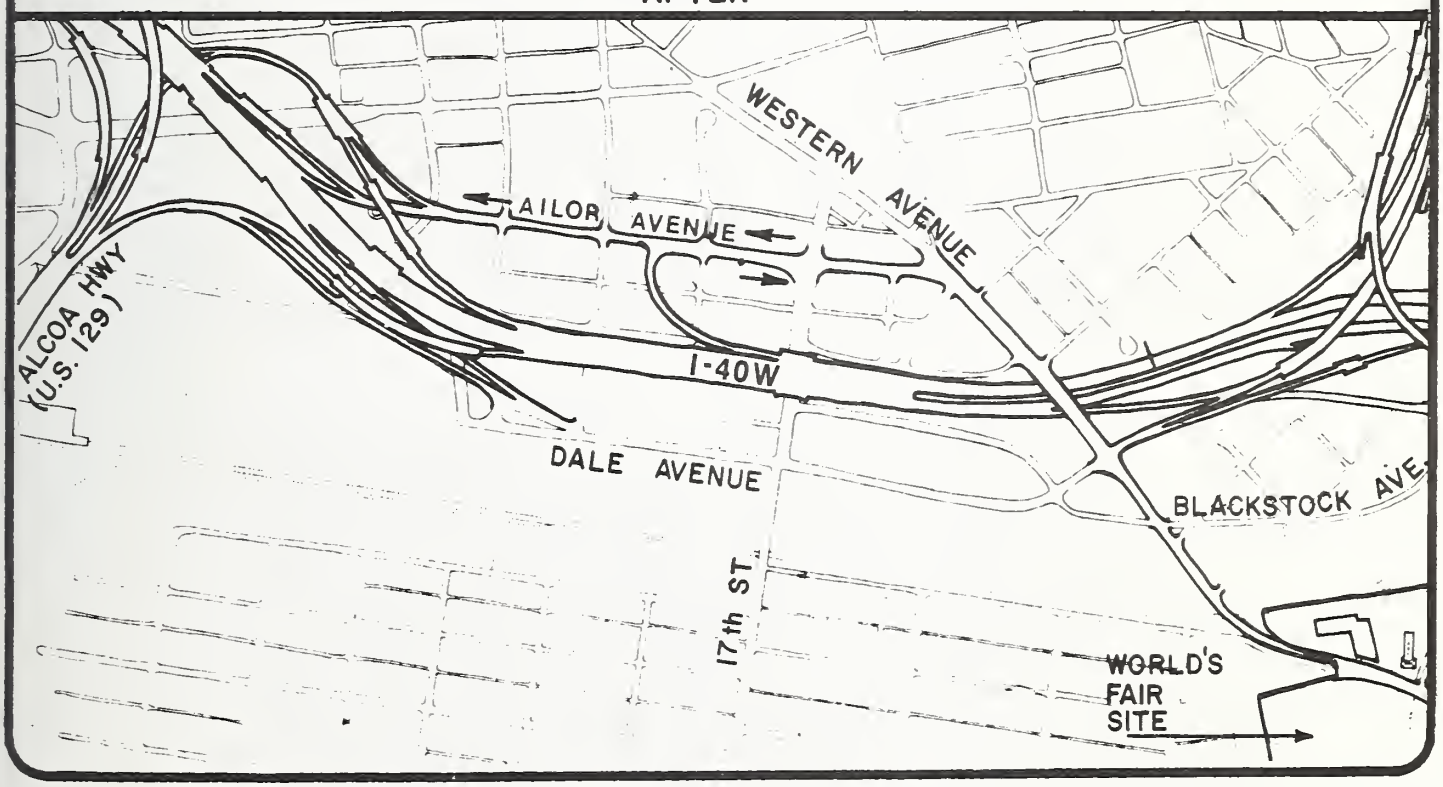
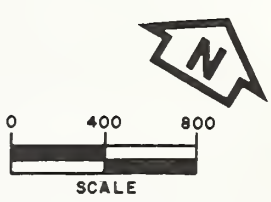


FIGURE 5 - B

COMPARISON OF CBD INTERSTATE SYSTEM BEFORE AND AFTER WORLD'S FAIR



Another change that occurred in the CBD section of the interstate was that I-75 was signed along the western leg of I-640, the semi-circumferential bypass route. This removed through I-75 traffic from the downtown area. That section of interstate which previously had been I-75 was designated as I-275 (see Figure 5-A).

Traffic management during the reconstruction of the CBD section of the interstate was necessary to accommodate as many as 100,000 vehicles per day. This required that construction be divided into stages, each with a plan for handling the large volumes of traffic, as well as some temporary facilities. A traffic management program was also used to alleviate problems. This included the establishment of a radio frequency that broadcasted updated detour and construction information, the use of police officers instead of flagmen to direct traffic, and coordination among contractors working on adjacent sections of the interstate. In a project of this magnitude, vehicular delays had to be expected. Field observations indicated that after the traffic management program was in full swing, delays averaged 20 to 30 minute per vehicle. Considering that whole sections of interstate had to be totally reconstructed, it is felt that this level of delay was not excessive in the managing of traffic through a major work zone.

The interstate improvements that have been completed cost nearly $180 million. Ordinarily this would have been an extremely large amount of money to dedicate to improvements over such a short span of time. However, FHWA announced the availability of a large discretionaly sum of interstate improvement funds in the late 1970's at the same time Tennessee identified the need to improve and reconstruct the Knoxville interstate system. These funds were previously committed funds that had not been used. As a result, Tennessee was able to secure $120 million of these funds for Knoxville's interstate improvements.

Local Street Improvements

Perhaps the most important of the local street improvements in the vicinity of the Fair were those to Henley Street, which forms most of the eastern border of the Fair site. Prior to the Fair this street suffered from congestion due to the large number of signalized intersections with inadequate numbers of lanes (the old cross-section was four lane undivided with a continuous center turn lane). TDOT and the City had agreed that even without the Fair some improvements were necessary but the right-of-way costs were extremely high. However, when the Fair site was purchased the right-of-way needed to expand Henley Street was included. The improvements on Henley were crucial to handle the substantial amount of Fair-related traffic (see next section of this chapter for discussion of "during" and "after" traffic volumes and patterns on the street network).

In order to take advantage of the parking facilities at the Knoxville Civic Coliseum, a temporary exit ramp from the business loop (which interchanges with I-40) to Hill Avenue was built. Similar to the temporary interstate ramps, this was not built to standard and was removed after the Fair. During the Fair this ramp carried slightly over 1,000 vehicles per day. Given the low utilization of the Coliseum parking lots, it is likely that much of this volume was local traffic. Although the ramp did remove these vehicles from entering into the CBD via the Cumberland Avenue exit, this seems to be the one project that was only marginally needed to handle Fair traffic.

Blackstock Avenue was not originally planned but was soon realized to be essential to provide adequate access to the tour bus terminal. The construction of Blackstock was a joint venture: the City paid for the right-of-way; KIEE paid for railroad track relocation and modification of an overpass bridge structure; and TDOT paid for construction.

The improvements to the Cumberland Avenue/Main Avenue one-way pair were required for several reasons. First, it was necessary to realign these streets to provide an adequate site for the U.S. Pavilion, which was one of the dominant structures planned for the Fair site. Second, as this pair divided the Fair site, it was desirable to move them closer together. Third, the closing of Clinch Avenue, a parallel route which traverses the Fair site on a viaduct, would divert approximately 10,000 vehicles per day to other routes. Increased capacity was needed and this also spurred intersection improvements further west on Cumberland Avenue at 16th and 17th Streets. (The Texas U-turn referred to in Table 5-1 allows for a U-turn movement from the westbound direction on Cumberland to eastbound on Main.)

The one-way street designations referred to in Table 5-1 are difficult to assess. Even with a one-way street system in the Fort Sanders residential area west of the Fair site, the number of accidents did not decline. It is possible that the number of accidents could have been higher if the one-way system had not been implemented. In other areas such as 11th Street, Poplar, and Ramsey, it is probable that congestion would have resulted on Cumberland Avenue and Blackstock Avenue. Uncongested traffic flow on the peripheral streets was important for emergency access as well as convenience.

The final two years before the opening of the World's Fair presented a significant work program for the City Traffic Signal Construction Division. Thirty-five intersections were signalized as new installations or existing signals were replaced due to extensive geometric construction. Thirty intersections had the traffic signal displays modernized to comply with Manual on Uniform Traffic Control Devices (MUTCD) standards. A $40,000

program for pedestrian display addition or modernization in the CBD was also accomplished. The pedestrian displays were converted from the "WALK -DON'T WALK" legends to the international symbols of the walking man and the hand. Three signal installations were warranted as a result of the Fair. These were at the intersections of Cumberland/Locust, Cumberland/11th, and Blackstock/Oak/I-40 Eastbound exit ramp. The traffic signal at Blackstock/Oak/I-40 Ramp has since been removed. The other two are being evaluated for signal removal.

The Knoxville computerized traffic signal system was partially operational during the World's Fair. Group 1, which consisted of 68 intersections, included the Central Business District, Cumberland Avenue, and Kingston Pike west to Northshore Drive. It also included Seventeenth Street, Dale Avenue, Ailor Avenue and Western Avenue in the fringe area of the CBD. Group 2, which included outlying roadways, was operational by midsummer. There was no assessment made during the Fair, but a study of Cumberland Avenue between Henley Street and Alcoa Highway (U.S. 129) indicates that, although traffic volumes between 1980 and 1983 have increased by 7,500 vehicles per day (35 percent), travel times have decreased by an average of 33 percent. While some of this can be attributed to the prohibition of left turns at two intersections, it is likely that most of it is due to the high degree of progressive movement provided by the system. Group 2 being operational was probably only marginally beneficial to Fair visitors.

Street Lighting

Seventy square blocks in the CBD were converted from mercury vapor to high pressure sodium type of street lighting. Many overhead services on wood poles were replaced with underground services on aluminum poles. The current cost of energy made this a break-even project. A cost of $10,000 was required to pay for the salvage value of some fixtures that had not fully depreciated in the downtown area. Street lighting was especially important around the periphery of the Fair site for property and pedestrian security. Overall, the installation was for crime prevention and aesthetics.

CBD landscaping, installation of street furniture, and sidewalk improvements were also part of the preparations made for the Fair. An adhoc committee called the "Community Appearance Committee" was formed to oversee aesthetic improvements to the downtown area. It was mainly composed of bank presidents and architects. This committee commissioned a landscape architect to develop a CBD beautification plan. The work included $325,000 for sidewalk repair or replacement and $50,000 for landscaping and street furniture. Over 100 trees were planted in the CBD, 25 benches were installed, 50 pole mounted trash receptacles were placed throughout the downtown area, and 25 large trash receptacles were placed outside the Fair site.

TRAFFIC MANAGEMENT TECHNIQUES

Because a large number of through I-40 trucks (roughly 5,000 per day) would have passed very close to the Fair, a decision was made jointly by TDOT and the City to prohibit through I-40 trucks from the downtown area, requiring instead that they use the I-640 bypass route. This was done to preserve freeway capacity and to move potential hazardous material accidents away from the high concentration of people in the CBD area. It required trucks to travel an extra four miles. However, there existed ample capacity on the interstate through town during the Fair. Although the prohibition ended with the Fair, residents in downtown neighborhoods are advocating that it be reinstated to avoid hazardous material accidents in the downtown area.

There are several ways the planners at TDOT responsible for implementing the trailblazer system felt it could have been improved. First, adequate time should be given to develop a signing concept and for installation (the Knoxville project was on a very tight schedule). Second, the signing plans should be done on good quality aerial photographs preferably at a one inch to 100 feet scale. Third, if done again, trailblazer signs might have been better used if they had directed southbound I-75 traffic around the I-640 bypass and into town on I-40 eastbound. This would have taken some pressure off the 17th Street exit which was heavily utilized during the Fair. Also, this traffic would have exited directly onto Dale Avenue from I-40 eastbound instead of making a left turn onto Dale Avenue enroute to the north parking area.

There was a continuation by the City of the street name signing program in the Central Business District and fringe area. This included approximately 400 of the city's 5,000 intersections. The City installed 1,400 signs of various other types, but they were primarily related to parking. The "Parking/No Parking" signs were a necessity.

WORLD'S FAIR TRAFFIC PLANNING COMMITTEE

Because there was so much concern about transportation prior to the World's Fair, a committee was formed to discuss the problems and possible solutions. The World's Fair Traffic Planning Committee was composed of representatives of the City Department of Engineering, Knoxville Police Department, KIEE's Transportation Consultant, Tennessee Department of Transportation, University of Tennessee Transportation Research Center, Tennessee Highway Patrol, and

AAA. This group met weekly or monthly for 14 months prior to the Fair. During the final 12 weeks before the Fair, KIEE's transportation consultant, the city traffic engineer, and the city designated police lieutenant for traffic control met weekly to resolve traffic issues.

The group was involved in gathering and sharing as much information as possible that related to World's Fair transportation. This information included activities related to parking lot operations, anticipated traffic patterns of World's Fair pedestrians, buses, taxis, and auto drop-offs. This information was overlayed on existing traffic patterns to anticipate potential problems and reach possible solutions through design.

An example of work of the committee was designation of the World's Fair local street loading areas for shuttle buses and taxis. Another example was meeting with Downtown merchants and their suppliers prior to the Fair to discuss anticipated traffic patterns.

The formation of the committee helped foster a very positive working relationship among the parties involved in providing transportation infrastructure, which had begun to develop during the initial phases of interstate reconstruction. In some cases the City and TDOT exchanged responsibilities across their normal jurisdictional boundaries. Another related aspect is that the TDOT main office in Nashville delegated to the regional office in Knoxville the responsibility to make many decisions that normally would have been retained in Nashville.

ANALYSIS OF TRAFFIC PATTERNS

Daily Traffic Volume Comparisons

Figure 5-C shows the projected and actual daily increases in traffic on major approach routes to the World's Fair. Interstate counts were made on single days two weeks before and two weeks after the Fair opened. The remaining counts were made at various times during and after the Fair and were generally taken over the course of several days. Unfortunately, counts were not available for I-275 or Broadway. During the planning stages of the Fair, traffic was projected to increase by approximately 33,000 vehicles per day on major approach routes. This is in close agreement with what actually occurred as depicted by the traffic counts on Figure 5-C. However, two locations showed significant discrepancies; it appears that more trips used Alcoa Highway than expected and less used I-40 West. Fortunately, major improvements were made on I-40 east of the Alcoa Highway interchange to accommodate expected heavy traffic on I-40 east of Alcoa Highway. These improvements

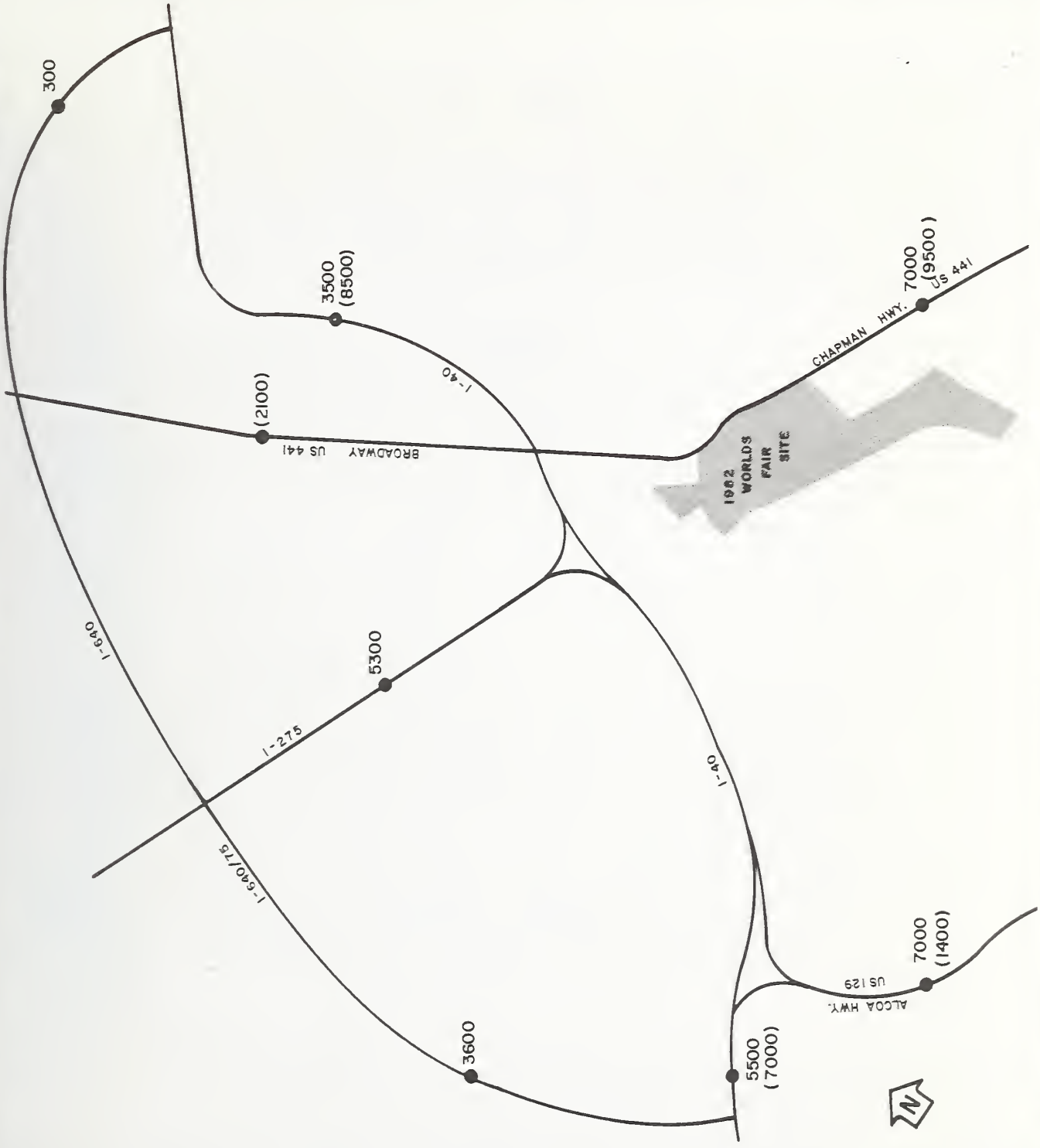


FIGURE 5-C

PROJECTED VERSUS ACTUAL TRAFFIC INCREASES (vehicles per day) ON MAJOR APPROACH ROUTES

000 ACTUAL INCREASE
(000) PROJECTED INCREASE

ultimately accommodated the increased number of trips apparently originating from Alcoa Highway. Further analysis of interstate traffic shows that volumes on I-40 inside the I-640 loop increased by seven percent. Traffic on the east leg of the I-640 loop increased only two percent (300 vpd) even though through I-40 trucks were required to use I-640 during the Fair. The small difference may be due to the fact that interstate counts were limited during the Fair and, hence, subject to large random variation.

Traffic on the west leg of I-640 (which is also the signed route for I-75) increased by nine percent. Again, trucks accounted for a large portion of this increase, but it is likely that some of it is due to Fair-related I-75 traffic going around central Knoxville to use the Dale Avenue approach to the north parking lots and bus terminal. Also, many local trips may have used this leg to avoid central area congestion. No comparable data exists for I-275 or I-75 and I-40 beyond the I-640 loop.

More extensive traffic count data was available for the local street system. This data was collected by the City Department of Engineering during and after the Fair in two forms: (1) tube counts at selected locations and (2) one-way counts made downstream from intersections by the newly installed computerized signal control system. Figure 5-D shows overall average daily traffic (ADT) volumes on the local street system adjacent to the Fair site during and after the Fair (these are average counts for both weekdays and weekends). Fair planners had originally expected very slight volume gains in the immediate vicinity of the site due to the distribution of parking space but, as can be seen, significant increases actually materialized. Much of this can be attributed to people driving close to the Fair site to get a glimpse of it before parking. This situation was perpetuated by the overall lack of traffic congestion around the site. (As will be shown later, the increases did not significantly affect traffic operations due to roadway improvements and Fair arrival/departure patterns.)

On major arterial streets, the most dramatic increase occurred on Broadway (+43 percent) north of the Fair site. This was due to increased use of the temporary interstate ramps and Blackstock Avenue during the Fair as well as increased through traffic on Broadway itself (which is signed as U.S. 441). Henley Street (the natural southern extension of Broadway) which borders the entire east side of the Fair site experienced a 37 percent increase. The Cumberland/Main one-way pair, which traverses the Fair site, showed a 32 percent increase.

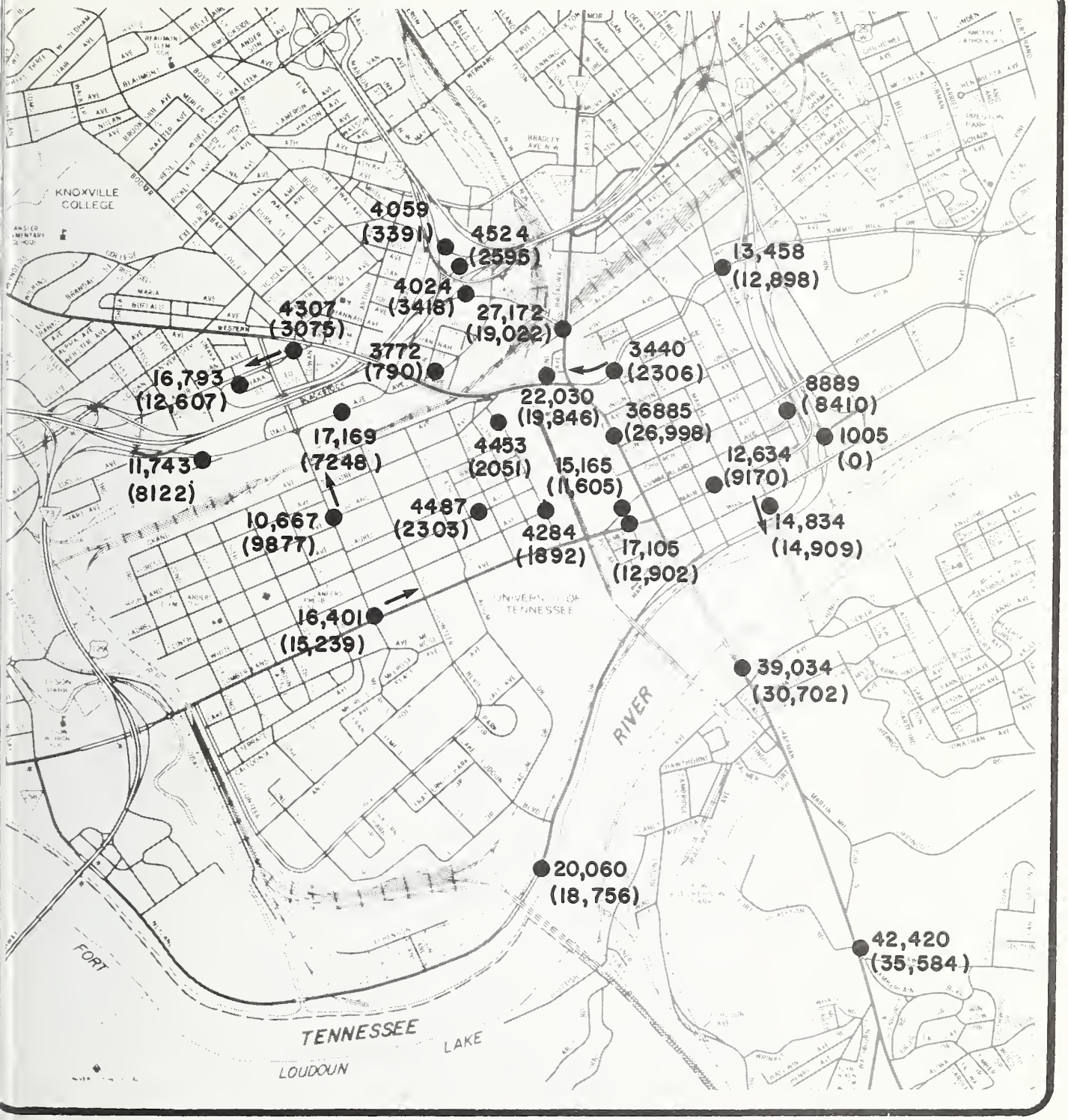


FIGURE 5-D

OVERALL AVERAGE DAILY TRAFFIC ON SELECTED ROUTES

000 DURING
(000) AFTER
← ONE WAY COUNT

There were also several arterials in the area that showed only marginal or no increases in traffic. Neyland Drive, which borders the site on the south, exhibited little increase. Since this was the primary access route to the shuttle bus terminal, it is possible that local trips avoided this area because of the presence of the buses. Also the underutilization of several World's Fair parking areas maintained by the University of Tennessee contributed to the lack of traffic increase on Neyland Drive. Western Avenue, which crossed over the north end of the site via a bridge, also showed only a small increase. This was probably due to lack of access to the site and parking facilities. Gay Street, the major north-south route within the CBD, showed no increase at all, indicating that Fair visitors concentrated their efforts on the Fair itself rather than the downtown area. This contention is supported by the experiences of downtown merchants who saw very little growth in business during the Fair. It is presumed Fair-related trips accessing the interstate system via the business loop led to the 38 percent increase on Main Avenue in the CBD. The effectiveness of the trailblazer signing system was likely responsible for only marginal increases in traffic on Cumberland Avenue and 17th Street several blocks away from the site.

The few collector-type streets counted showed large increases. Traffic on 11th Street along the western border of the Fair site more than doubled during the Fair since it provided a view of the site before parking.

Traffic on Clinch Avenue, the major east-west route through the residential neighborhood of Fort Sanders, almost doubled. Observations on other Fort Sanders streets show that traffic as a whole increased in the neighborhood. These increases may be associated with the proliferation of small parking lots and apartments catering to Fair visitors. If neither of these had occurred, traffic impact on the neighborhood would probably not have been as great, with the exception of 11th Street which was on the Fair's perimeter.

The Dale/Ailor one-way pair, which was instituted to serve as a collector/ distributor to the interstate system, experienced significant increases during the Fair. The largest increase was on Dale Avenue east of 17th Street where both eastbound and westbound I-40 traffic was directed on their way to the north parking areas. The temporary entrance ramps to I-40 west and I-275 north in the immediate vicinity of the North gate were also heavily utilized during the Fair.

The most dramatic increase in traffic on any street where counts were available was Blackstock Avenue where an increase of 477 percent was experienced. (In terms of absolute volumes this was not the largest increase, however.) This street was constructed to handle tour bus traffic to the north terminal. It also appears that a large number of visitors arriving by car used it. The fact that traffic decreased dramatically after the Fair is a reflection of the low level of development and, hence, lack of traffic generators in the area.

The comparison of overall ADTs does not give a full picture of the impact of Fair traffic on daily commuting and business travel by area residents. Figures 5-E and 5-F depict ADTs derived from weekday and weekend counts. In nearly every case, the weekend difference in traffic is far greater than the weekday difference. This indicates that the differences shown in Figure 5-D are attributable to large increases in weekend traffic during the Fair. The weekday ADT map shows that, in most cases, the weekday effects of Fair traffic are minimal. For example, the weekday increase on Henley Street was 17 percent but the weekend increase was 60 percent. If weekday versus weekend ADT's for during the Fair are compared to weekend versus weekday ADT's after the Fair, it is found that traffic varied much more after the Fair than during the Fair. This implies that traffic during the Fair distributed itself more evenly through the week. Thus, the excess in capacity that normally exists on weekends due to lack of commuters and business travel was used by Fair traffic. The fact that weekend Fair traffic was generally higher than weekday Fair traffic is due to the fact that weekend attendance was higher than for weekdays (the average weekday saw 13.8 percent of total weekly attendance while weekends experienced 15.5 percent).

Hourly Traffic Volume Comparisons

Graphs of hourly variations in traffic during and after the Fair were compiled from both tube and computer counts and represent volumes factored for day and month. These show the variations in traffic patterns caused by the Fair.

Figure 5-G shows Friday traffic on westbound Ailor Avenue just west of its intersection with Western Avenue. As previously mentioned, this route serves as a collector/distributor to I-40. Hourly variations were similar for low and high Fair attendance days as well as for after the Fair. The exception is the sharp spike between 10 and 11 P.M. during the Fair. This represents traffic leaving the Fair after it closed (10 P.M.). Figure 5-H shows westbound Summit Hill Drive just west of Locust Street one block from the Fair site. This also exhibits the 10-11 P.M. spike

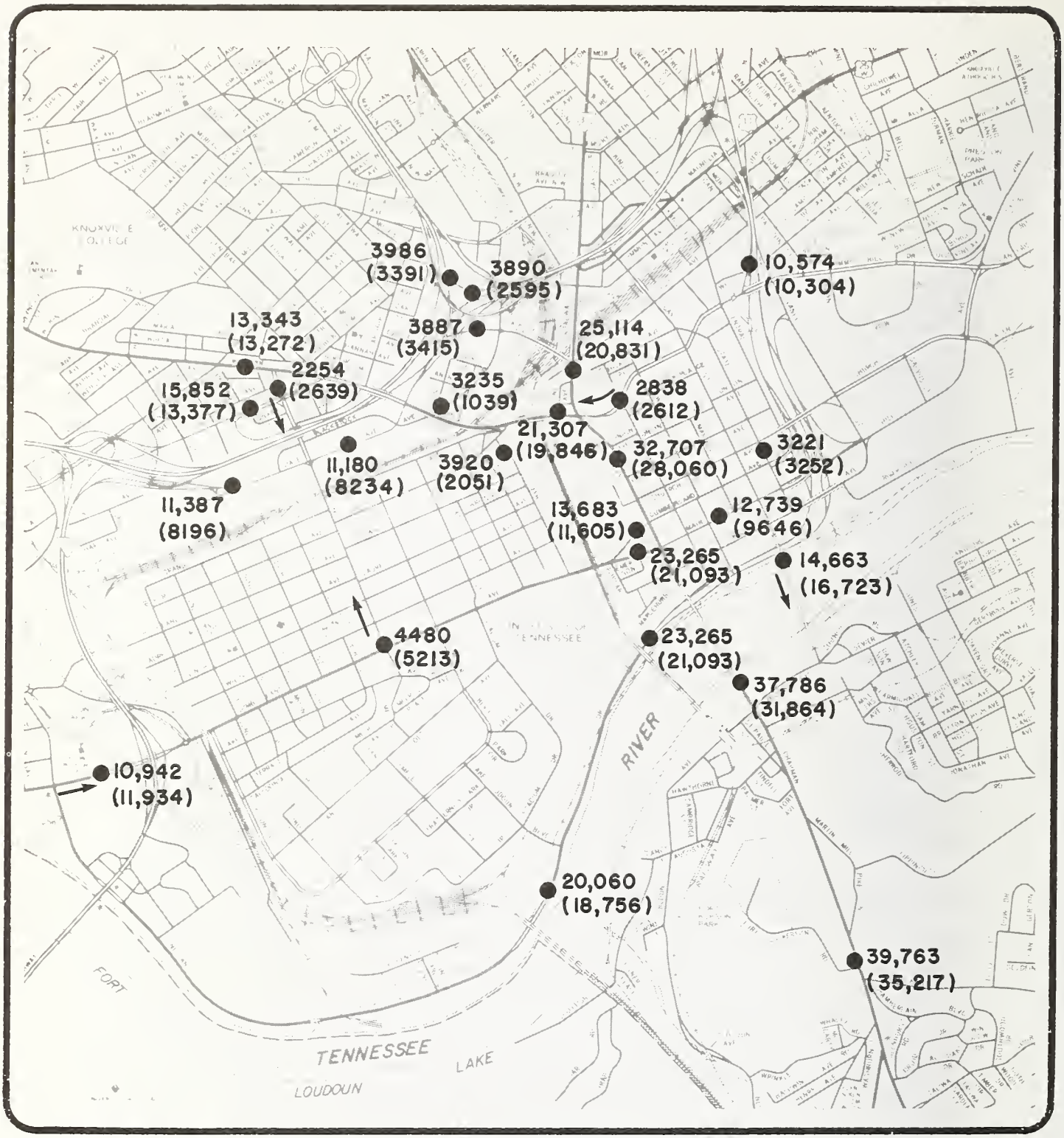


FIGURE 5-E

WEEKDAY AVERAGE DAILY TRAFFIC
ON SELECTED ROUTES

000 DURING
(000) AFTER
← ONE WAY COUNT

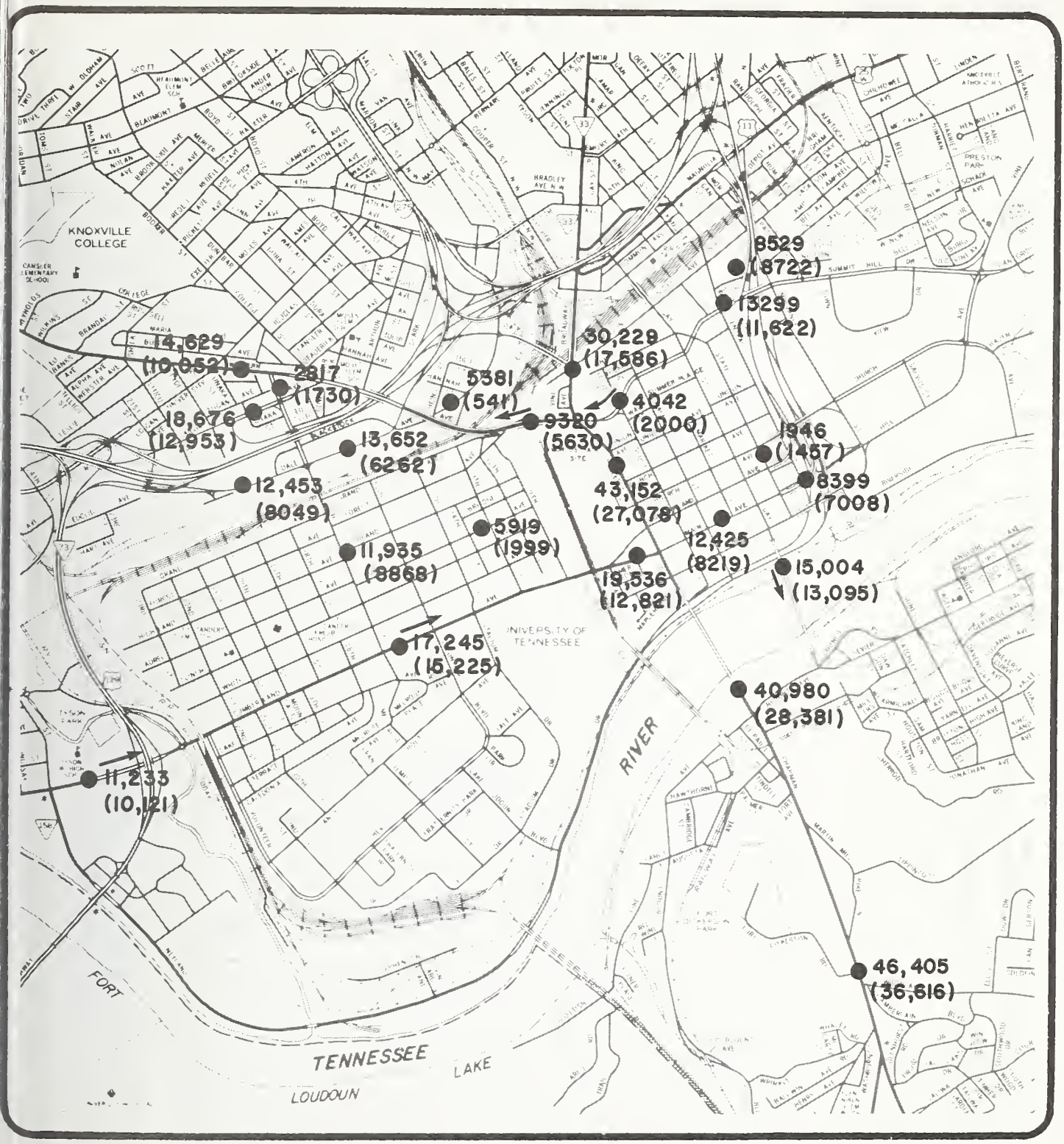


FIGURE 5-F

WEEKEND AVERAGE DAILY TRAFFIC
ON SELECTED ROUTES

000 DURING
(000) AFTER
⟵ ONE WAY COUNT

FIGURE 5-G
TRAFFIC VOLUME VARIATIONS

Note: A=Attendance

FIGURE 5-H
TRAFFIC VOLUME VARIATIONS

Note: A=Attendance

as well as the normal afternoon peak around 4 P.M. However, the 10-11 P.M. spike is more pronounced for Ailor Avenue, which is expected since it is leading away from the site. The increased traffic during the Fair between 8 A.M. and noon on Summit Hill Drive represents the morning CBD inbound peak and visitors arriving to the Fair.

Figure 5-I shows southbound Henley Street at Clinch Avenue. Again there is the normal morning and afternoon peaks, the morning inbound visitor peak, and the 10-11 P.M. spike. As with Summit Hill Drive, there is the "continuation" of the morning peak during the Fair, indicating that most Fair visitors arrived after morning rush hour traffic had cleared (opening time for the Fair was 10 A.M.). This contention is verified by gate information that showed nearly 60 percent of inbound attendees arrived before noon. These graphs are typical of weekday hourly variations of traffic at locations that showed increases during the Fair in that: (1) the morning peak was extended over several hours to accommodate visitors arriving to the Fair, (2) the afternoon peak was generally not affected, and (3) many Fair visitors tended to leave around Fair closing time causing a third traffic peak between 9 and 11 P.M.

Figure 5-J graphs hourly northbound traffic variations on 11th Street at Forest Avenue. This shows the increase in traffic near the residential neighborhood of Fort Sanders. (While 11th Street is a Fair perimeter street, Clinch Avenue, a major through street for the neighborhood, showed equivalent gains in traffic.) The pattern of traffic is similar but in larger volumes during the Fair (observations indicated this to be true of most streets in Fort Sanders) with the exception of the spike found late in the day. Unlike the rest of the locations that were studied, this spike occurs between 11 P.M. and midnight. However, this count was taken during the last week of the Fair when many activities were extended past the 10 P.M. closing time.

Figure 5-K shows the variation in traffic on southbound Gay Street at Church Avenue. As mentioned in the previous section, traffic impacts on the CBD were minimal. This small differences in variations during and after the Fair imply that Fair visitors concentrated their driving on the Fair approach routes and around the Fair itself rather than the CBD.

Traffic counts depicted on Figure 5-L show weekend traffic on westbound Ailor Avenue just west of its intersection with Western Avenue. The 10-11 P.M. spike during the Fair is present as well as two other spikes on October 16 due to a home football game. Comparison of October 9 (no football) and November 13 shows that the traffic pattern is generally similar, but daily traffic volumes are higher during the Fair. This result is typical of the majority of weekend count locations.

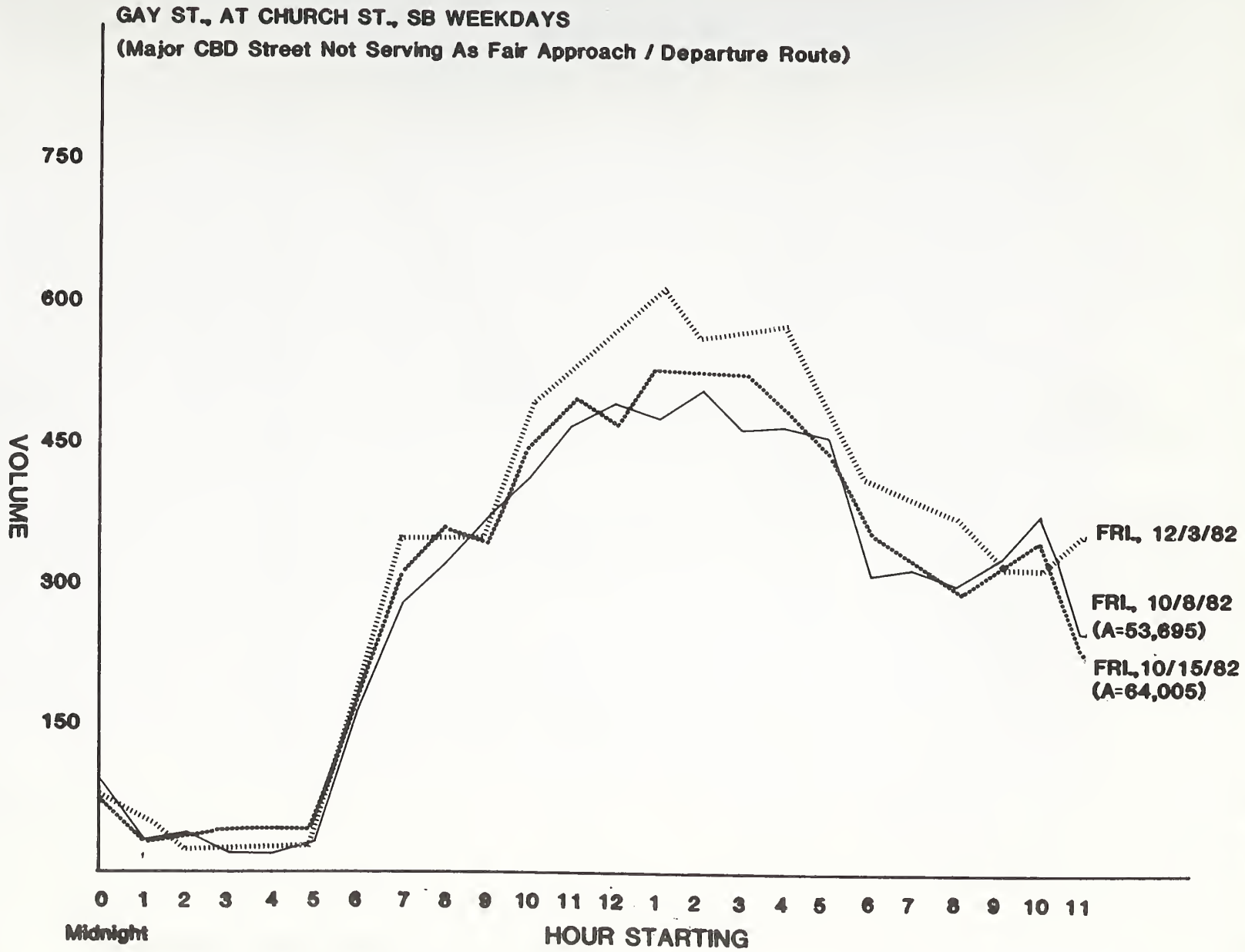
FIGURE 5-1
TRAFFIC VOLUME VARIATIONS

Note: A=Attendance

FIGURE 5-J
TRAFFIC VOLUME VARIATIONS

Note: A=Attendance

FIGURE 5-K
TRAFFIC VOLUME VARIATIONS



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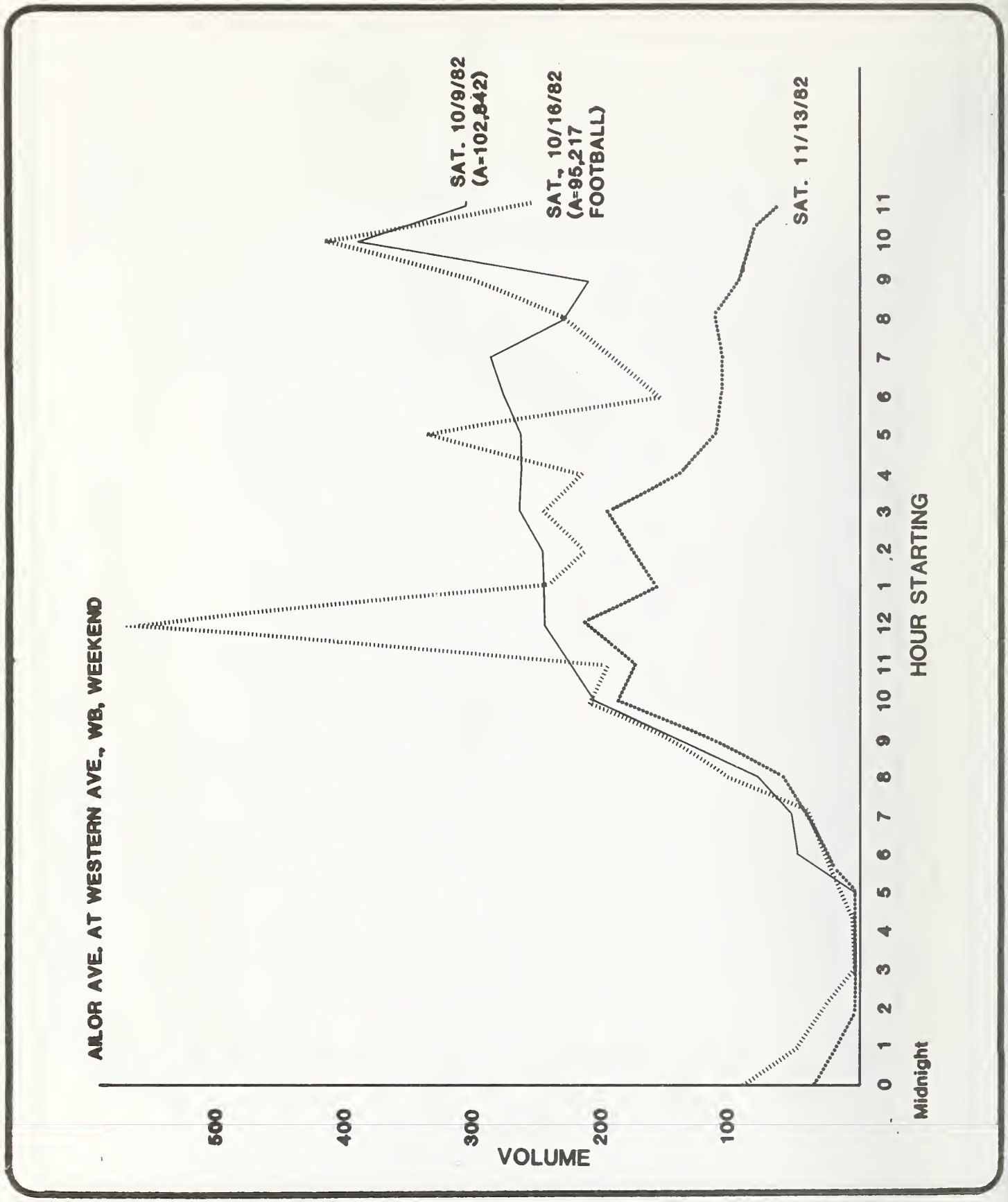

FIGURE 5-L
TRAFFIC VOLUME VARIATIONS

Note: A=Attendance

Vehicular Accidents

Table 5-2 documents the reported vehicular accidents in 1981 (before the Fair) and 1982. Comparison between years should be made carefully since 1981 was a period of intense roadway construction activity. Thus, comparison of 1982 and 1983 data would probably yield more useful results. Accidents increased by about 3.3 percent during the Fair. Some increase should be expected due to higher traffic volumes during the Fair. The 3.3 percent increase is not statistically significant, especially considering that total vehicle miles of travel increased substantially during the Fair.

TABLE 5-2: COMPARISON OF 1981 AND 1982 KNOXVILLE ACCIDENTS*

	1981	1982	% Increase
January	694	635	- 8.5
February	703	623	-11.4
March	666	643	- 3.5
April	667	698	+ 4.6
May	776	803**	+ 3.5**
June	692	749**	+ 8.2**
July	671	735**	+ 9.5**
August	686	687**	-0-**
September	694	738**	+ 6.3**
October	857	809**	- 5.6**
November	797	756	- 5.1
December	793	804	+ 1.4
TOTAL	8,696	8,680	-0-

*includes property damage only, personal injury, and fatal accidents plus accidents on the Interstate system.

**occurred during 1982 World's Fair

Table 5-3 shows that accidents have been declining in Knoxville over the past five years. It is possible that the extensive road reconstruction effort associated with the World's Fair has been instrumental in effecting the decline, but without more precise data it is difficult to reach a firm conclusion.

TABLE 5-3: HISTORICAL ACCIDENT DATA FOR KNOXVILLE

YEAR	TOTAL ACCIDENTS	INDEX*
1978	10,148	1.00
1979	10,150	1.00
1980	9,626	0.95
1981	8,696	0.86
1982	8,680	0.86

*Compared to 1978 base.

Traffic Crossing Selected Cordon Lines

Figure 5-M identifies three cordons for analysis; Fair perimeter, CBD, and Fair impact area. Table 5-4 shows the percent increases for the morning and afternoon peak hours and daily percent increases. For the Fair perimeter and Fair impact area cordons, the increases during the peak hours are substantially less than daily increases. This supports the results shown in the hourly variation graphs that Fair-related traffic tended to distribute itself over the entire day rather than at normal commuting times. The increases for the Fair impact area for the morning and afternoon peaks are largely attributable to the Cumberland Avenue count location where increases of 36 and 40 percent for the morning and afternoon peak hours occurred. This location appears to be the single exception to the conclusion that Fair related traffic did not conflict with commuter peaks. The fact that it bisected the Fair site and had a gate to the site located along it are major contributors to its volume increases. It is likely that traffic naturally gravitated to this area because it provided high visibility of the site. The daily increase in CBD cordon traffic is not representative of traffic within the CBD as the count locations, with the exception of Gay Street, are located on Fair approach routes.

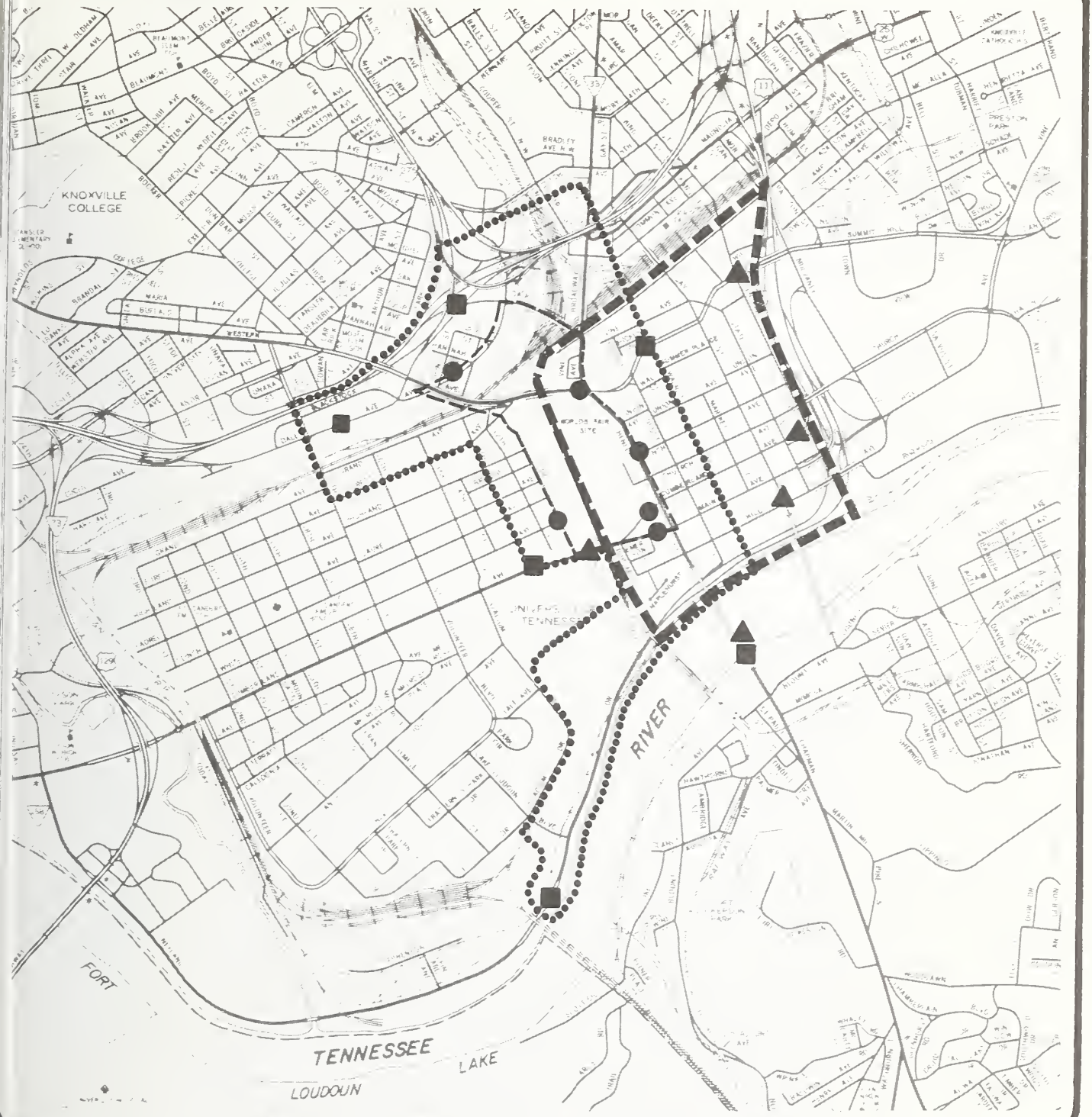

FIGURE 5-M

SELECTED CORDONS AND COUNT LOCATIONS

- FAIR PERIMETER CORDON
- FAIR COUNT LOCATIONS
- CBD CORDON
- CBD COUNT LOCATIONS
- FAIR IMPACT AREA CORDON
- FAIR IMPACT AREA COUNT LOCATIONS

TABLE 5-4: WEEKDAY TRAFFIC INCREASES ACROSS SELECTED CORDONS DURING THE FAIR[1]

CORDON	PERCENT INCREASE A.M. PEAK[2]	P.M. PEAK[3]	DAILY
Fair Perimeter	+ 6.9	+ 6.3	+16.1
CBD	+10.2	+ 9.4	+17.0
Fair Impact Area	+13.9	+12.5	+15.5

NOTE: Traffic counts have been factored to account for daily and monthly variations.

[1]For cordon boundaries see Figure 5-M.
[2]8:00-[:00 A.M.
[3]4:00-5:00 P.M.

CONCLUSIONS

Knoxville's street system capacity was greatly increased during the 1982 World's Fair due to aggressive planning and construction efforts. Planners, engineers, and administrators from a variety of agencies cooperated in identifying and implementing needed projects. Almost all of the major improvements will have residual benefits to Knoxville. Many of these projects were necessary to accommodate future traffic; however, the presence of the World's Fair accelerated their implementation.

Certain other improvements which were conceived specifically for the Fair functioned very well (e.g., Blackstock Avenue and temporary interstate ramps). Most of these projects were in the immediate vicinity of the several gates used for access to the Fair site. Therefore, planners of future special events must involve themselves not only with general access to the area but with the impact of improvements on the flow of traffic and people around the Fair gates. If done over again, it is generally agreed that little or no major changes would be made.

Analysis of traffic during and after the Fair reveals that the specific hourly and daily distribution characteristics of the traffic patterns which developed did not create the serious congestion which was expected. The results of this analysis are summarized as follows.

1. Traffic volumes on the interstate system increased only between two and nine percent. The mainline improvements that were implemented, including completion of the I-640 loop and widening of I-40 in the downtown area, were more than adequate to meet the needs of Fair-generated traffic. The exception was tour buses backing up onto the mainline of I-40 which was rectified by staggering arrival times. Overall, forecasts of increased traffic on major approach routes were fairly accurate.

2. Traffic volumes (ADTs) generally showed significant increases on roadways in the vicinity of the Fair site. New roadways constructed to handle Fair traffic, such as the temporary interstate entrance ramps and Blackstock Avenue, were heavily utilized during the Fair. Non-interstate approach routes including U.S. 129 and U.S. 441 also showed marked increases.

3. There were main arterials in the area that did not exhibit notable increases in traffic. The western portion of Cumberland Avenue and 17th Street saw little change, probably due to the trailblazer system directing traffic elsewhere. Gay Street also did not experience traffic increases due to Fair visitors concentrating on the Fair alone. This contradicts early expectations that the Fair would cause not only a growth in traffic but also in business in general. Neyland Drive showed only marginal increases, even though it was on the trailblazer system and used for access by shuttle buses to their terminal.

4. Traffic in the Fort Sanders residential neighborhood increased notably due to its location adjacent to the Fair site and the abundance of small parking lots and curb parking.

5. The increase in ADTs during the Fair was attributable to large increases in weekend traffic which minimized interference with local commuting and business travel. Analysis of weekday hourly variations in traffic reveals that arriving and departing trips generated by the Fair occurred after the normal morning peak and did not conflict with the afternoon peak. Distributions of weekend traffic during and after the Fair were similar, although during-Fair volumes were much heavier.

6. The presence of several gates tended to distribute traffic more evenly over the street system than otherwise would have been possible. If fewer gates had been used the traffic increases found adjacent to the site would have been directed onto a smaller number of streets and caused congestion problems.

Chapter Six:

PARKING

A general overview of the parking system for The 1982 World's Fair, and its operation, was provided in the Phase 1 report. While no attempt has been made in this chapter to repeat or review the Phase 1 documentation, a substantial amount of supplemental information is provided here. The parking-related conclusions stated in the Phase 1 report have been combined with those drawn in Phase 2 and restated.

WORLD'S FAIR VISITOR PARKING

As mentioned in the Phase 1 report, a design day need for about 13,300 visitor parking spaces (11,300 off-street) was estimated based on a 65 percent automobile mode split, a 3.5 average vehicle occupancy, and a daily maximum on-site accumulation of 82.5 percent of the day's attendance. In response to a perceived parking shortage, KIEE and private interests provided substantially more spaces than were actually needed.

Supply

Table 6-1 shows the number of spaces by area for opening month (May), summer, and fall. On the opening weekend some 25,000 spaces were available, with only about 16,800 during a May weekday. That lower number was more than sufficient to meet any day's demands because the mode split, vehicle occupancy, and peak accumulation (see Chapter 3) all produced lower parking accumulation than projected.

After the first few days, several lots which had virtually no business ceased operation. This included most lots along Ailor, University, and Fifth Avenues northwest of the Fair, as well as several unofficial remote lots (most included in Table 6-1). By mid-June, a privately developed 2,500 space complex in the Coliseum area closed. By late June the parking supply had stabilized at about 11,300 weekday and 18,800 weekend off-street spaces, changing only to reflect school term availability. Virtually all lots which ceased operation were either (1) the farthest away in a given direction, (2) not on a major (direct) approach route to the Fair, or (3) on the far side of a perceived "barrier," such as a freeway or railroad track.

TABLE 6-1: VISITOR PARKING SUPPLY BY AREA - WEEKDAY

Area	Opening Week	Summer	Fall
I-275	1,350	450	450
Ailor/University	1,240	-	-
Dale Avenue - North Gate	3,130	2,780	2,910
Grand Avenue	370	370	370
Ft. Sanders (lots and available curb space)	540	740	540
CBD - Fair lots	2,550	2,300	2,300
Other Available	1,000	1,000	1,000
Church Avenue Area	4,550	1,850	1,850
Neyland Drive	360	1,160	360
Chapman Highway	1,700	710	710
Total Weekday	16,790	11,360	10,490
Additional Weekend Spaces	9,050	7,500	8,500
Total Weekend	25,840	18,860	18,990

SOURCE: Barton-Aschman Associates, Inc.

Distribution

Figure 6-A shows the percentage distribution of the spaces by area for early May and October weekdays. Initially, spaces were available in almost every direction both within walking distance and beyond (when shuttle buses provided transportation). Approximately 46 percent of all weekday spaces were within relatively easy walking distance to a gate. After the unused lots closed, 68 percent of the weekly spaces were within walking distance.

It had been intended to locate visitor parking along approach routes in proportion to the projected directional distribution of approaching Fair traffic. With the exception of the more distant lots, the ultimate distribution was similar to the directional distribution of approaching Fair visitor traffic. In this case, the market forces of supply and demand helped shape the ulitmate system.

Pricing

Designated "Official" World's Fair visitor parking lots all maintained a daily parking rate of $6.00, with one exception discussed in Chapter 12. Unofficial lots had daily rates which varied between two and ten dollars per day. These rates were modified on an hourly basis, if necessary, to try to fill lots. Most hourly rate changes occurred by 11 A.M.; many by 10 A.M. after operators became more experienced and could predict lot usage based on the amount of business before 10 A.M.

Theoretically, pricing changes were directed toward achieving increased revenue and not necessarily maximizing the number of vehicles parked. However, many operators perceived that a lot had to be almost full to be profitable. Hence, some cut prices until the lot could be mostly filled, regardless of the impact on revenues.

Many of the daily price changes were meant to be competitive with nearby (within sight) lots. Generally, when changes were made, daily rates were dropped to a dollar lower than the nearby lot(s). However, some parking operators dropped the opening rate to four dollars or even two dollars. By October most successful lots close to the Fair charged $6.00 per day. Those which were less successful had lowered their prices, generally to $4.00.

Location was observed to influence parking selection more than price. Often a lot could command one to two dollars more than another just one block further from a gate.

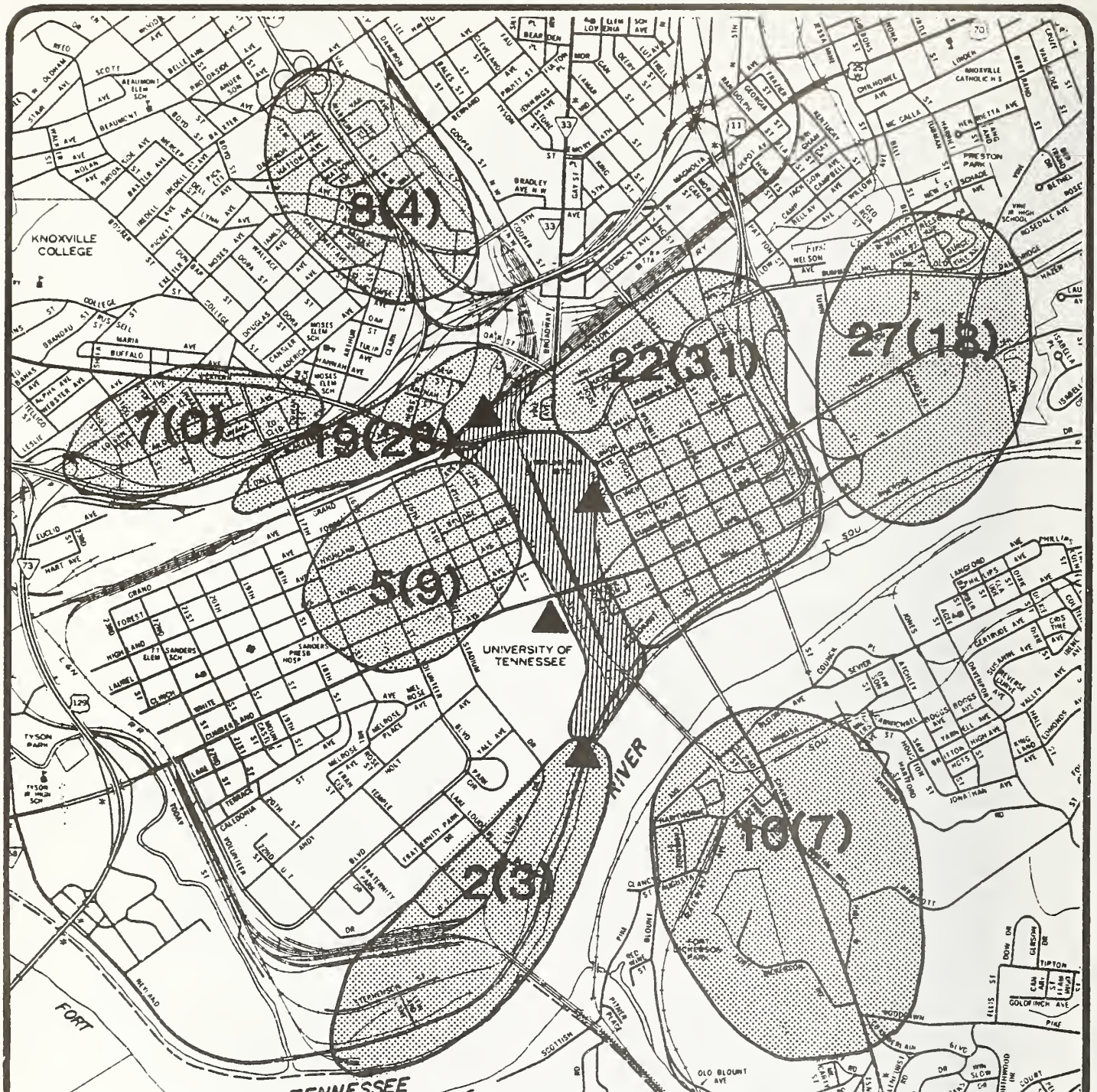

FIGURE 6 - A

PROPORTIONAL DISTRIBUTION OF WEEKDAY VISITOR PARKING

PERCENT OF TOTAL PARKING SPACES

00 - EARLY MAY

(00) - FALL

▲ GATE

Downtown spaces made available to Fair parkers maintained April pre-Fair first 1/2 hour rates, but raised the daily (maximum) rate to $6.00 or more. In most cases April rates had already risen above the level that had prevailed six months earlier.

Usage

Peak Occupancy. Figure 6-B shows the approximate distribution of Fair visitor parking on one mid-May weekday. This was the only day for which occupancy data for most spaces were available. Figure 6-C shows the peak occupancy as a percentage of available spaces by area. As can be seen from Figure 6-B, parking space usage was generally distributed according to approach distribution and not mearly availability, except in downtown and the Ft. Sanders neighborhood (well known by local residents).

Overall, it is estimated that on May 10th, an average attendance day for the Fair (61,000), approximately 5,100 parking spaces were occupied at maximum accumulation. This represented about 30 percent of the initially available weekday spaces and about 49 percent of the weekday spaces available at the end of the Fair. "Official" remote lots averaged about 20 percent ("official" walk-in lots averaged 36 percent occupancy in May).[1]

Only once during the Fair, on an October Saturday when attendance reached over 102,000 (highest of Fair), did most convenient lots fill. On that day, most of the remaining official remote lots also filled. With the maximum accumulation being approximately 75,000 persons that day (9,000 above design day peak accumulation), and with 170 percent of the design day parking space available, this result was foreseeable. The highest weekday attendance was 97,000 and no parking space shortage occurred.

Lot Selection Pattern

Based on counts of license plates, it was evident that remote lots attracted almost entirely out-of-towners. The local residents knew where close and/or cheaper parking was available and went there (e.g., Ft. Sanders, Grand Avenue lots, downtown--none of which were signed with trailblazers). Out-of-towners merely followed the trailblazer signs to lots. Often remote parkers saw closer lots on their bus ride to the Fair and on subsequent visits sought out these spaces.

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[1] On that day, approximately 50 percent of visitors arrived by personal vehicle compared to an average of about 63 percent during the six months of the Fair.

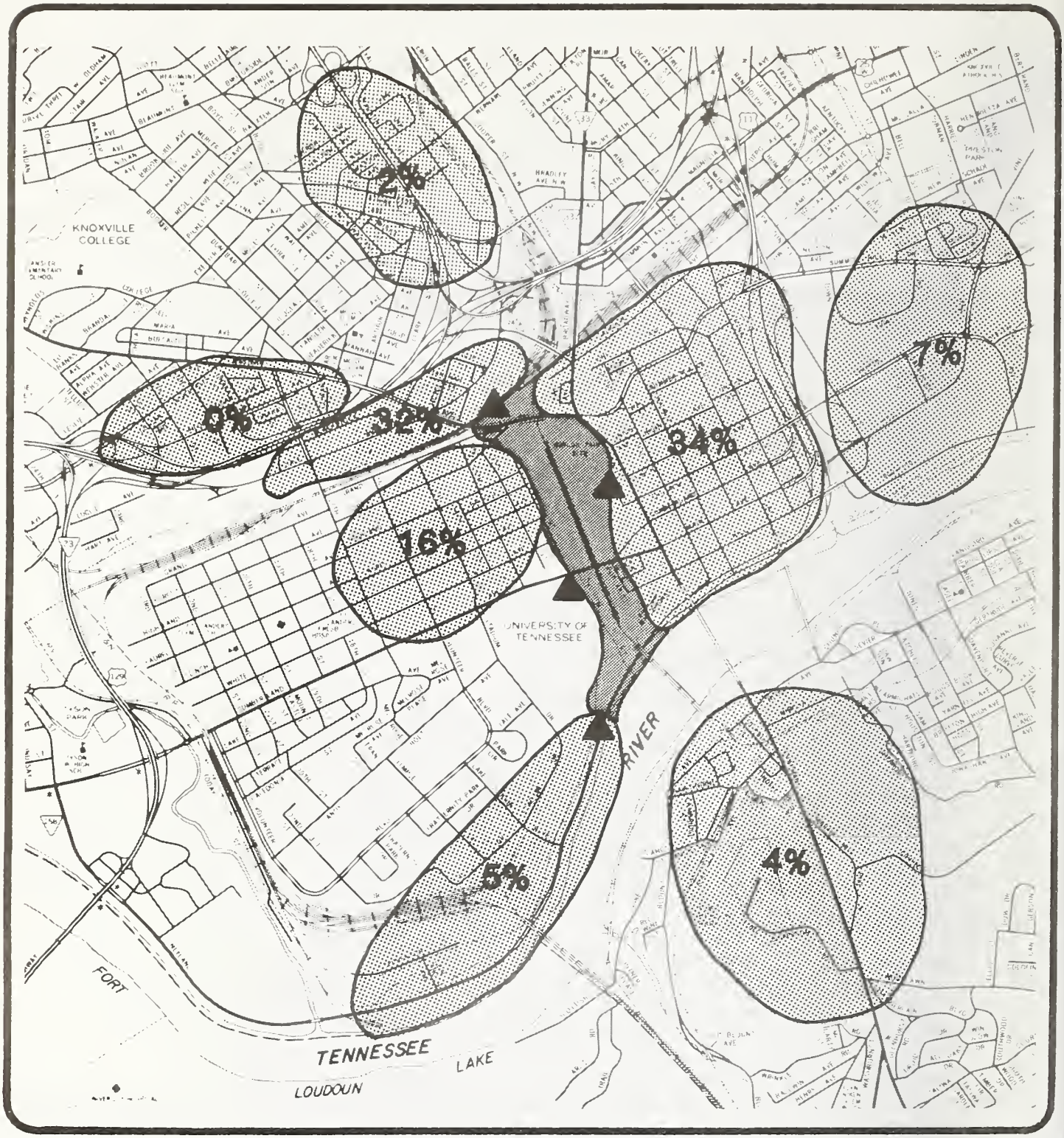

FIGURE 6-B

NUMERICAL DISTRIBUTION OF WEEKDAY VISITOR PARKING, MAY 10, 1982

00% - PERCENT OF TOTAL VISITORS VEHICLES PARKED

▲ GATE

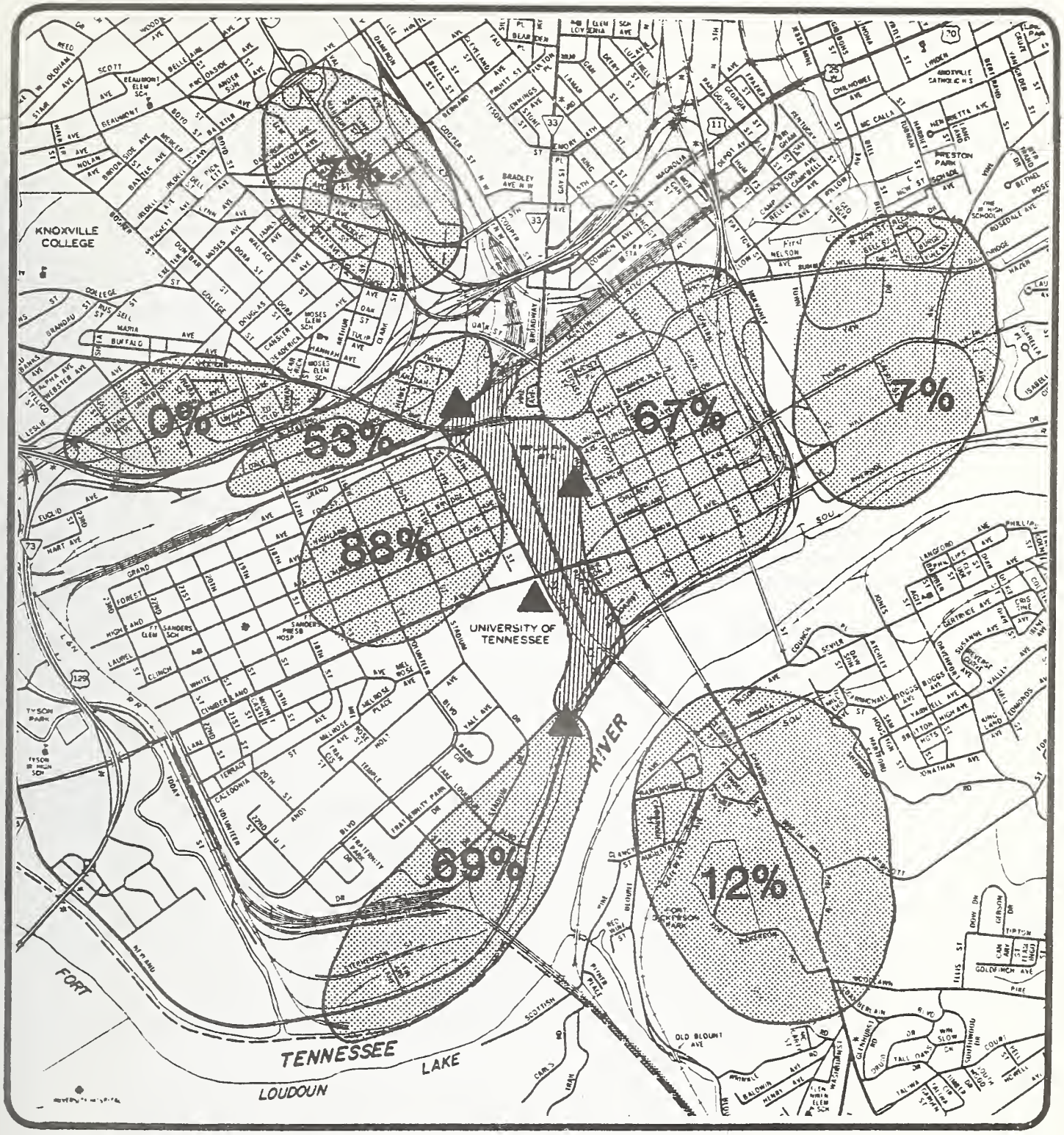

FIGURE 6 - C

WEEKDAY VISITOR PARKING SPACE UTILIZATION MAY 10, 1982

00% - PERCENT OF AVAILABLE SPACES OCCUPIED (PEAK OCCUPANCY)

▲ - GATE

Once off the freeway, and on a given approach route, drivers tended to select lots they felt were going to be closest to a gate. Sometimes they knew where the gates were. Other times (first visits) many guessed that gates were where pedestrians disappeared from sight (turned a corner). Many used that criterion to select parking locations. Others kept driving until they saw a gate or ran out of lots and then turned back. At other times visitors parked in the first lot they found without knowing they could continue along that approach and find a space nearer to the gate.

Because of the excess supply of spaces, competition on some approach routes was very keen. This was especially true along the Dale/Blackstock Avenue approach where many lots were operated by different parties. Pricing, flagmen, appealingly dressed flagwomen, large bright signing, and souvenir stands were all used to try to attract parkers. A heavily advertised Laurel and Hardy promotion was even attempted on one lot. Each method attracted some parkers; however, it is difficult to conclude how effective each method was when almost all operators used them.

Fate of Remote Lots

As mentioned above, the remote lots were able to attract mainly out-of-towners making their first visit to the Fair. The distant location of these lots which were not lower in price, combined with almost constant availability of closer spaces, discouraged use of remote lots.

The high cost of providing sufficiently frequent shuttle bus service, coupled with low revenues, caused most remote lots closed quickly. KIEE, under contract to provide shuttle service to the remote facilities, tried in late May and again in July to terminate shuttle service due to the financial burden. Both times the remote lot operators succeeded in forestalling the termination of service, although one operator accepted termination in June and made other arrangements. Finally, KIEE succeeded in terminating its contract shuttle service in early October. The remote operators arranged with K-TRANS to provide similar service for the last 3½ weeks of the Fair.

Both KIEE and the remote operators knew that both the lots and the shuttle service required a substantial level of parking to cover capital and operating costs. Remote lots were felt by KIEE to be needed to meet total parking demands. Once committed, both parties had to follow through even though speculators developed many new walk-in lots during the last 60 days before opening day. In hindsight, KIEE should probably not have subsidized the shuttle

service so heavily. If lot operators had to pay all or most of the cost, the results might have been different.[1] Chapter 7 contains additional information concerning temporal use of remote parking lots and shuttle service.

Conclusions

Visitor parking has been oversupplied at most recent World's Fairs, including Seattle, San Antonio, Spokane, and Knoxville. Even though this history has been known to fair sponsors, they all have feared that there would not be enough parking. As a result, they provided enough themselves, then had an excess created at the last minute when private interests created additional parking in temporary facilities. The same is true for remote lots, which all the above fairs had despite knowledge that they were always little used.

It is difficult to accurately predict how many spaces private interests will create at the "last minute." However, experience in the four above cities points toward these "last minute" lots providing 30 to 40 percent as many spaces as are provided by the Fair sponsor itself. In Knoxville the last minute walk-in lots accounted for over 3,000 spaces, about 20 percent of early May weekday spaces. This amounted to about double the "official" walk-in spaces.

EMPLOYEE PARKING

Inbound, Outbound, and Accumulation Variations

Little information on employee parking is available to supplement that presented in the Phase 1 report. However, 24-hour counts of employee ingress and egress to the Fair from the remote employee lot by shuttle bus were made and have been summarized in graphic form in Figure 6-D. This represents a very limited sample, but nonetheless, it is the only information of this type available. Figure 6-D shows hourly inbound and outbound movements plus on-site accumulation. The accumulation closely parallels visitor accumulation, as would be expected, except for an overlap where shifts change in mid-afternoon.

---

[1] Land and development costs for temporary lots comprised the largest part of the total 6-month cost. These costs were incurred prior to opening day. The cost to operators to remain open during the Fair was low. Hence, with only a small amount of parking, most operators could generate enough revenue to exceed daily operating costs. Parking operators paid KIEE for shuttle bus service based upon the number of cars parked. Hence, the financial risk for shuttle service was mainly KIEE's.

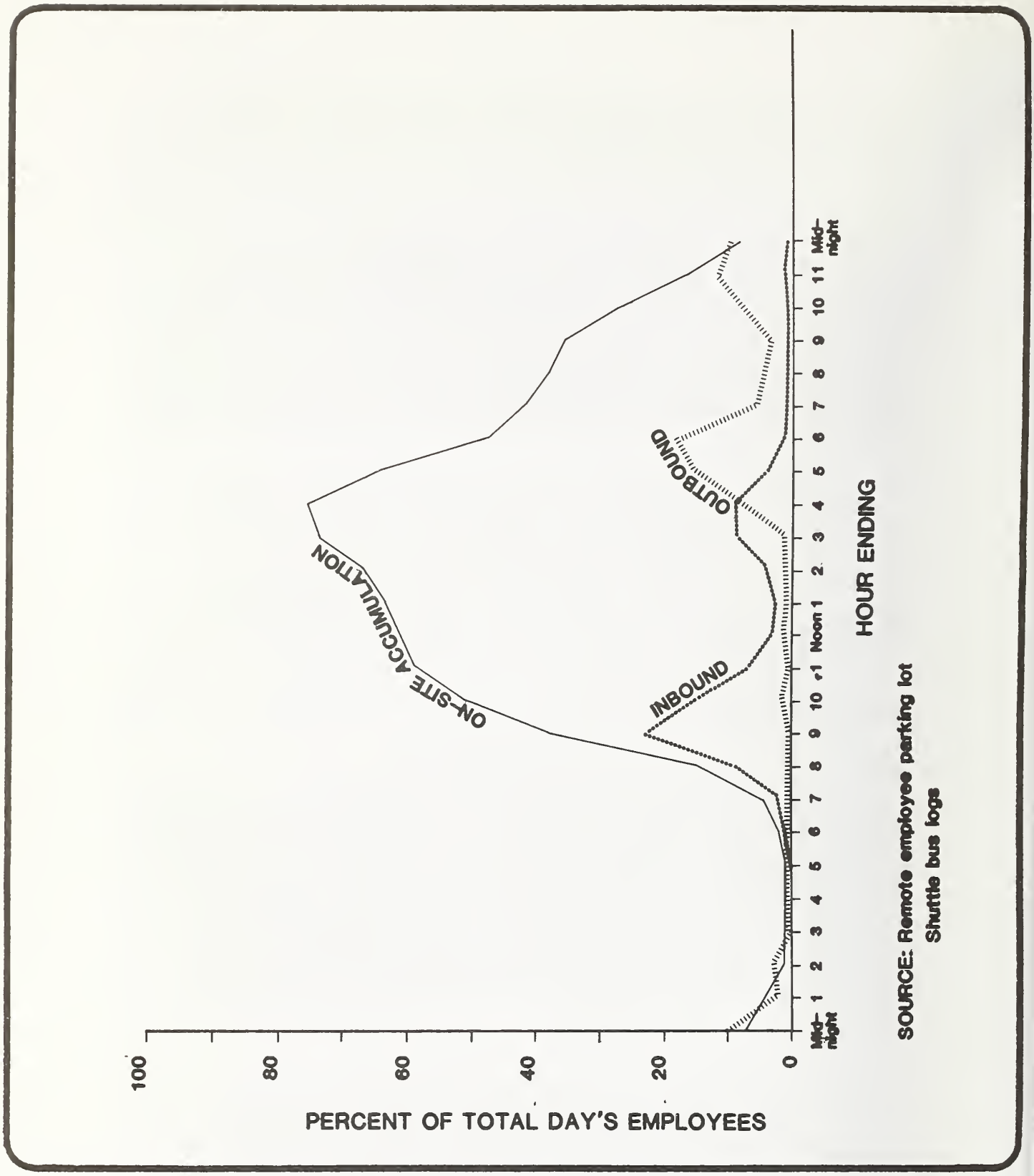

FIGURE 6-D
INBOUND AND OUTBOUND MOVEMENT FROM EMPLOYEE REMOTE LOT

It should be noted that the percentages shown on Figure 6-D are of the total employees working on a given day, not overall total employees. It should also be noted that the number of employees working from day to day varies, peaking on Saturdays (peak day of week).

Parking in Official Employee Lots

KIEE provided employee lots adjacent to the Fair site and at one remote location. Use of these lots required a $20 monthly parking permit, although a daily fee was used in one lot during May. Even at that low rate (downtown parking was typically $40 to $50 per month where available), most employees were able to eventually make other parking arrangements.

Table 6-2 shows the monthly permits sold for employee lots. Permit sales, and therefore employee lot usage, fell steadily from August to the end of the Fair. Some of this decrease can be attributed to overall Fair staff reduction. However, the drops during the last two months are substantially greater than employment decreases.

The initial May employment at the Fair was estimated to total 5,000 to 6,000. Using 5,500 as a working estimate together with the surveyed 1.14 employee vehicle occupancy, the June permit sales represent only one permit for every 13 total employees and one person in 11 using the employee lots as a driver or rider. This compares to an estimate that about two persons in five would use the lots as a driver or rider. While no similar statistics were available for other World's Fairs, interviews indicated a similar experience in Spokane.

TABLE 6-2: PERMITS SOLD FOR WORLD'S FAIR EMPLOYEE PARKING LOTS

	Lots		
	Walk-In	Remote	Total
May	-(1)	-(2)	-
June	205	223	428
July	232	185	417
August	246	120	366
September	195	-(3)	222
October	195	-(3)	195

(1) Information Not Available.

(2) Not Applicable. Employees were allowed to use lot with either permit or daily fee.

(3) Lot closed in August.

SOURCE: Knoxville International Energy Exposition, Inc.

CBD PARKING - THE FAIR'S IMPACTS

Parking Supply

Prior to the Fair, about 10,000 parking spaces existed in downtown Knoxville. As a result of the Fair, a number of additional parking facilities were added to the downtown parking supply. Those which remain in use or were available for use after the Fair are listed in Table 6-3 and shown on Figure 6-E. The hotels listed were built to meet projected lodging needs in Central Knoxville, but were precipitated by the Fair. The two lots listed were built as "temporary" lots for the Fair, but were paved and remain available for downtown parking. Several other small lots were constructed in the CBD for the Fair, but have been converted back to their prior uses or closed.

One lot, totalling about 150 spaces, has been created since the Fair closed. It is on the Fair site near the L & N Station complex and will support residual restaurant activities. This lot raised the total residual parking supply increase due to the Fair to 1,740 spaces, or about 15 percent of the pre-Fair CBD parking supply.

Two other residual lots in the central area, but not actually in the CBD, remain in use or available for use. A temporary lot across from the Civic Coliseum on Mulvaney Avenue at Church Avenue contains about 200 spaces. It has not been paved and could be removed if not used. The other residual lot is actually an expansion of an existing University of Tennessee commuter student parking lot. This lot was expanded to accommodate its original number of spaces plus the shuttle bus terminal. With the terminal removed, an additional 300 spaces were created on a campus which has been short of parking.

Rate Structure

Parking rates in downtown Knoxville have varied from lot to lot as well as by area. These rates are structured in a four tier system:

- first half-hour rate
- additional half-hour or hour rate
- daily maximum rate
- monthly rate

Rate changes made between late 1981 and early 1983 have tended to decrease the variation in rates, but some differences remain.

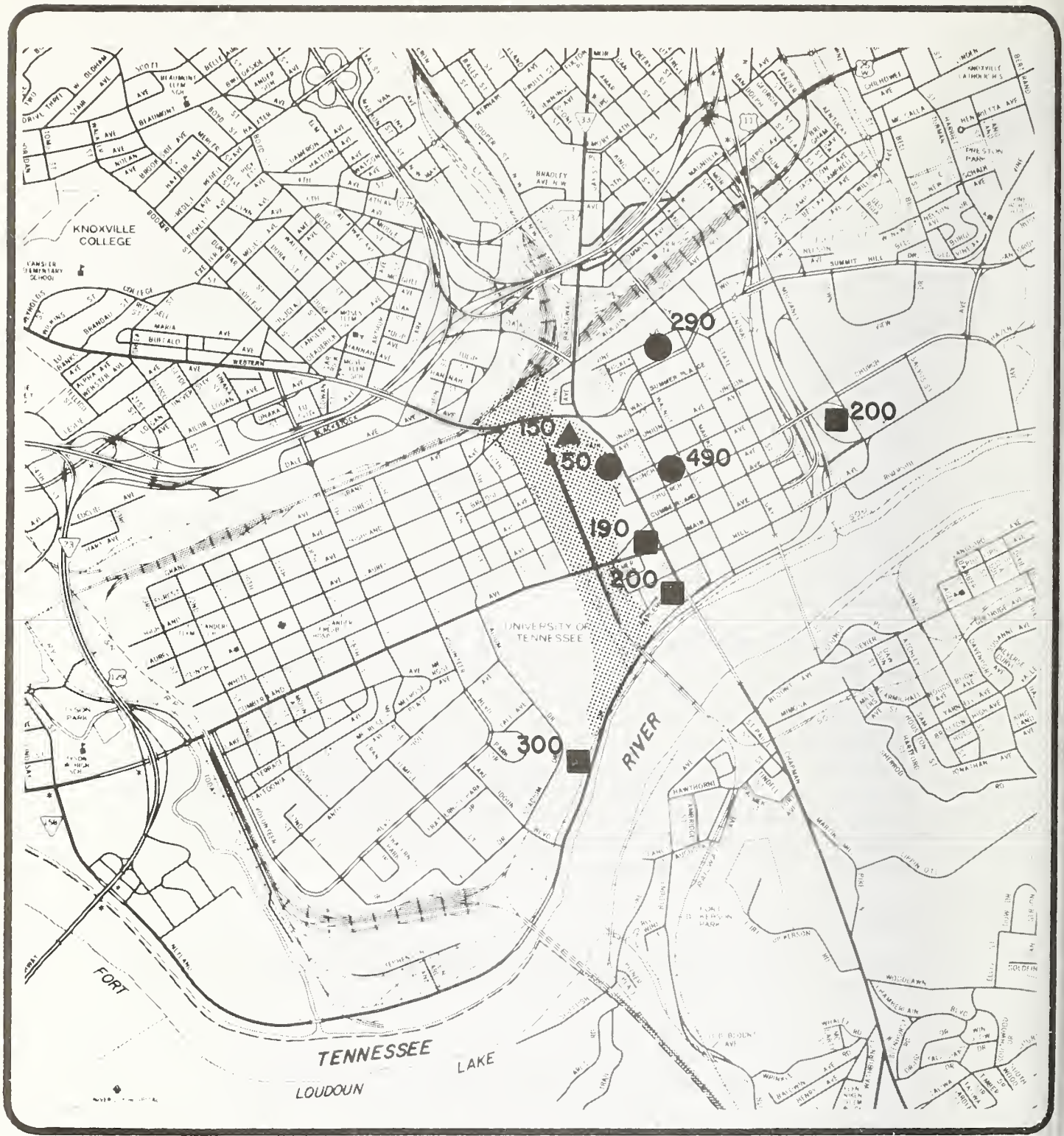

FIGURE 6-E

ADDITIONAL AVAILABLE PARKING SPACE RESULTING FROM THE FAIR

00 SPACES

● GARAGES

■ LOTS

▲ ON SITE LOT CREATED AFTER FAIR

Hourly and Daily Parking

To provide an overview of the actual impact on short and long term parking in downtown, exclusive of monthly parking, weighted average charges per vehicle were estimated using lot size, individual rate structures, and the parking duration profile determined in an October, 1981 CBD parking survey.[2] Figure 6-F shows the estimated average charge per car parked in October, 1981 (before any rate changes), October 1982 (during Fair), and March 1983 (after rates restabilized to post-Fair conditions). Prior to the Fair, the average charge for non-Fair downtown parking ranged between 90¢ and $1.55. During the Fair, the range increased to between $1.85 and $2.95. After the Fair, the range dropped back to between 95¢ and $1.80. Using the pre-Fair October 1981 charges as a base of 100 percent, average charges during the Fair were about 200 percent and after the Fair about 125 percent.

It should be emphasized that in all cases these charges are based on non-Fair parking durations. They reflect charges made to persons parking downtown to pursue normal downtown activities and not to go to the Fair. Hence, the non-monthly parkers in downtown who went about their normal business paid about twice as much during the Fair as they had the previous fall and paid about 25 percent more after the Fair than before.

Short-term parking during the Fair decreased in most lots. One facility reported a 50 percent decrease in short-term parking, even though the facility was not usually filled.[3]

After the Fair ended, operators suffered through a few months of continued low transient (short-term and daily) parkers. It took two months for them to return in anything close to the pre-Fair numbers.

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(2) Knoxville CBD Parking Study Update, Kimley-Horn & Associates, Inc., December, 1981.

(3) Much of the information provided in the remainder of the CBD parking discussion is derived from conversations and data provided by Safety Park, Inc., Knox Allright, Inc. and Central Parking Systems. These three entities operated most of the Central Knoxville area parking before, during, and after the Fair.

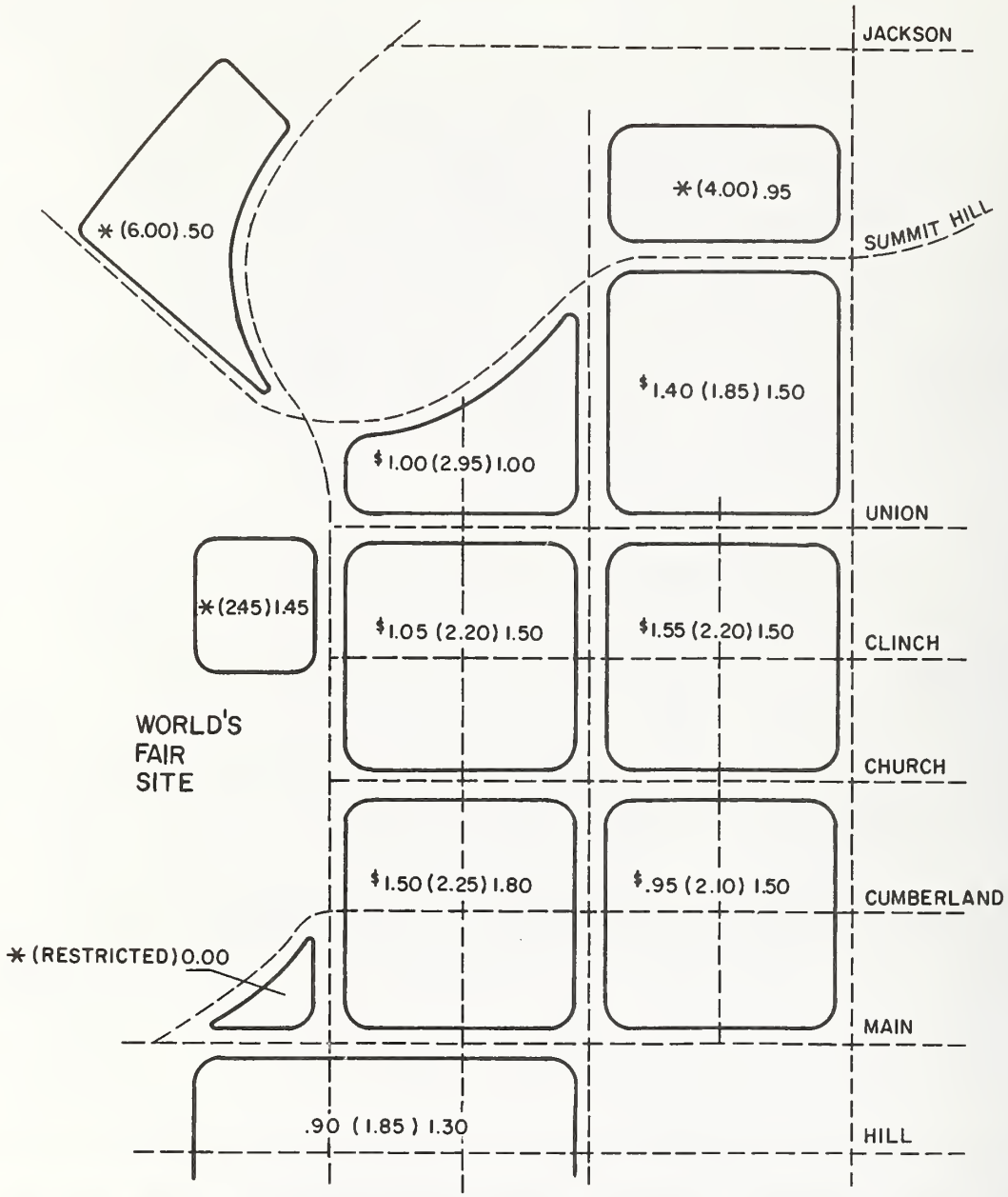

FIGURE 6 - F

CHANGES IN CBD PARKING FEES

AVERAGE PARKING CHARGE

$0.00 (0.00) 0.00

- POST FAIR
- DURING FAIR
- PRE-FAIR

*** NO PARKING PRE-FAIR**

TABLE 6-3: CBD PARKING SPACE INCREASE AS RESULT OF WORLD'S FAIR

Facility	Spaces
Constructed In Conjunction With Fair	
Hilton Hotel Garage	490
Holiday Inn Garage	450
Quality Inn Garage	260
Main-Cumberland-Henley Lot	190
Hill-Broadway-Neyland-Locust Lot	200
Subtotal	1,590
Created After Fair To Serve Residual Activities	
L & N Station Lot	150
TOTAL	1,740

SOURCE: Barton-Aschman Associates, Inc.

Monthly Parking

Monthly charges for downtown employee parking in late 1981 typically ranged between $27 and $37, with several exceptions. Beginning around January, 1982, monthly rates began to increase. These increases varied, mainly by operator rather than facility, due to different approaches adopted to balance increased revenue potential with long-term business objectives. The intent was to capitalize on the change in the demand/supply balance during the Fair without driving off monthly parkers who generate much of the revenue in many facilities.

Monthly rate increases generally ranged between $5 and $15, or 20 to 40 percent. In some cases the increases were made a few dollars at a time. In others, the increase was made all at once.

In addition to rate increases, the supply of monthly parking was limited. By May, it was nearly impossible to obtain a new monthly parking space. Most operators stopped selling new monthly permits prior to the Fair (some as early as January), although they renewed all existing commitments. In several cases, monthly parking for the entire six months had to be paid for in advance to ensure space would be secured. In other cases a small surcharge was added. However, in only a few cases was the monthly parking intentially not renewed by the operators. In both known cases, monthly business was hard to regain after the Fair since the operators or owners had forced out previous parkers.

A check of selected downtown parking facilities indicated that during the Fair (June), monthly parkers were down from pre-Fair (January, 1982) levels by about 20 percent. By January 1983, three months after the Fair, the monthly permits had returned to only five percent below pre-Fair levels. This later decrease may be due as much to the effects of the ongoing recession's impact on CBD employment as to parking system workings.

After the Fair, monthly rates returned to or near pre-Fair rates. While specific average rates are not available, monthly rates were reported by CBD operators to typically average ten percent higher than pre-Fair rates.

The parking operators stated that monthly parking during the Fair was very stable, with little turnover despite rate increases. Most monthly parkers were reported to have felt they were treated fairly, given the increased demand and revenue potential foregone by operators in retaining monthly parking (monthly parking revenues averaged only about $2.00 to $2.50 per day compared to the $6.00 prevailing daily rate).

Operating Cost and Revenue Impacts

In the few years prior to the Fair, parking rates were held at a constant level or lowered slightly to meet the rates offered at the City of Knoxville's State Street Garage. This facility of nearly 800 spaces was opened in the late 1970's. Its rates were below those charged in other downtown facilities. As a result, other operators were forced to lower or maintain their rates over an extended period to maintain their business. Finally, in late 1981, rates began to increase for the first time in over two years, although operating costs had been increasing the entire time.

During the Fair, all lots which had operated with coin box fee collection were converted to attendant controlled facilities. While attendants parked cars in a few lots, nearly all remained self-park. In addition, operators increased staffing from one eight-hour shift five days per week to two eight-hour shifts seven days per week. On some lots, additional labor was added during peak activity periods. Overall labor costs during the Fair were about triple pre-Fair levels. Land/lease and other costs also increased, but to a much lesser degree. Total CBD operating costs during the Fair were reported to have increased to about double pre-Fair levels.

Revenues during the Fair increased dramatically. Within two blocks of the Fair, downtown parking revenues tripled. Smaller increases were experienced farther away, although not many World's Fair visitors parked east of Walnut Street.

After the Fair, rates returned to near pre-Fair levels. Operators retained some of the increases to offset cost increases incurred during 1979-1981 when rates were constant. Post-Fair revenues have typically run between ten percent below and ten percent above 1981 revenues. The increased supply has resulted in fewer cars being parked in facilities which existed before the Fair. Operators also said the return of some short-term parkers to downtown was slow and some apparently decided to do business in outlying areas instead of the CBD.

Overall Impacts

Overall, the Fair had a beneficial impact on downtown parking conditions as experienced in a period of four months after closing. Some of the impacts are:

- The parking supply is up by about 15 percent
- Revenues during the Fair were up by as much as 200 percent, although operating costs increased only 100 percent

- Post-Fair monthly rates returned to near pre-Fair rates

- Post-Fair 1st ½ hour rates are higher, making the average parking fee about 25 percent above pre-Fair levels; overall this probably brings costs and revenues close to their 1978 balance.

It is not yet known if the 15 percent increase in supply will result in the same reduction in rates as was experienced when the State Street Garage opened several years ago. As of March, 1983, operators of some of the new facilities were either not charging for parking (indicating that costs to monitor lots would be higher than projected revenues), were still adjusting rates to try to attract parking, or were subsidizing their parking operations from other revenues (for example, hotel) while maintaining rates similar to other downtown facilities. Business in pre-Fair facilities is down near these new facilities and this could lead to further changes in pricing or removal of some of the low demand surface lots from (public) parking use.

STATUS OF TEMPORARY WORLD'S FAIR PARKING LOTS

According to provisions in the City's temporary parking lot ordinance, all temporary lots were to be "reclaimed" after the Fair. The few temporary lots that remained in downtown are paved or mostly paved. Temporary lots elsewhere remained as gravel covered land with almost no reclamation activity.

One small temporary lot was returned to its pre-Fair condition as a neighborhood playground on private land. Several other lots were slowly returned to pre-Fair uses, mostly as materials storage yards utilizing gravel surfaces. The majority of lots lay idle four months after the Fair.

While the City ordinance required reclamation within three months of the Fair's end, it was felt by City officials that gravel lots are preferable to bare dirt lots. While both would eventually be covered by weeds, the existing gravel surfaces would provide much better erosion control. In the long run, while weeds and grass would take longer to grow on gravel lots, the ultimate appearance would be similar. Efforts to enforce the reclamation provision of the ordinance had not been initiated as of four months after the Fair.

CONCLUSIONS

The single most important decision made relative to parking was KIEE's decision to break even financially on transportation. This decision, combined with the resulting $6.00 parking fee and the City's determination to limit its control of temporary parking facilities to meeting standards and zoning regulations, generated a surplus of World's Fair parking space. This surplus had far-reaching consequences in the financial problems it created for KIEE as well as private operators of temporary parking lots outside of downtown.

On the supply side, there was more than enough parking to meet design day demand. Parking was widely available along all approach routes to the Fair. Operationally, the available space was generally well located. Access to parking facilities worked well due to prior roadway improvements, an effective trailblazer signing system, and location of parking on Fair approach routes to intercept vehicles before they reached the site. Also the downtown and University of Tennessee parking supply was increased with several permanent facilities created in the process.

Downtown parking facility owners and operators recovered profits not made during the prior two to three years due to a depressed rate structure resulting from an excess supply and artificially low rates at the largest CBD parking facility. Post-Fair rates appear to have stabilized at only about ten percent above pre-Fair rates for monthly parking. Hourly and daily rates rose and then fell. This resulted in a doubling of the average non-Fair CBD parking charge during the Fair. Rates after the Fair stayed at about 25 percent above pre-Fair levels.

Temporary gravel lots, which had been expected to be eyesores after the Fair, were ultimately felt to be preferable to cleared dirt lots and provided better erosion control characteristics. Despite ordinance requirements to reclaim the land from Fair conditions, enforcement did not occur for the aforementioned reason.

As with Fairs in Seattle, San Antonio, and Spokane, remote lots again proved unattractive to visitors and employees. It is possible that the 1982 World's Fair could have survived with virtually no lots beyond 1/3 to 1/2 mile distance from its gates, since approximately 8,000 off-street visitor spaces were available on "school weekdays" within this distance. This is further supported by the fact that most downtown parking by Fair visitors occurred within about two blocks of the Fair, although trailblazer signs generally did not lead to CBD parking facilities.

The relationship between parking supply and demand might have been better balanced if information on the number of permitted temporary lots were disclosed earlier. This was complicated, however, by the unwillingness of entrepreneurs to make firm commitments and the desire of the Transportation Services Division to keep negotiations private. However, it should be noted that this would not have met sponsor desires for "guaranteed" space since verbal commitments or permit applications did not always result in lots actually being constructed.

World's Fair parking prices drove up downtown parking rates. Some monthly parkers changed parking locations to other less desirable locations or were encouraged to change modes of access to downtown. Some visitors to downtown business decided to do business elsewhere during the Fair, affecting those businesses. After the Fair, all parking rates stabilized at levels above pre-Fair levels. Average non-monthly charges per car parked were up by 25 percent. It is possible that earlier negotiations might have reduced the cost of providing the parking system. However, given the relative portion of parking costs attributable to land costs, it is unlikely that rates would have been much below the $6.00 fee unless remote parking was eliminated and/or the cost of shuttle buses was not covered from parking revenues. On the other hand, lower fees would probably have resulted in decreased private sector interest. Precisely how much sensitivity entrepreneurs would have to a lower daily rate could not be determined. Neither could the parking rate at which supply and design day demand were nearly in balance.

Most recent World's Fairs have been located in or adjacent to downtowns. The following suggestions are made for considerations when creating a supply of parking for a downtown World's Fair:

- Permit temporary parking lots
- Provide close walk-in parking adequate to meet average weekday needs
- Assume private enterpreneurs will develop additional parking facilities adequate to meet most of the remaining (peak) demand
- Make final commitments for any additional "official" or Fair-sponsored parking no more than one month before opening day
- Avoid remote parking facilities beyond 1/2 mile from a Fair gate.

Chapter Seven:

SHUTTLE BUS SERVICE

There were three types of shuttle service to carry visitors to the 1982 World's Fair. Long-distance shuttle buses operated from outlying communities as far as 100 to 200 miles from Knoxville on a daily basis. Some of them sold transportation and Fair admission as a package deal. Most of those carriers used the charter and tour bus terminal at the North Gate.

Other shuttle buses served hotels, motels, and campgrounds in Knoxville and the surrounding area. They had agreements whereby the bus operator would provide transportation for the people staying at a given lodging and the lodging operator would sell tickets for the bus operator. Some of those arrangements were exclusive and in some cases the bus driver sold tickets but the lodging operator received a commission. Most of the hotel/motel/campground shuttles used the Southwest Bus Terminal at the beginning of the Fair.

In addition, some private bus operators contracted with operators of remote parking lots to carry their patrons to and from the Fair. Shuttle buses from remote unofficial parking lots also used the Southwest Terminal.

HOTEL/MOTEL SHUTTLE BUS SERVICE

Prior to opening day, over 70 shuttle operators (buses and vans combined) had informed the Fair's Transportation Services Division of their intent to provide service to the Fair and requested an allocation of space in the Southwest Bus Terminal. Operators indicated they could provide over 600 full-size buses, plus almost 100 vans, with a total seating capacity of over 26,000 passengers for service to the Fair. The total of all the individual operators' projections forecast daily passenger volumes would range from 50,000 to 68,000. This contracted with the Fair's transportation consultant design day forecast of 11,000-12,000 shuttle bus and local transit passengers. Of those, only 4,000 were anticipated to arrive as shuttle bus passengers, with the remainder distributed by local transit to the East and West gates. The shuttle operators' projections were 12 to 17 times higher than the Fair's projections on ridership.

As noted in the Phase 1 report, demands for loading space in the shuttle (Southwest) terminal far exceeded the available space. However, the Fair's Transportation Services staff attempted to allocate the available space as equitably as possible and assured operators that space would be reallocated after an initial period allowed for attrition.

Operation Attrition

Unfortunately, precise shuttle operation service records were not kept. Hence, only sketchy statistics can be presented for the operation. Initially, 66 shuttle and van operators were assigned space in the Southwest terminal. Eight additional van operators were directed to a curbside loading area on 11th Street north of Cumberland adjacent to the West Gate. Although it is known that some of the applicants never operated in the terminal, it can not be stated with certainty that none of the terminal "no-shows" operated at all. Some may have found other loading spaces at other gates. The dispatchers who operated the shuttle terminal recalled the names of approximately 35 firms that had remained in operation through the first month or two of the Fair. By the end of October, between 12 and 15 operators remained in business, and some of them only ran one or two trips per day.

Demand Estimates

The original demand estimates developed by the transportation consultant for the Fair indicated that a total of 15 percent of the Fair visitors would use local transit. This would be comprised of approximately 10 percent on the local K-TRANS buses (scheduled fixed route service) and the remaining five percent on the hotel/motel shuttle bus system. These estimates were derived based on the number of hotel rooms and other lodging facilities and the estimated propensity of the visitors to use their personal automobiles.

The shuttle bus operators serving the hotels and motels typically estimated the demand for their service on the basis of 3.5 occupants per room and a mode split of 30 percent for transit. This yields an average daily ridership estimate roughly equal to the number of lodging units at each facility. This estimate was unrealistically high.

For reasons stated in Chapter 12, many of those who drove to their lodging chose to drive to the Fair. Those who arrived at the lodging as part of a tour group typically traveled to the Fair with the charter bus that brought them to the Knoxville area. It may also be conjectured that many people staying in the resort

areas of Gatlinburg, Pigeon Forge, and similar localities did not travel to the Fair every day of their stay. The operators' assumed 30 percent mode split did not take this into account. It also did not take into account that some of the lodging units being served by the shuttle operators were also served by the local transit routes.

Finally, apparently many operators assumed that occupancy rates during the course of the Fair would be 100 percent. In fact, many were well below that due to cancellations of space blocked early by tour operators and individuals who changed their minds about coming to the Fair. Also the operators did not take into account the other shuttle companies that would be operating in the same area when estimating their ridership for each of the lodging units served.

Actual Demand

Only limited data is available on the actual use of the shuttle bus system. Counts of inbound and outbound shuttle bus riders were collected for different time periods for different days during a one week period in July. At the time the counts were conducted, the shuttle bus riders accounted for approximately six percent of the Fair visitors. According to some of the shuttle operators, the use of shuttle buses peaked in late May and early June. These were the high attendance periods of the Fair.

Typically, Mondays through Wednesdays were relatively busy shuttle days, with Thursdays and Fridays slower and the weekends the lowest days. At the time the statistics were collected, operators had still not entirely adjusted their schedules to reflect the realities of demand. The result was that load factors over the evening hours (from 7 to 11 P.M.) were only about 40% for outbound trips. Of course, the peak hour averaged more. By July, several of the more successful shuttle operators had developed the practice of parking buses outside the terminal and loading them when the evening fireworks display ended (peak outbound flow surge). This provided very high load factors (sometimes over 100%) for at least one trip and reduced unprofitable mileage.

Figures 7-A and 7-B show the time distribution of inbound and outbound shuttle ridership as a percent of the daily total shuttle usage. Over half the daily ridership arrived before 11 A.M. A slight upturn in the early evening hours was noted for weekday arrivals, but not for Saturday riders. Departures were somewhat more spread out, with roughly 10% of the day's riders leaving each hour between 5 and 10 P.M. and the remainder (about 40%) departing between 10 and 11 P.M. It should be noted that the evening fireworks display ended at 10:30 P.M. during the time the sample was taken. Earlier departures were observed when the fireworks ended earlier.

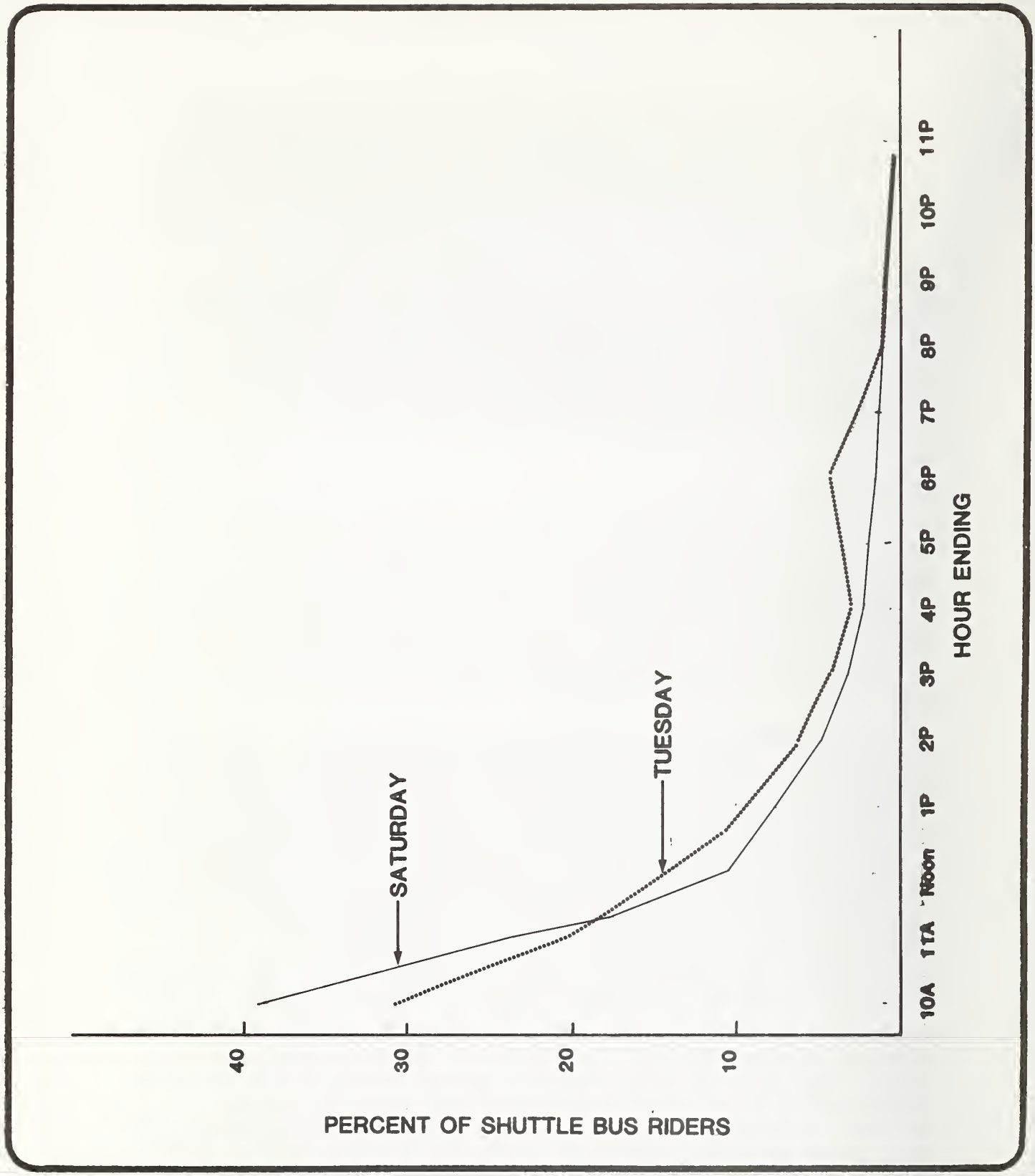

FIGURE 7-A
INBOUND SHUTTLE BUS RIDERS

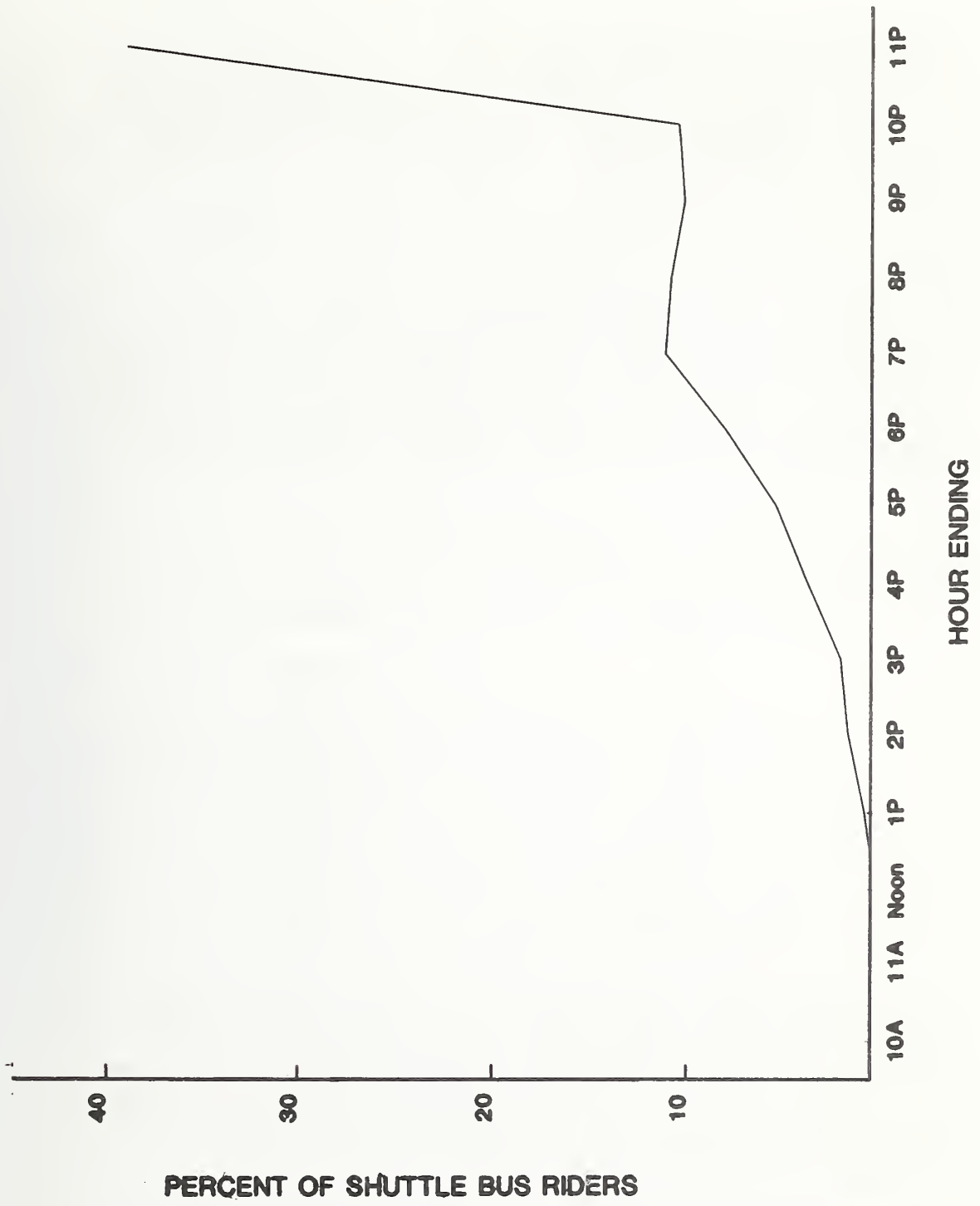

FIGURE 7-B
OUTBOUND SHUTTLE BUS RIDERS

Gatlinburg-Pigeon Forge Shuttle Service

The service operated by Trailways, Inc. from a parking lot at the edge of Gatlinburg to the shuttle terminal was one of the more aggressively promoted services. It offered round trip service between Gatlinburg and the Fair for $10 per person ($9 from Pigeon Forge) and frequent departures. Trailways also sold one-way tickets at the Fair for the return ride. This service was promoted to individuals and tour operators as an alternative for people who came to the Fair with a group, but wished to return to a Gatlinburg or Pigeon Forge lodging at a different hour than the group's schedule. In total, this service carried approximately 70,000 passengers (one-way) during the course of the Fair. At the start of the Fair they were running 36 trips per day. By the end of October, the schedule had been reduced to eight daily trips on weekdays and five on Saturdays and Sundays. Passenger volumes declined steadily, month by month, as shown in Table 7-1.

TABLE 7-1: TRAILWAYS GATLINBURG/PIGEON FORGE SERVICE

Month	Passengers
May	20,000
June	18,500
July	10,800
August	8,300
September	6,600
October	5,400

The Gatlinburg-Pigeon Forge area was the site of active competition among shuttle bus operators. In addition to Trailways, service was provided by Gatlinburg Coach and Stage Line, Transpo, Peak Transportation, Smoky Mountain Transit, and at least one van operator. All operators reduced service quickly when the realities of demand became apparent. None claimed the service was profitable.

One attempt to reduce competition and adjust supply to demand was made by an operator who advanced the concept of a "universal ticket" to be sold at the public parking lots in Pigeon Forge. This ticket would be honored by any carrier serving the area. KIEE's Transportation Services Division endorsed the idea as a way

to increase load factors and reduce congestion in the bus terminal, but the other operators denounced it as an attempt by one carrier to increase his revenue at the expense of others. The pooling arrangement to reduce the total number of bus trips was never tried.

SOUTHWEST TERMINAL OPERATIONS

Figure 7-C, provides a detailed illustration of the shuttle bus terminal. Built on a narrow strip of land created by adding fill to the edge of an existing University of Tennessee parking lot, it operated under significant constraints. Not only was the terminal area itself narrow, but the placement of the entry relative to the intersection of Lake Loudoun Boulevard and Neyland Drive created some traffic management challenges. The site did not have enough land area to permit bus staging within the terminal, which in turn forced shuttle operators to dispatch and schedule to meet the terminal constraints as well as the traffic demands.

The description of terminal staffing and operations which follows is intended to show what is possible given a constrained site.

Terminal Operations and Staffing

The operating concept originally developed for the shuttle bus terminal envisioned buses arriving in the morning and being directed by a KIEE dispatcher to the nearest available unloading position. Buses would pull in, unload, and leave the terminal immediately. Each carrier was also assigned a specific loading berth for departures from the Fair. Depending on the carrier's projected volume, the loading berth was assigned on a shared or an exclusive basis. For afternoon and evening trips leaving the Fair, the carrier pulled into the dedicated loading berth no more than ten minutes before the scheduled departure time, loaded and departed promptly (all trips leaving the Fair were required to be scheduled unless the carrier had exclusive use of the space). Carriers were only to be allowed to bring as many buses into the terminal at one time as they had spaces. For the largest carriers, this meant a maximum of four buses.

The original plan to have buses unload at locations other than their assigned departure berths resulted from an attempt to minimize walking in the terminal. The long, narrow terminal layout resulted in a distance of almost 1,000 feet between the most remote bus loading berth and the beginning of the walkway to the Southwest Gate. There appeared to be no need to force visitors to walk that far, since the anticipated arrival pattern for buses would have enabled virtually all of them to unload within 200 feet of the walkway.

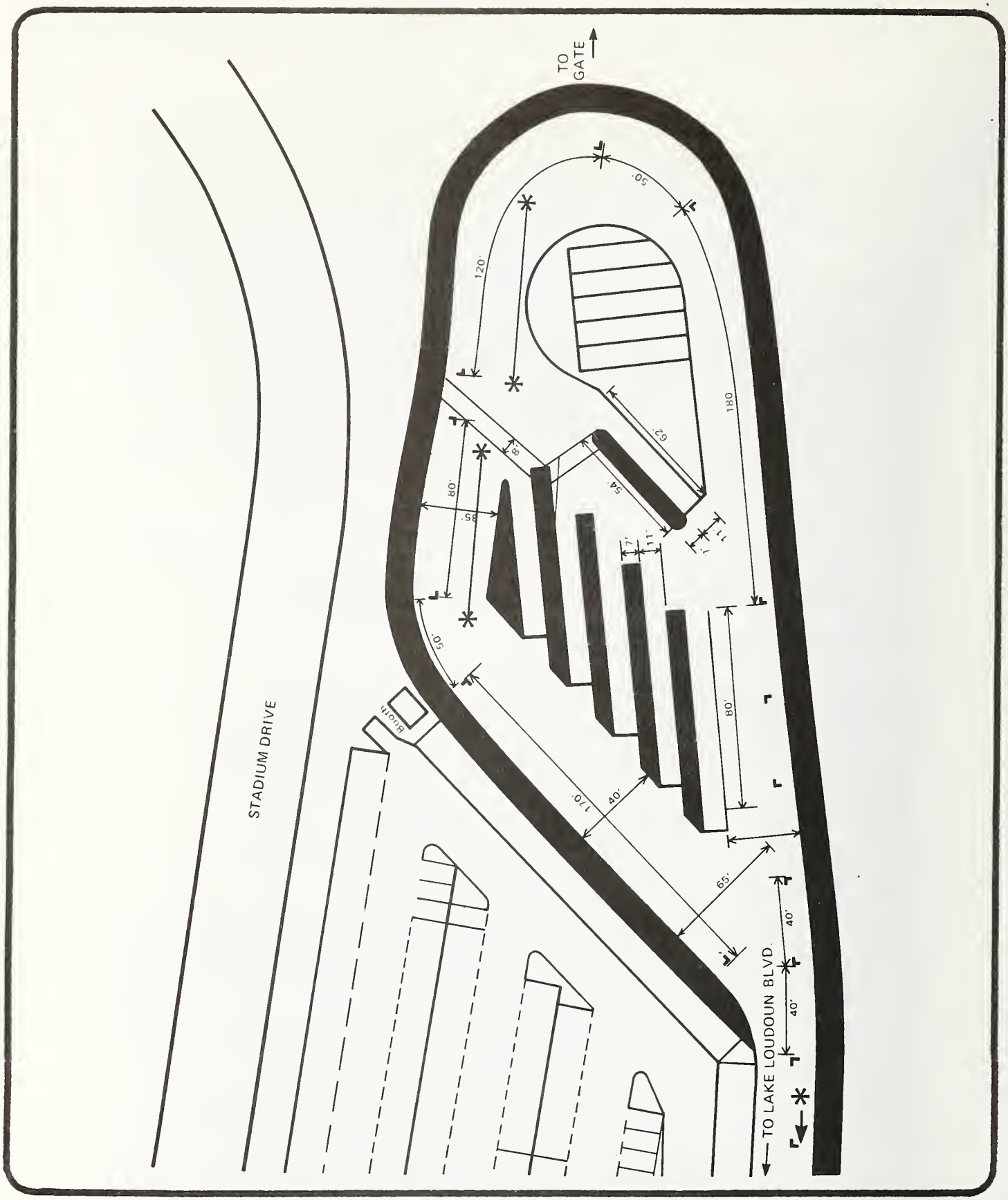

FIGURE 7-C
SOUTHWEST SHUTTLE BUS TERMINAL

✱ DISPATCHER
(Dark Areas Are Pedestrian Islands)

Berth allocation was governed by two general principles. First, the carriers with the highest projected volumes were assigned berths nearest the gate, using the prinicple of minimizing total walking distance within the terminal area. The three high-volume carriers who had arranged to interchange passengers (Trailways, Energy Express, and Southern Cartage) were assigned adjacent loading areas for the same reason. An agreement between these carriers allowed passengers of Energy Express and Southern Cartage to spend the day in Gatlinburg rather than at the Fair. The passengers could purchase tickets to ride on the empty backhaul Trailways buses to Gatlinburg in the morning and return on the empty buses coming back to Knoxville in the evening.

Second, capacities of loading positions were assumed to be six buses per hour for exclusive use; four buses per hour for shared use. Carriers' estimated demand and initial schedules were taken into account in space assignments and the KIEE Transportation Services Division staff judgments were used to deflate overly optimistic projections of need for space. Carriers who shared loading spaces were contacted when necessary and asked to shift arrival or departure times slightly to make space utilization more efficient.

Under the original staffing plan, one KIEE dispatcher was scheduled to stand at the entry of the terminal to regulate the flow of buses and assure that carriers did not attempt to bring more buses into the terminal than they had berths assigned. In the morning, the second and third staff members were to stand in the main portion of the terminal directing buses to the first available unloading slot and assisting traffic to clear the terminal promptly. In the evening, one dispatcher was to be stationed in the main portion of the terminal to insure that carriers sharing loading berths did not remain past their scheduled departure time, with an assistant dispatcher to help.

Changes in Staffing and Operation

Within the first week of the Fair, it became apparant that the original unloading scheme was unnecessary. Carriers with slots near the walkway to the gate preferred to use their assigned loading zones for unloading, and it was neither necessary nor possible to make them stop. Carriers who shared spaces more distant from the walkway divided into two groups. One group used the loading zone for unloading, on the theory that passengers would be less confused if they were told to find the bus in the evening at the very spot where they left it in the morning. Their passengers arriving at the Fair seemed willing to walk to the gate, even from the far ends of the terminal. The other group of carriers would slow down when passing their loading zone, tell their passengers where to find the bus in the evening, and

drive up as close to the gate as possible before unloading. Both systems appeared to work equally well, once terminal volumes stabilized at rates appropriate to demand.

The dispatcher stationed at the lot entrance found a major portion of the workload consisted of barring unauthorized vehicles from the terminal rather than regulating the flow of authorized vehicles. Since a sheriff's deputy paid by KIEE was also stationed at that location during peak hours, it became apparent that the dispatcher's job was somewhat redundant, although the position was retained. With hindsight, either the communications between the terminal itself and the entryway should have been improved (walkie-talkies proved unreliable due to electrical interference from high-tension lines close to the site) or the entry dispatcher should have been ordered and trained to keep a strict tally of loading zone occupancy and only allow vehicles into the terminal when space was available. In a similar situation in the future, one person at the terminal entry can be used to control entry by unauthorized vehicles. The staff in the middle of the terminal can enforce berth allocations by directing excess vehicles to leave the terminal without loading. This was done on several occasions at the shuttle terminal.

Once demand and schedules stabilized and drivers became familiar with the terminal, the KIEE staff's main responsibility turned out to be safety. The terminal configuration unfortunately made it tempting for passengers to ignore the pedestrian zones and walk directly across the terminal bus drive to the waiting buses. Hence, pedestrian-vehicle separation became the major safety concern and the lot dispatchers often had their hands full when the post-closing crowd arrived in the terminal. Given the space available, a better design to reduce conflict may only have been achieved at the cost of the 10 bus and 10 van berths in the middle of the terminal.

The original design also called for individual bus berths, each of which could accommodate only one vehicle, to be assigned to individual carriers or to be shared among carriers. The berths were separated by 40' of unassigned space to permit one bus to pull out and depart without waiting for the bus ahead to leave. It soon became obvious that this concept was creating a hardship for some carriers who might be prevented from entering the terminal since another carrier was using their berth while an adjacent berth stood empty. At the urging of both KIEE staff and several carriers, the assignments were converted to loading zones, each of which accommodated three buses (again, with pull-out space between buses). Passengers had no difficulty finding their own bus in a group of three within a 200-foot segment of platform and operators

had the added convenience of reducing delays at the entry to the terminal. Pooling the berths in groups of three increased utilization and made the terminal function more efficiently.

PARKING LOT SHUTTLE BUS OPERATIONS

Shuttles from unofficial parking lots used the Southwest Terminal and were handled in the same way as hotel/motel shuttles. It was noted that two of the more successful shuttle operations, at least as far as load factors were concerned, were privately operated from parking lots relatively close to the Fair. These shuttles used school buses and appeared to be fairly busy even on days when plenty of parking space was available in the "Official" lot next to the shuttle bus terminal.

Shuttles from "Official" World's Fair parking lots used an on-street terminal on Locust Street between Clinch and Church Avenues a block away from the Fair's East Gate. The terminal was situated at the end of the pedestrian bridge which spanned Henley Street and led directly to the East Gate. By locating the parking shuttle terminal on Locust Street, the Fair's planners hoped to achieve several objectives:

1) To reduce the number of pedestrians attempting to cross Henley Street at grade.

2) To reduce traffic congestion on Henley Street by having the buses unload on another street.

3) To reduce shuttle bus cycle times by avoiding the congestion anticipated on Henley Street, yet still operating to the gate closest to the remote lots.

4) To avoid overtaxing the capacity of the other bus terminals.

Terminal Operations

The terminal was located on the west side of Locust Street in the block between Clinch and Church Avenues. (See Figure 7-D). It was determined that the block face along Locust could only accommodate four buses at one time. Four of the five shuttle routes were assigned to load and unload at that location. These buses were allowed to layover at their loading zones between trips when there was slack time in the schedule. Layovers were to be taken at the parking lot end of the line during hours when the peak demand was inbound to the Fair.

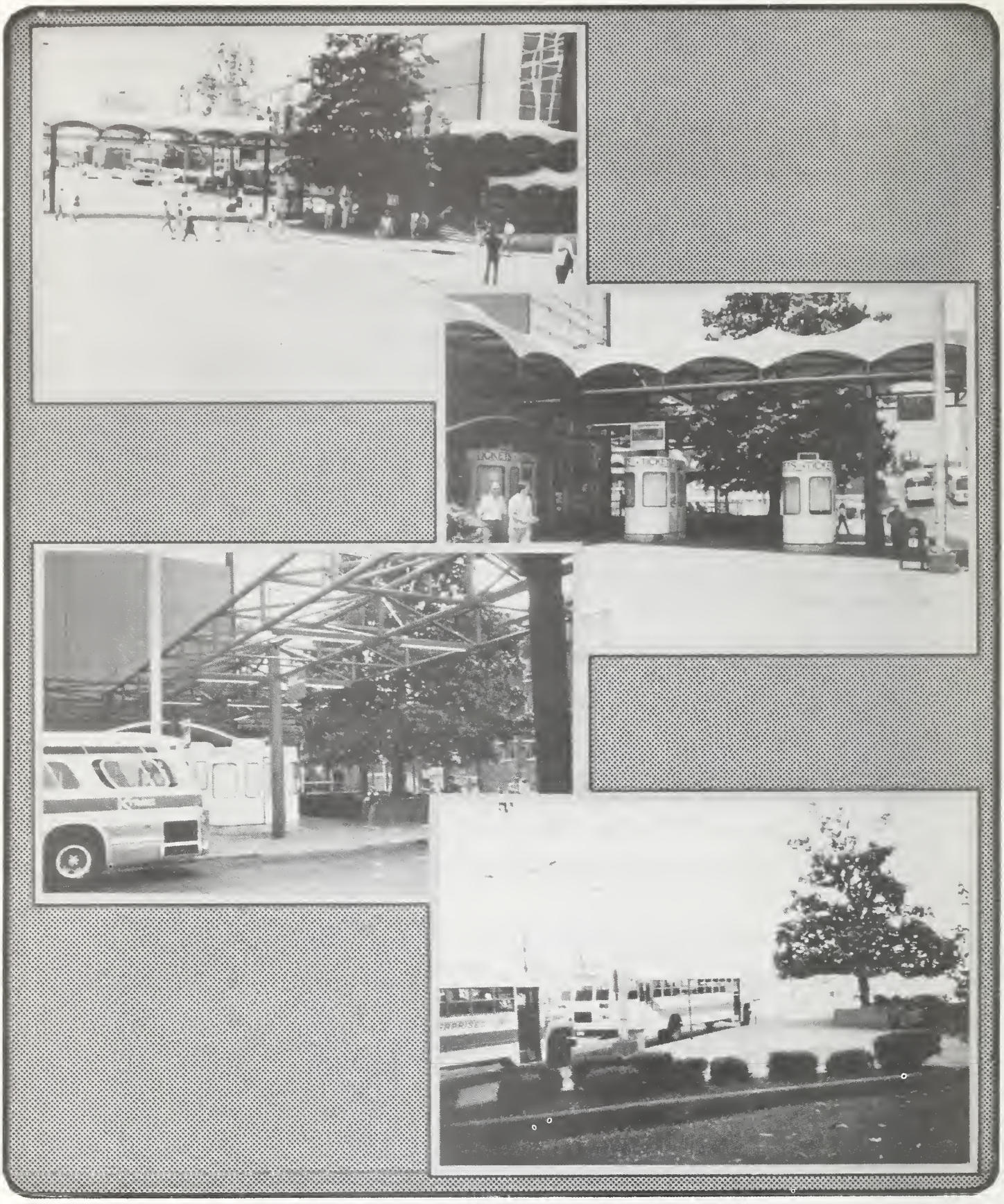

FIGURE 7-D
LOCUST STREET SHUTTLE BUS TERMINAL

The fifth route, serving the Willow Street lot, operated west on Clinch Avenue and stopped on the north side of Clinch Avenue just east of the intersection of Locust Street. Layovers were not permitted at that location by order of the Knoxville Police Department, which felt that Clinch Avenue was not wide enough to handle the traffic volume with the curb lane blocked by buses. Fortunately, the Willow Street lot was one of the routes operated by K-TRANS and there was already an established bus stop at that location. Hence, K-TRANS could use this stop in ways similar to its normal operations.

As mentioned in the Phase I report, the "official" parking lot shuttle services operated under contract to KIEE were divided between two carriers: K-TRANS and Transportation Enterprises, Inc. (TEI). K-TRANS initially served the Willow Street and Coliseum lots east of the Fair site. TEI served the Baxter Avenue lots north of the Fair and the Hawthorne Street and Martin Mill Road lots off Chapman Highway south of the river. Each route had a designated loading berth initially, although when shuttle bus volumes declined the operators became somewhat more casual about the precise loading zone.

Original plans called for the terminal to operate on a rapid flow-through basis, with buses stopping in the downtown area only long enough to unload or load and then proceeding immediately back to the parking lot. The initial schedule called for a maximum of 16 buses in service for the Coliseum, 3 for Willow Street, 7 for the Chapman Highway lots, and 8 for Baxter Avenue. If operated, these schedules would have resulted in an aggregate flow of 43 buses per hour through the terminal. At peak hours, schedules were planned on the basis of loads of 55 passengers per bus and the passenger volume through the terminal would have amounted to 2300-2400 persons per hour.

Dwell times were estimated at three minutes to unload and five minutes to load. Since the peak direction of travel was always expected to carry virtually all the traffic with very little reverse-flow riding, the layover time was based on time of day with shorter layovers in the morning and longer ones in the afternoon and evening. The bus capacity of the terminal was thus estimated at 100 per hour for arrivals (20 turnovers per space per hour) and 60 per hour for departures.

Little effort went into attempting to determine the pedestrian capacity of the terminal area since there was no choice open to the Fair in terms of the layout of the pedestrian space on the sidewalk adjacent to the bus loading zone.

The capacity of the bus terminal was never tested. Remote parking lots and their associated shuttles never experienced enough demand to heavily load the terminal except for very brief evening periods after the end of the nightly fireworks display. Therefore, it is not possible to make an informed judgment about the adequacy of the terminal design.

Carrier Operations

The two shuttle carriers operated in relative harmony once boundaries of their respective loading zones were clarified. The Knoxville Police Department enforced the no-layover rule. This made it necessary for both operators to time their departures from the parking lots in evening hours to afford them just enough time to load and leave the downtown terminal without lingering.

Carriers responded quickly to cut back service at KIEE's direction once it became obvious that the demand was not going to live up to forecasts. KIEE's incentive to cut back TEI's service was somewhat tempered by the fact that the contract between TEI and KIEE called for a guaranteed minimum of ten hours' of service per day by each of 16 buses for the first 60 days of the contract. There were minor cancellation penalties for buses released from the fleet before August 25, 1982. There was barely enough demand for TEI to provide the daily minimum number of hours of service. Even with TEI responsible for operating the employee shuttle from the remote employee parking lot, the total number of hours of service purchased tended to remain near the contract guarantee figure until after July 1. Thus, KIEE had contracted for more service than was needed.

Hourly Distributions

Limited data are available indicating the hourly distribution of ridership to and from the Fair on the remote parking shuttles. Figures 7-E and 7-F show the inbound and outbound distribution for a typical Tuesday and Saturday. Shuttle operators commented that they often found loads waiting at the lots well before 9 A.M. and that they felt it would be advisable to begin the shuttle service as early as 8:30 A.M. With high daily ridership of approximately 2000 one-way trips per route, TEI found peak-hour inbound loads were approximately 30% to 45% of the daily inbound movements. Outbound movements were somewhat more evenly spaced, with the outbound peak hour of 20-25 percent of the daily outbound traffic occurring between the hours of 10:00 and 12:00 P.M. This was the result of activities ending on the Fair site such as the fireworks display. However, the outbound distribution from remote parking lots was not as peaked as that at the gates.

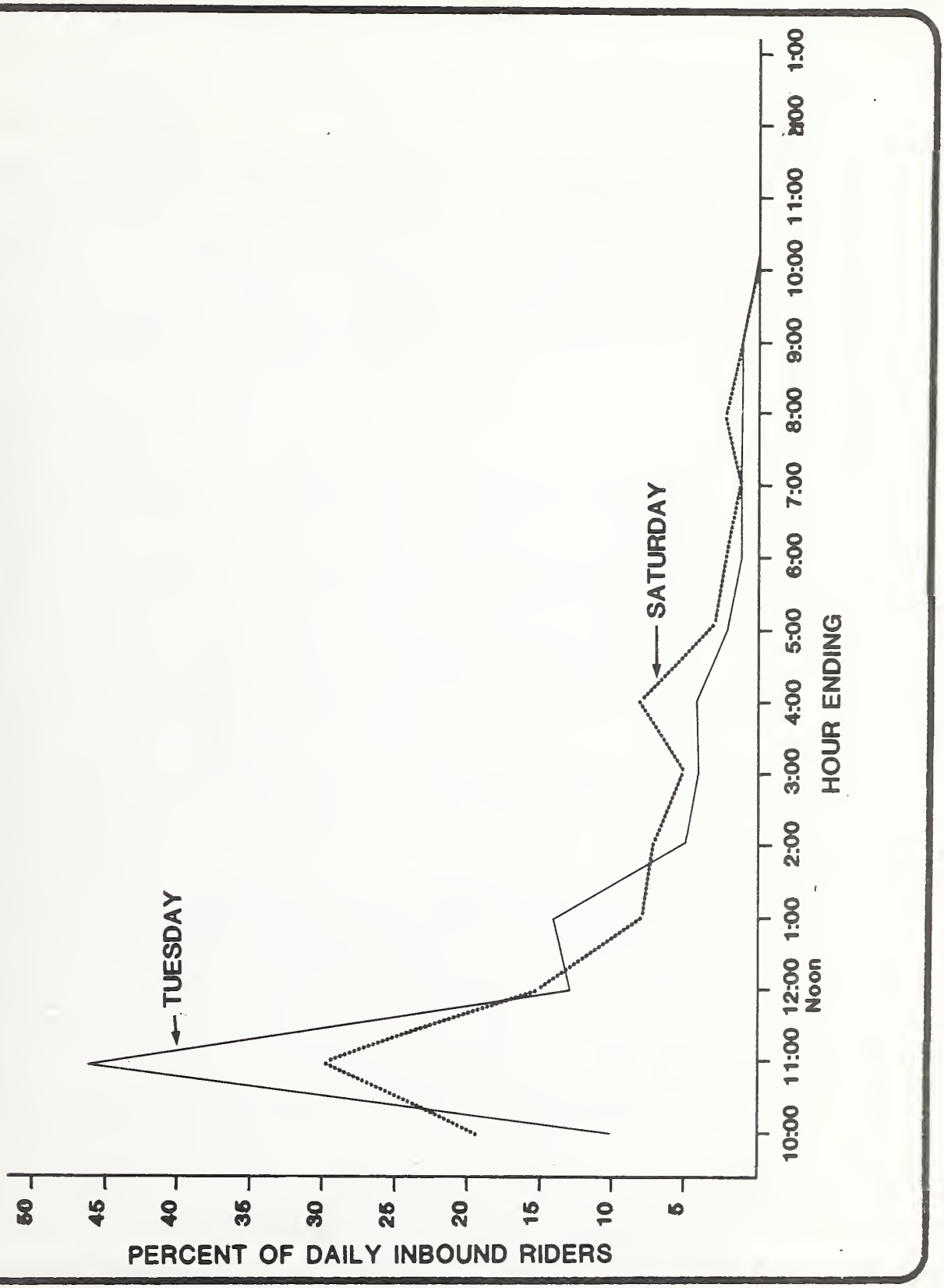

FIGURE 7-E
INBOUND SHUTTLE BUS RIDERSHIP PATTERN

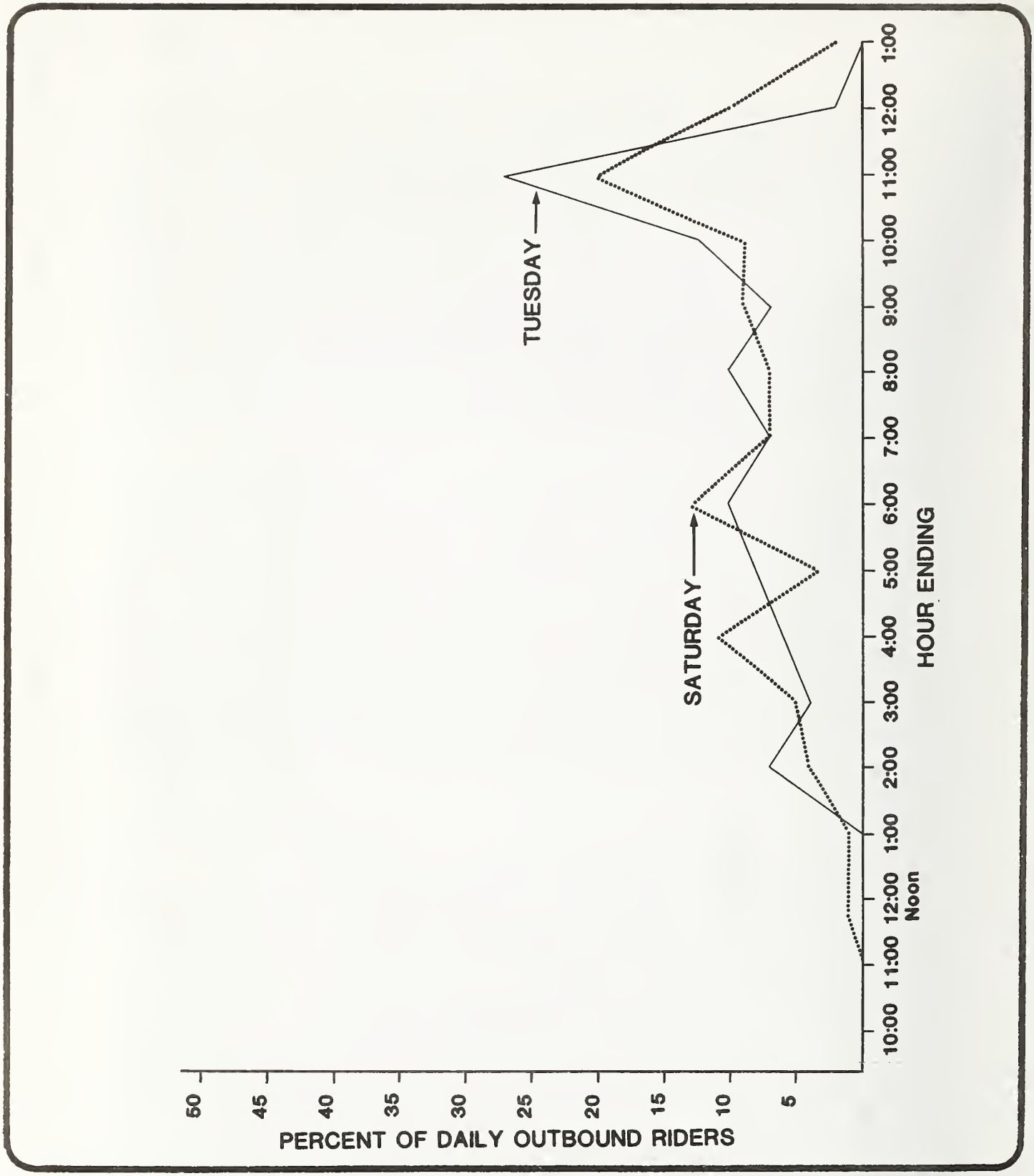

FIGURE 7-F
OUTBOUND SHUTTLE BUS RIDERSHIP PATTERN

Seasonal Variations

Figure 7-G shows the number of vehicles parked in the remote lots per 100 attendance for the course of the Fair. As seen in the plot, there is a wide variation in the parking rate per 100 attendance. The parking rate peaked in mid-June, was stable through July, and declined significantly in August. The general feeling was that the remote lots tended to serve out-of-town visitors who were not familiar with the area and parked in the first space that was available.

CONCLUSIONS

Several conclusions can be drawn about hotel/motel shuttle operations from the Knoxville experience. A terminal facility needs to be provided to accommodate the shuttle operations. The terminal should be located close to a Fair gate to encourage passengers to use the shuttle buses. One problem that arose in Knoxville was that the terminal was located adjacent to a major parking lot that was available for Fair patrons. The parking lot was typically not full and shuttle operators lost passengers as they found they could park as close to the Fair as the shuttle terminal and pay less to park than they were paying to ride the shuttle service.

Shuttle terminals designed for future Fairs or major special events should incorporate the following features, where possible:

- -- Permanent loading zones for each carrier or group of carriers.
- -- Sufficient flexibility in the layout to permit shifting carriers to other locations to reflect changes in bus volumes or berthing requirements.
- -- Maximum feasible separation of pedestrian and vehicular traffic.
- -- Clear identification of location of carrier loading zones, preferably with a graphic display of the terminal for reference.

The excess supply of shuttle operators, as discussed in the Phase I report and sections of this report, might have been alleviated by different methods. Had it been able to commit the necessary manpower, the Fair could have acted as a broker between shuttle operators and lodging operators to combine the service being provided by each of the operators into efficient patterns. This could also have been accomplished through the Public Service Commission's regulatory process by awarding the right to provide service on a route by route basis. In the absence of this strong

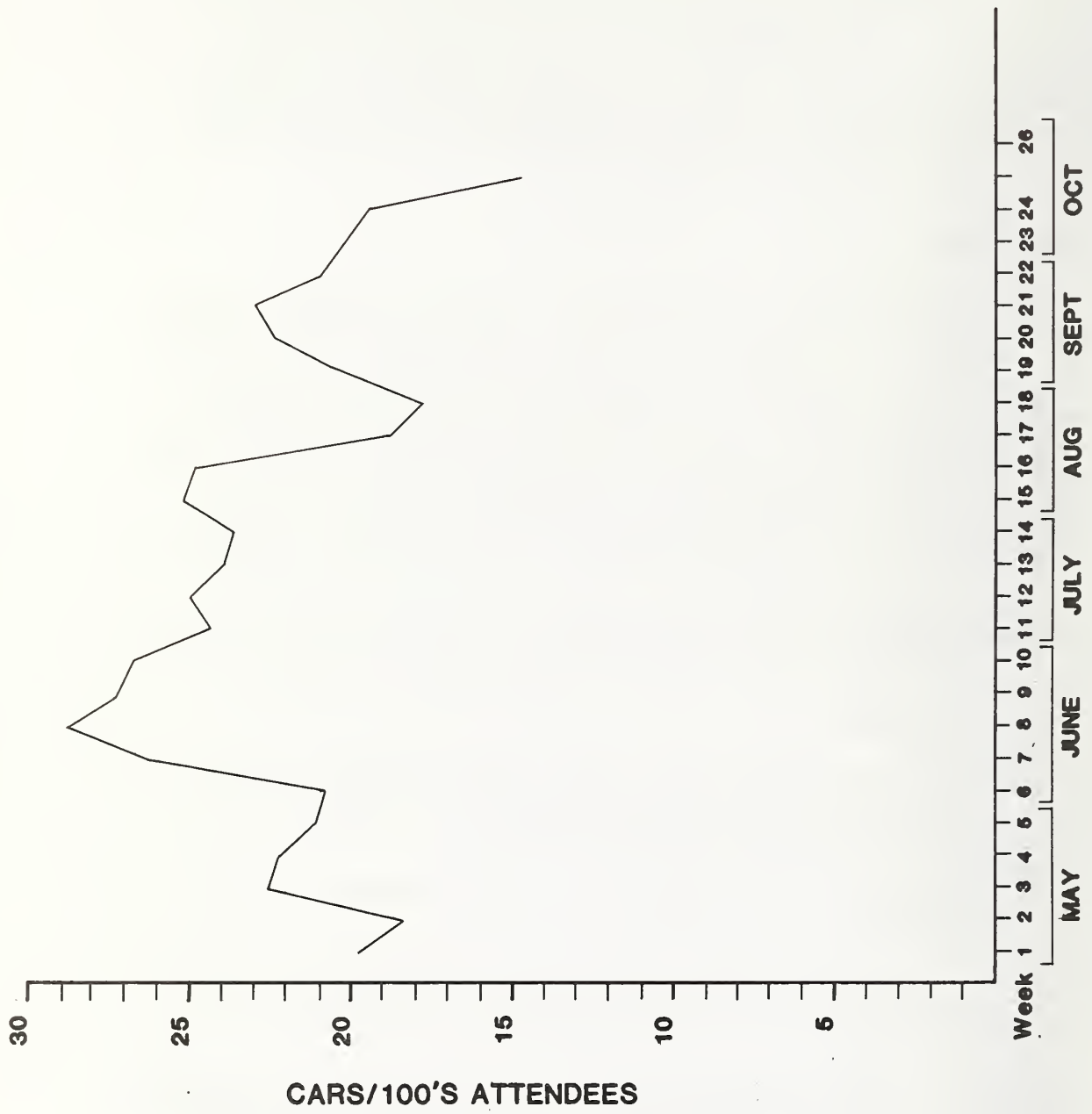

FIGURE 7-G
PARKING AS A FUNCTION OF ATTENDANCE

regulatory action, it is doubtful that any effort undertaken by the Fair to combine the service into efficient patterns would have been beneficial. The regulatory agency could have intervened to limit overall supply to more closely match demand. However, the degree of uncertainty about the size of demand would have made the regulators' task extremely difficult.

A more drastic alternative would have been for the Fair itself to operate the lodging shuttles. This option was discarded early by KIEE's Management Committee, in line with the general policy of allowing the private sector to provide as much of the auxiliary services as possible. In retrospect, while the supply could have more closely matched the demand, the risk of substantial loss in shuttle operations was far greater than the profit potential. The Fair's main interest in transportation was to ensure that visitors had easy access to the site and the private sector responded adequately without any stimulus from the Fair.

While KIEE Transportation Services Division staff were subjected to intense pressure to allocate more space to individual carriers during the final few weeks before the Fair opened, the consensus afterward was that the allocation had generally been equitable. Furthermore, the fact that the shuttle terminal closed on September 4, with operations transferred to the tour bus terminal, proved that allocating more space overall to shuttle operations would not have been justified.

One drawback to the market sector arrangement for shuttle service was the ability of shuttle operators to terminate service abruptly without warning. KIEE management had no effective way to prevent an unscrupulous operator from providing service. Only the City of Knoxville and State Public Service Commission had this ability. In some cases visitors who had pre-purchased shuttle bus tickets as part of a lodging package were left without transportation to the Fair. In one instance, a shuttle operator cancelled some but not all of his routes and refused to honor requests for refunds of prepaid transportation. KIEE management responded by barring the operator from the shuttle terminal, but he continued to operate service to a downtown, on-street bus stop. Management of future special events might consider requiring that operators post a cash bond to guarantee service if they are pre-selling tickets. However, this provision is difficult to enforce and may have the effect of making the special event management liable for defaults by the carrier.

Another key in the oversupply of shuttle service was the timing in the granting of licenses by the Public Service Commission. Due to weather constraints discussed in the Phase I report, the hearings were held late. By the time the licenses were granted, no one had sufficient time to evaluate the service that was being provided. If the hearings had been held earlier, the prospective operators would have had a better understanding of what the service levels would be. Given the time to assimilate the information, there may have been an opportunity to coordinate the services being offered and bring the supply into line with the demand.

It is also important in the future that the licensing of the shuttle carriers occur so that the prospective operators have sufficient time to gather the necessary information to provide the service without oversupplying. This is particularly important if the regulatory agency controlling the licensing is not going to regulate the number of operators that will be issued permits.

For future special events of this type it is important for the demand for shuttle service to be defined. From the service provided by one of the operators in Knoxville, it is seen that the actual demand for the shuttle service correspond to two passengers per 100 hotel beds. This differs substantially from the one passenger per lodging unit used in the projections by the operators.

The small on-street terminal operated well, although it was never tested to the design capacity because of the underutilization of the remote parking lots. However, it could not have accommodated the lodging shuttles or tour buses.

The distribution of the terminals among three different gates undoubtedly helped minimize the traffic congestion near the Fair site on busy days. The merging of the shuttle and tour bus terminals near the end of the Fair helped to reduce operating costs. When the terminals were merged, the tour bus volumes were at or below average day volumes. The shuttle bus volumes at the time of the merger were also low with only 12 to 15 of the original operators still in existance.

The procedure of sizing the terminal to the anticipated passenger flow, rather than to the anticipated bus volumes, also turned out to be appropriate, given the excess supply at the start of the Fair.

In both the shuttle and tour bus terminal experience, it is possible to conjecture that initial space requirements, are significantly greater than space requirements once everyone has become familiar with the facility.

Chapter Eight:

TOUR BUS SERVICE

The Phase I report outlined the operations and facilities provided at the 1982 World's Fair to accommodate charter and tour bus operations. The intent of this chapter is not to restate the information contained in that report, but rather to document the resulting operations, trends, and provide some guidelines for planning for tour and charter buses at future events.

One of KIEE's objectives in providing transportation facilities was to facilitate the arrival of the desired number of visitors arriving in shuttle and tour buses. To accomplish this, KIEE had a strong market thrust to tour and charter organizations, including a group ticket sale discount program. The marketing effort was successful and the 1982 World's Fair had a larger than expected tour bus volume.

The pre-Fair estimates indicated that, because of this major marking thrust, approximately 15 percent of the Fair visitors would travel in tour groups. Approximately 500 buses were anticipated on peak days, 300 on a design day, and 225 on average days. Actual bus volumes exceeded the projections, with over 700 buses accommodated on the peak day, approximately 425 buses accommodated on the 90th percentile (design) day, and over 275 buses on an average day.

Figure 8-A illustrates the cumulative tour bus volumes for the Fair. As seen in the figure, the top 10 days are fairly similar. Over 600 buses arrived on these top 10 days and substantially less arrived on other days. The 600 buses correspond to the 95th percentile day. The 90th percentile day accommodated 415 buses and was 150 percent of the average day. The 80th percentile day accommodated approximately 360 buses and was 130 percent of an average day. An average day of 275 buses was the 63rd percentile day.

TOUR BUS TRENDS AND PATTERNS

Monthly Trends

There was significant seasonal variation in tour bus volumes throughout the course of the Fair. Bus volumes were very high in May and June, with over 12,000 buses using the terminal in May and almost 11,000 buses in June. The volume dropped sharply during the summer, with 7,600 and 5,800 buses using the terminal

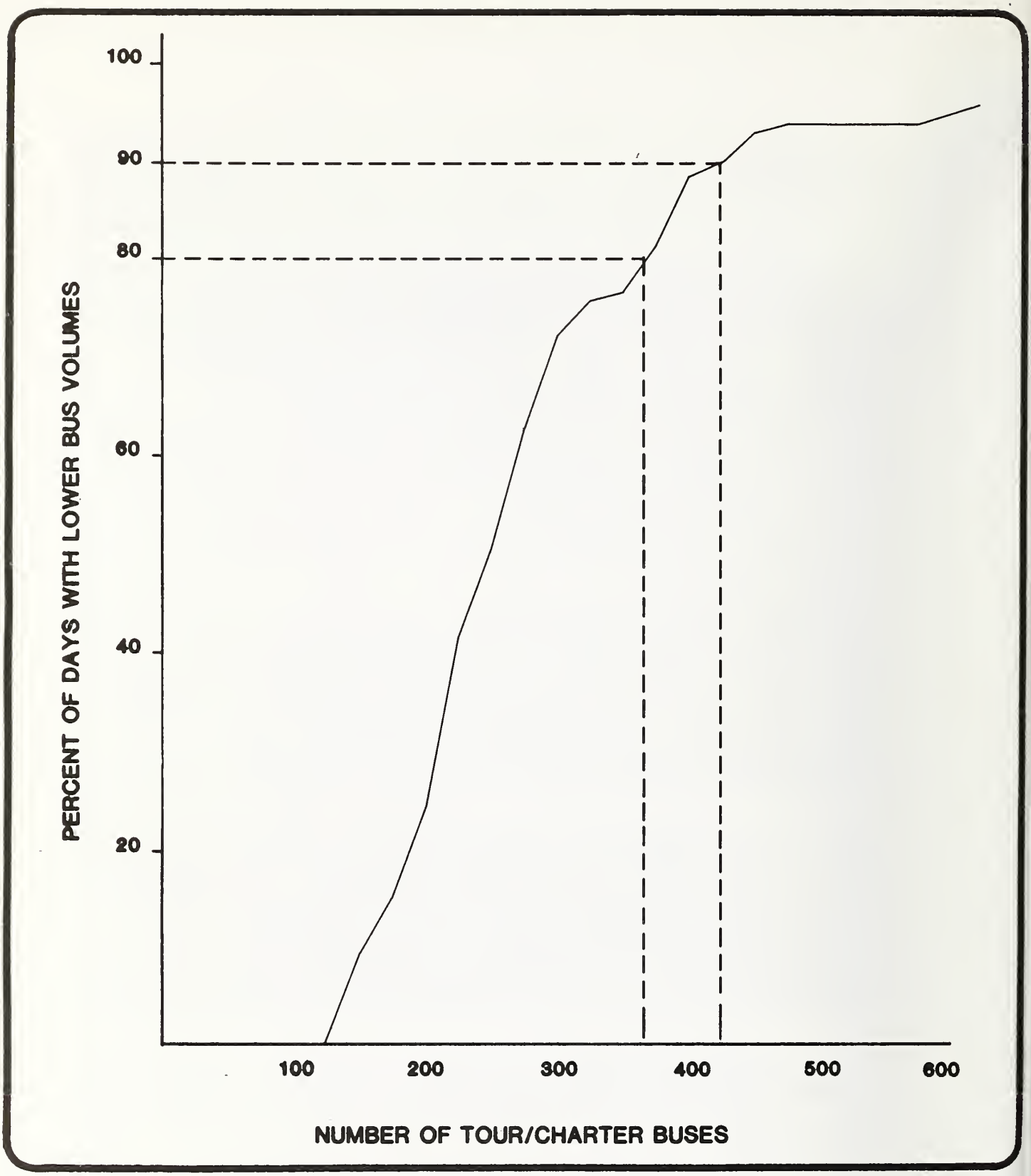

FIGURE 8-A
DISTRIBUTION OF DAILY TOUR BUS VOLUMES

in July and August, respectively. Volumes picked up slightly in September, with over 6,800 buses using the terminal. Data for bus volumes in October was incomplete; however, from October 1st to October 20th, 4,176 buses used the terminal. It is estimated between 90 and 120 buses used the terminal daily during the remainder of the month.

The bus volumes as a percentage of total Fair attendance shown in Figure 8-B illustrates these trends. It should be noted that these trends reflect the percentage of Fair patrons arriving by charter and/or tour bus, not the actual number of tour buses.

Daily Variations

There was also a marked variation in tour bus volumes by day of week. (See Figure 8-B) During the spring season (May and June), the Friday and Saturday tour bus volumes were 71 to 110 percent higher than the weekday volumes. During the summer (July and August), the Saturday volumes were still about 60 to 80 percent higher than weekday volumes, although weekday volumes were more stable during this period. During the fall (September and October), the trend reversed itself, with Wednesdays being the peak bus days and Fridays and Saturdays being average days.

Throughout the course of the Fair, the highest tour bus volumes occurred on Fridays and Saturdays and the lowest volumes on Sundays and Mondays.

Tour Scheduling in the South

Discussions with several of the major tour operators and carriers indicated that the seasonal and day-of-week patterns experienced in Knoxville were reflective of what was anticipated by the tour industry. Most tours were scheduled to arrive in Knoxville for the weekend; thus, the high bus volumes on Fridays and Saturdays.

The seasonal trend of more tours in the spring and fall with lower volumes in the summer is typical of tour operations in the South. The general concensus is that major special events in the South could expect the same seasonal and day-of-week trends seen in Knoxville.

Another point raised by the tour operators was the effect that publicity had on Fair tour groups. During May and June, the publicity about room reservations being unavailable in Knoxville made tours more desirable. The negative publicity received at the beginning of the Fair may have deterred people, although the extent of any such impacts are unquantifiable.

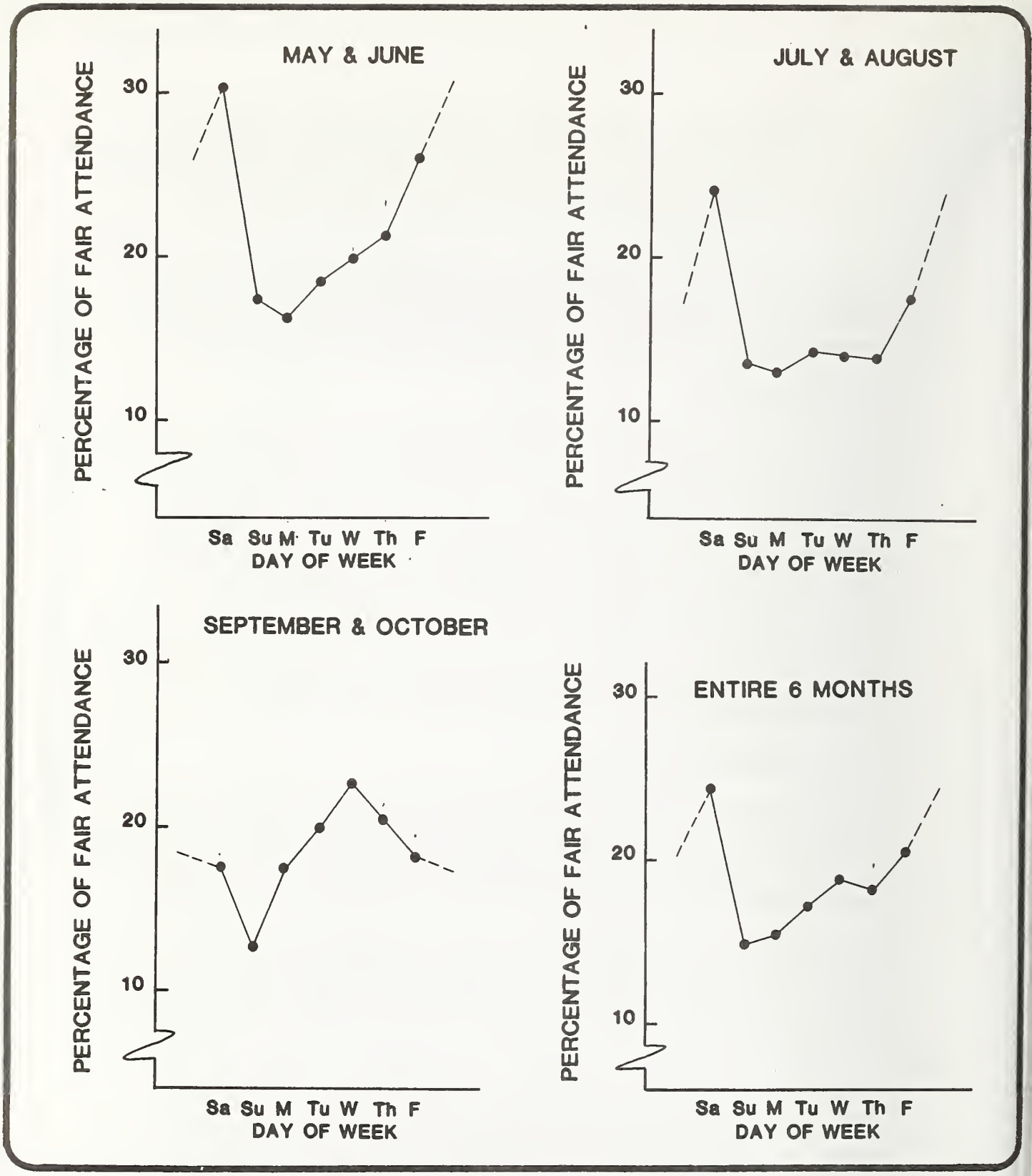

FIGURE 8-B
TOUR BUS TRENDS BY SEASON

Hourly Trends

Arrival patterns, as discussed in the Phase 1 report, were based on the 10:00 A.M. opening time. Early in the Fair, departures were scheduled around the 10:00 P.M. fireworks display time. As the Fair progressed, some tour operators changed their schedules to accommodate their patron's desires . Thus, arrival and departure patterns varried with many arrivals before 10:00 A.M. and many departures after 10:00 P.M.

The buses traveled in mixed traffic which resulted in long queues. On the heaviest bus volume days, arriving buses would queue from the terminal entrance up to one mile or more. For future events, if possible, it would be advisable to separate charter bus traffic from regular automobile traffic due to the bus queues.

MODE SPLIT

An analysis of the percentage of Fair patrons arriving by charter bus indicated that there was little or no correlation between bus volumes and daily attendance. Mode split varied from a low of approximately 9 percent on a Sunday in October to a high of 36 percent on a Saturday in June. Table 8-1 lists the percent of Fair visitors arriving by charter bus. The overall average for the entire Fair was 18 percent. As is seen in the table, the percentage of charter bus patrons decreased throughout the course of the Fair, as did the actual number of buses.

Due to the variable relationship between daily attendance and tour bus volumes, it is difficult to use overall mode split as a predictor of design day bus volumes. The average day attendance in Knoxville was approximately 60,550, with an average bus volume of 275 buses. The mode split was 18 percent (assuming 40 passengers per bus) or 4.55 buses per 1,000 attendance. Using only the Knoxville experience as a predictor, and assuming the intensity of the tour marketing thrust used in Knoxville, future special events could expect approximately the same bus volumes. With the 90th percentile (design day) being 150 percent of an average day, the design day bus volume mode split would be 27 percent of average day attendance, or about 6.8 buses per 1,000 average day attendance.

TABLE 8-1: TOUR BUS MODE SPLIT VARIATIONS

	PERCENT OF ATTENDANCE ARRIVING BY TOUR BUS						
	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
May-June	30	18	16	19	20	21	26
July-August	24	14	13	14	14	14	18
September-October	17	13	17	20	23	20	18
Overall Fair	24	15	15	17	19	18	21

OPERATIONS

As discussed in Phase I, the terminal operated efficiently. Discussions with major carriers after the Fair indicated that they were pleased with the terminal operations and their passengers were pleased with the proximity of the terminal to the gates. Overall, the operations were better than had been originally anticipated. The Phase I report describes the operation in some detail.

Platforms

As discussed in the Phase I report, the platforms were fenced to prevent passengers from crossing between platforms. Breaks in the fencing were provided to allow KIEE staff to move between platforms; however, passengers also used these breaks to traverse the terminal. Traffic and crowd control staff were necessary during peak periods to keep pedestrians in the marked crosswalks and out of the bus lanes. While physically possible, it was economically infeasible and impractical in a temporary terminal to grade-separate bus and pedestrian movements in the terminal. Crowd control personnel generally resolved the problems.

Information

One problem noted during the course of the Fair was the quality of information to tour bus passengers inside the Fair. The Fair information staff were not well informed as to the differences between the various bus terminals. Occasionally, passengers were sent to the wrong gate, which was approximately one mile from their intended gate. This could have been alleviated by having the on-site Fair staff better informed.

Advance Reservation System

With the exception of Greyhound and Trailways, all buses were dispatched by KIEE. All groups used a first-come, first-served arrival system and a reservation departure system. Trailways and Greyhound assigned departure slots as each group arrived.

KIEE had an advance reservation system for departures. Buses that arrived without advance departure reservations were accommodated where possible. Table 8-2 lists the percentage of departure reservations that were used, the actual volume as a percent of reservations, the percentage of the actual volume with reservations, and the percentage of the actual volume that arrived without reservations. Data from a typical week for each month were used.

As shown in the table, less than 50 percent of the advance reservations were claimed. The resulting no-show average of slightly over 50 percent may be somewhat overstated due to misidentification of buses either in the terminal or on the advance reservation log sheets. Another reason why the no-show reservations are high is that, despite initial warnings to carriers, consistent no-shows were never purged from the reservation logs. On the average, only 42 percent (ranging from 34 to 60 percent) of the buses actually handled in the terminal arrived with advance reservations.

One purpose of the advance reservation system was to prevent buses from crowding the terminal at the 10:00 P.M. closing hour. The reboarding check element of this system enabled KIEE staff to assist lost passengers in locating their buses. It also helped to control pedestrian flows in the terminal since passengers knew where and when the bus would be in the terminal. Another reason for the advance reservation system was to assure tour groups of a specific departure time. This was important if the tour had other plans after leaving the Fair.

TABLE 8-2: ADVANCE RESERVATION PERFORMANCE

Month	Percent Reservations Used	Actual Volume as Percent of Reservations	Pop-ups[1] as Percent of Actual	Claimed Reservations as Percent of Actual
May	52%	89%	41%	59%
June[2]	--	--	--	--
July	46	118	61	39
August	42	118	64	36
September	39	114	66	34
Fair Sample	46	108	58	42

[1]Pop-ups refer to buses arriving without an advance reservation.

[2]Data for June reservations was not available.

On many days it appeared that departure time slots were full when in reality they were not due to a high percentage of no-shows. Except on the peak bus days (Saturdays in May and June), KIEE staff was able to give a departure slot to every "pop-up" within a half hour of their desired departure time despite the slots being shown as "filled" by no-shows. Upon arrival, it took slightly longer to process a bus without a departure reservation than a bus with a reservation.

For future special events, there is a trade-off between the costs of the labor-intensive advance reservation system and the longer bus processing times upon arrival. The substantial number of "pop-ups" that occurred in Knoxville and were processed should be taken into account when assessing this trade-off.

If an advance reservation system is used at future events, it is recommended that future reservations for consistent no-show carriers be cancelled and the carrier informed. This will permit more efficient allocation of departure reservations. If no advance reservations are used, the longer processing time per bus will require more terminal staff and affect terminal capacity; however, it would eliminate the office reservation staff. It should be noted that the pre-arrival guarantee of departure time alleviated some of the carriers concerns about terminal operations. Yet, Greyhound and Trailways operated out of the same terminal in Knoxville without advance reservations and felt their operation worked well. In any case, some sort of departure reservation system is strongly recommended if a terminal is to be used to handle tour buses at future special events.

The windshield cards issued upon arrival indicated the passenger reboarding check number, departure platform, and departure time. These cards were 8½ x 11 on white cardboard. The cards allowed the buses to enter the terminal for their evening departure. The cards were difficult to see at night, particularly through the tinted windshields on the newer buses. For future events, it is recommended that bus identification be larger to be more visible to terminal staff.

BUS PARKING FACILITIES

The remote bus parking facilities provided by the Fair were not heavily utilized. This was partially due to the poor accessibility of the selected sites and the provision of bus parking and servicing facilities by private entrepreneurs closer to the bus terminal and Fair gates. Trailways and Greyhound provided facilities for their own fleets.

The facilities for bus parking provided by KIEE were remote because of the lack of available land close to the site. During the last months prior to the opening of the Fair, it appeared that no private entrepreneur would provide bus parking. Therefore, KIEE contracted with a local firm to provide the parking in return for being described as the "Designated World's Fair bus parking-servicing facility" in information sent to carriers by KIEE.

In addition to the "designated" remote bus lot, one of the north parking lots was made available for tour bus parking in mid-May because it was underutilized during the first weeks of the Fair. Approximately 30 to 90 buses used this lot daily during the months of May and June. Discussions with tour operators who used this parking indicated that it would have been more desirable if sanitary dumping and servicing facilities were available.

As discussed in the Phase I report, once the drivers became familiar with the area, they secured their own parking location and the private sector was capable of providing adequate bus parking without stimulus from the Fair. Where parking is to be provided for tour buses at future special events, sanitary dumping facilities should be provided. Minor servicing facilities would be desirable. One entrepreneur even provided bus fueling and sanitary dumping service from trucks based on a parking lot located four blocks from the North Gate.

Alternate Facilities Concepts

The policy decision was made by KIEE to encourage tour groups to attend the Fair and to provide facilities for tour buses adjacent to the North Gate. The two major types of facilities evaluated were: (1) a bus terminal at the gate with remote bus parking (as provided) and (2) a bus terminal/parking area as close to the gate as possible. In Knoxville, the terminal with remote parking concept was selected principally because of lack of available land adjacent to the North Gate to provide a terminal/parking facility. Because of the KIEE policy decision to provide official automobile parking at the North Gate, sufficient land was not available to also provide bus parking. For future special events, trade-offs need to be made between providing bus parking or car parking adjacent to the gate. The following describes guidelines that can be used in evaluating the trade-offs.

Two concepts of bus parking were considered. The first had buses platooned for departure, thus necessitating only an absolute minimum distance between buses. The second concept allowed for individual buses to pull out of bus bays. These concepts are

illustrated in Figure 8-C. The area required to park the buses is 760 square feet per bus for the platooned concept ahd 1,350 square feet per bus for the independent pull-out concept. For the design day in Knoxville (425 buses) land areas of 7.4 to 13.2 acres would have been needed. If the equivalent land areas were used for automobile parking, they would accommodate 1,000 to 1,800 vehicles.

Another aspect that needs to be considered is the number of Fair visitors who would be served by the facility. As a bus terminal, the area would serve approximately 17,000 patrons. As a parking lot, the area would serve 3,700 to 6,600 persons, or 22 to 39 percent as many as with buses. The associated parking revenues would also need to be compared. Bus revenues (at $10 per bus) would yield $4,250 per day with the lot full, while auto revenues would yield $6,000 to $10,800 per day with the lot full. If the area was used as bus parking, the pavement would need to be heavier, thus substantially increasing construction costs over vehicle parking. It should be noted that the terminal used in Knoxville occupied approximately two and one-half acres of land, or less than one-third of the minimum amount of space that would have been required for the parking facility.

Caution should be used in assuming the absolute minimum design. Buses for each departure time would be required to park in their own line, as no bus could move without the bus in front moving. Given the variability of the distribution of departure times, the efficiency of the lot would not be 100 percent as had been assumed in the previous calculations. Also, bus breakdowns, while not prevalent in Knoxville, could cause significant delays in the lot. This layout also precludes a tour from changing the desired departure time after arriving at the Fair. The terminal/parking concept providing more space between buses is the more practical and preferred concept.

In sizing the bus terminal, there may have to be more than one line for each departure time given the variation in distribution of desired departure times. The parcel also will have to be approximately rectangular in shape to accommodate the buses, preferably long and relatively narrow. Odd-shape parcels would probably be relatively inefficient for use as a bus parking area.

In sizing the parking/terminal facility, the fact that all buses may not need to remain parked at the Fair for the day also needs to be considered. This was evidenced in Knoxville by the number of charter buses parked at area hotels during the middle of the day. Parking was needed for no more than 50 percent of the arriving buses (this does not include Greyhound and Trailways who provided their own facilities).

FIGURE 8-C
BUS PARKING / TERMINAL CONCEPTS

If the bus parking/terminal concept is to be used, provisions need to be made for accommodating buses that need to unload near a gate but not park on-site. Also provisions are needed for overflow situations when buses arrive in excess of the capacity of the parking facility. For buses not parking at the Fair, a terminal facility similar to that provided in Knoxville should be created, although on a much smaller scale.

Another factor in sizing the bus parking facility is the unreliability of bus projections. The industry and the Fair's transportation consultant projected peak bus days of 500 and a design bus day of 300. Actual bus volumes in Knoxville were 650 to 700 buses on peak days, with a design bus day of 425. On 50 days in Knoxville, the bus volumes exceeded 300. The ability to project bus volumes for future special events is limited to the Knoxville experience. It is also very sensitive to the Fair's marketing efforts to tour operators, and the tour operators' acceptance of the Fair as an attraction.

CONCLUSIONS

Overall, the tour bus operations were a highly successful component of the transportation system provided for the Fair. With an aggressive marketing campaign undertaken by KIEE, the volume of tour groups exceeded original projections. The terminal concept used allowed the operations to be flexible and to accommodate the increased volume. The provision of the terminal adjacent to the gate enhanced its desirability.

In projecting bus volumes for future special events, the Knoxville experience indicated design day bus volumes of 6.8 buses per 1,000 average day attendance. This volume was achieved by an aggressive tour marketing program sponsored by the Fair resulting in 18 percent of total attendance arriving by tour bus (not to be confused with total persons with group tickets admitted). Tour bus trends of high volumes on Friday and Saturday and lower volumes during the week can also be expected. The staffing of the bus facilities should take this into account. According to major carriers, the seasonal variation of high volumes in the spring and fall and lower volumes in the summer could also be expected at special events in the South.

Some type of off-street bus terminal and/or parking facility needs to be provided to accommodate the large number of buses. The evaluation of the type of facility is a trade-off between the use of available land. If a terminal concept is used, it is recommended that a departure reservation system be used. The trade-off evaluation of an advance reservation system versus a system of reservation upon arrival will need to be made.

Chapter Nine:

LOCAL TRANSIT

K-TRANS is Knoxville's urban mass transit system. All equipment, buildings, facilities, etc. are owned by the City of Knoxville and it is legally restricted to serving Knoxville and Knox County.

The 1982 World's Fair was keenly anticipated by K-TRANS management, employees, and its governing board, the Knoxville Transportation Authority. Management viewed the Fair as an opportunity to introduce long desired changes. Employees saw a choice of better runs and hours along with the potential for lucrative overtime work. The City of Knoxville and the Knoxville Transportation Authority saw the potential of providing additional service at what was hoped to be relatively minimal public expense.

K-TRANS significantly increased service for the 1982 World's Fair. Additional hours of service were provided on every regular route. Service frequency was increased on several routes. Certain minor route revisions were also made before or during the Fair.

This chapter focuses on two major areas. One area is changes in K-TRANS prior to the opening of the Fair as well as changes during the Fair itself. The other area is the impact of the Fair on K-TRANS before, during, and after the Fair.

SITUATION PRECEDING THE FAIR

Proposals by K-TRANS for special Fair associated service were perceived as discriminatory by local citizens in light of the fare increase and service reductions authorized by the Knoxville Transportation Authority. In a public hearing, critics accused K-TRANS of trying to reduce service to residents while planning to offer special transportation services to out of town visitors during the Fair. They believed that resources were actually available to maintain existing service levels, but that the money was instead being used to pay for Fair-associated service.

The Knoxville Transportation Authority expressed a policy for K-TRANS operations during the Fair. The policy:

* Directed K-TRANS to spend no money out of its regular budget for operations of World's Fair associated service.

* K-TRANS must at least break even on all World's Fair associated service and preferably turn a profit.

* Profits from operations of World's Fair associated services would be used exclusively to support the K-TRANS regular route system.

The policy was primarily directed toward special World's Fair services such as park & ride shuttles, hotel/motel/campground shuttles, and similar operations which were dedicated to exclusive use by the World's Fair visitors. However, the policy was much more loosely interpreted by both K-TRANS and the Knoxville Transportation Authority when it came to expansion of the K-TRANS regular route system.

Another concern which was frequently expressed at Knoxville Transportation Authority meetings was that K-TRANS would likely assign its newer and more desirable buses to World's Fair shuttles and use older equipment on regular routes. Although some buses were assigned to World's Fair shuttles, most of the better equipment was placed on regular routes. This was done for four reasons:

1) Newer and more reliable buses could be assigned to routes with more demanding service. Most regular routes had runs with a greater number of hours of service per day while Fair routes had fewer hours and came relatively close to the K-TRANS maintenance facility. In the event of a road failure, the shop could respond more quickly.

2) Frequent passengers rode the regular route buses while Fair passengers used the service only occasionally. K-TRANS considered better equipment to be important in passenger satisfaction and an aid in retaining riders after the Fair.

3) Assignment of the best equipment to regular routes could reinforce local perceptions that K-TRANS was a responsive municipal service.

4) Compliance with federally mandated Title VI regulations was achieved which prohibit discrimination in assignment of equipment.

REVIEW OF K-TRANS SERVICES

K-TRANS provided both conventional transit service and special Fair associated service. It was well suited to offer these services during the Fair because it was an established local operator, had an existing fleet of buses, a maintenance facility, and a two-way radio system.

One important factor in providing service was the ability to transfer both people and resources from one type of service to another. For example, a bus and driver which ran an express trip in the morning peak could become a park and ride shuttle when Fair visitors began to arrive.

EXPANDED ROUTE SERVICE

K-TRANS made a variety of service improvements. This included additional hours of service on all routes, service adjustments and route revisions, and more frequent service on certain routes. Due to the location of the Fair site, most K-TRANS routes served at least one gate of the World's Fair and all but one route operated within one block of the Fair. That remaining route primarily served residential areas and operated within three blocks of the Fair's East gate.

Route Descriptions

K-TRANS' regular routes provide coverage throughout the City of Knoxville, serving all major residential areas with the exception of northwest Knoxville and most commercial and employment areas in the city. Table 9-1 lists the routes and gives a brief description of major transit origins and destinations and general demographic characteristics of riders.

Route Revisions

There were several route changes before and during the 1982 World's Fair. Route #4 Kingston Pike was split so that trips which operated via Sutherland Avenue were redesignated as #10 Sutherland Avenue. The remaining portion of #4 Kingston Pike was extended from the West Hills subdivision to Downtown West shopping center. This expansion provided additional service to the Fair site and to downtown Knoxville from a large parking lot at Downtown West shopping center.

The closing of the Clinch Avenue viaduct necessitated the rerouting of the UT and Fort Sanders Hospitals line to run along Cumberland Avenue to 16th Street, then to return to Clinch Avenue farther west. Before the opening of the Fair, Routes #3 Westhaven, #7 College Street, and #10 Sutherland Avenue had been rerouted away from Summit Hill/Western Avenue to avoid heavy construction on Interstate 40 and concurrent improvements on nearby major arterials. These routes continued to be detoured away from Summit Hill/Western Avenue after the opening of the Fair to avoid expected heavy traffic at the Fair site. Figures 9-A through 9-D show route modifications made prior to the opening of the Fair.

TABLE 9-1: ROUTE DESCRIPTIONS

ROUTE #	MAJOR TRANSIT ORIGINS AND DESTINATIONS	GENERAL DEMOGRAPHIC CHARACTERISTICS OF RIDERS
#1 - Holston Drive/ Rutledge Pike	Greyhound Bus Terminal Educational Facilities Knoxville Zoo Recreational Facilities Commercial Areas Social Service Agencies	Blacks Senior Citizens Low Income Persons
#1 - Fountain City	Multi-Family Housing Educational Facilities Hospital Park	Low, Middle and Upper Income Whites Senior Citizens
#2 - Lincoln Park	Single-Family Housing Multi-Family Housing	Low and Middle Income Whites Senior Citizens
#2 - North Lonsdale	Commercial Areas County Health Department	Low and Middle Income Blacks
#3 - Vestal	Hospital and allied professional services Multi-Family Housing Industrial Areas Commercial Areas Park	Low Income Whites

TABLE 9-1: ROUTE DESCRIPTIONS (CONT.)

ROUTE #	MAJOR TRANSIT ORIGINS AND DESTINATIONS	GENERAL DEMOGRAPHIC CHARACTERISTICS OF RIDERS
#3 - Davenport	Single-Family Housing Hospital Educational Facilities	Low and Middle Income Whites
#3 - Lonsdale	Social Services Center Multi-Family Housing Educational Facilities Commercial Areas Industrial Areas	Low Income Blacks and Whites
#3 - Westhaven	Commercial Areas Multi-Family Housing Social Services Center Park	Low and Middle Income Whites
#4 - Kingston Pike	Commercial Areas Educational Facilities Hospital Churches Motels	Low, Middle, and Upper Income Whites Elderly Persons
#5 - Sequoyah Hills/ Lyons View	Multi-Family Housing Single-Family Housing Educational Facilities Commercial Areas Industrial Areas	Low and Middle Income Blacks and Whites Elderly Persons

TABLE 9-1: ROUTE DESCRIPTIONS (CONT.)

ROUTE #	MAJOR TRANSIT ORIGINS AND DESTINATIONS	GENERAL DEMOGRAPHIC CHARACTERISTICS OF RIDERS
#6 - Dandridge Avenue	Multi-Family Housing Museum Churches	Low and Middle Income Blacks and Whites
#7 - College Street/ McCalla Avenue	Multi-Family Housing Educational Facilities Commercial Areas Social Services Center	Low Income Whites and Blacks
#8 - University of Tennessee Hospital/Fort Sanders Hospital	Hospitals and allied professional services	Low and Middle Income Persons
#9 - Chapman Highway	Single-Family Housing Multi-Family Housing Commercial Areas Hospitals Motels	Low and Middle Income Whites
#10 - Sutherland Avenue	Educational Facilities Industrial Areas Multi-Family Housing Single-Family Housing Commercial Areas	Low and Middle Income Persons

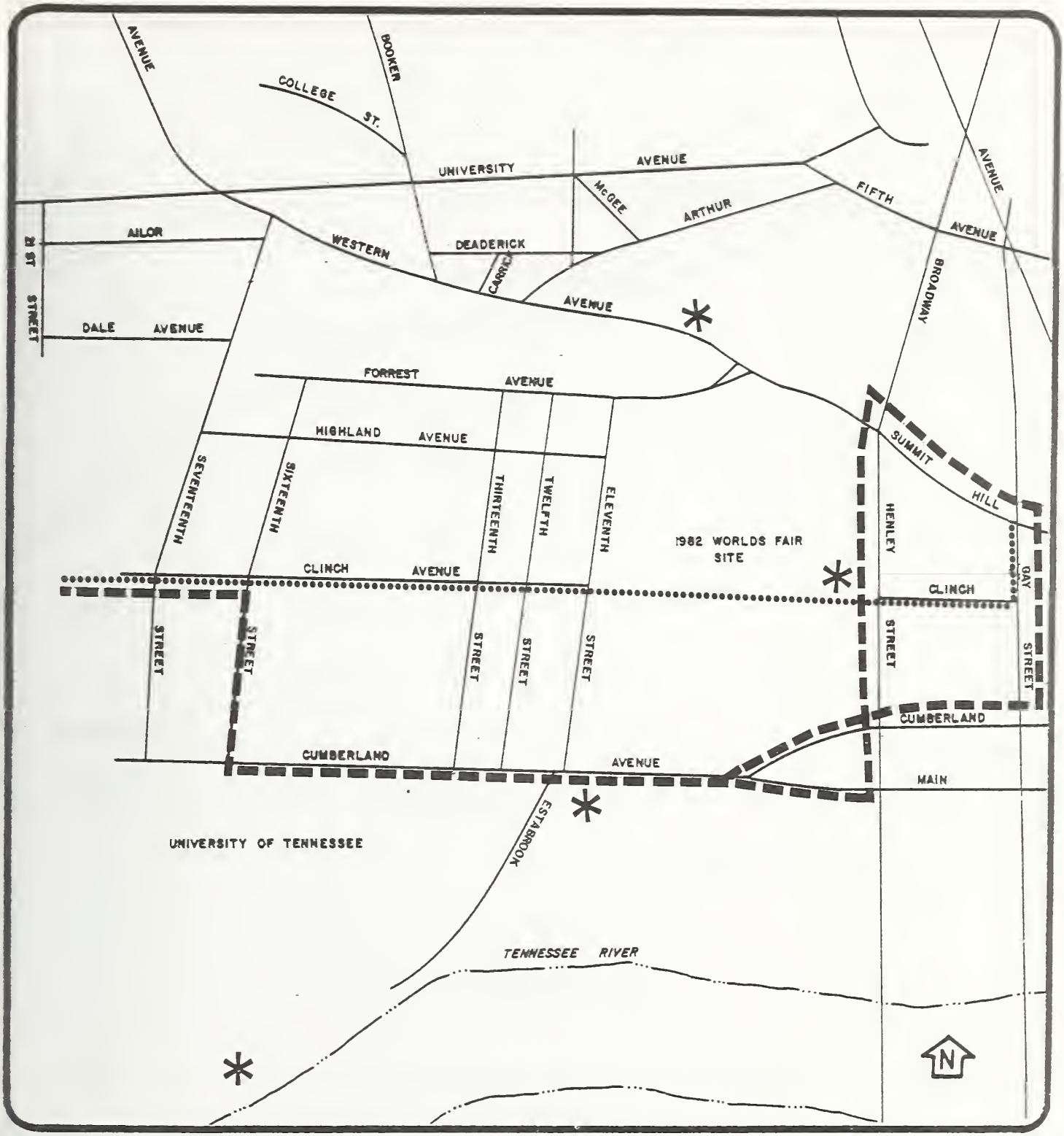

FIGURE 8-A UT/FT. SANDERS HOSPITALS ROUTE REVISION

..... REGULAR UT/FT. SANDERS HOSPITALS ROUTING

▬ ▬ REVISED ROUTING

* WORLD'S FAIR GATES

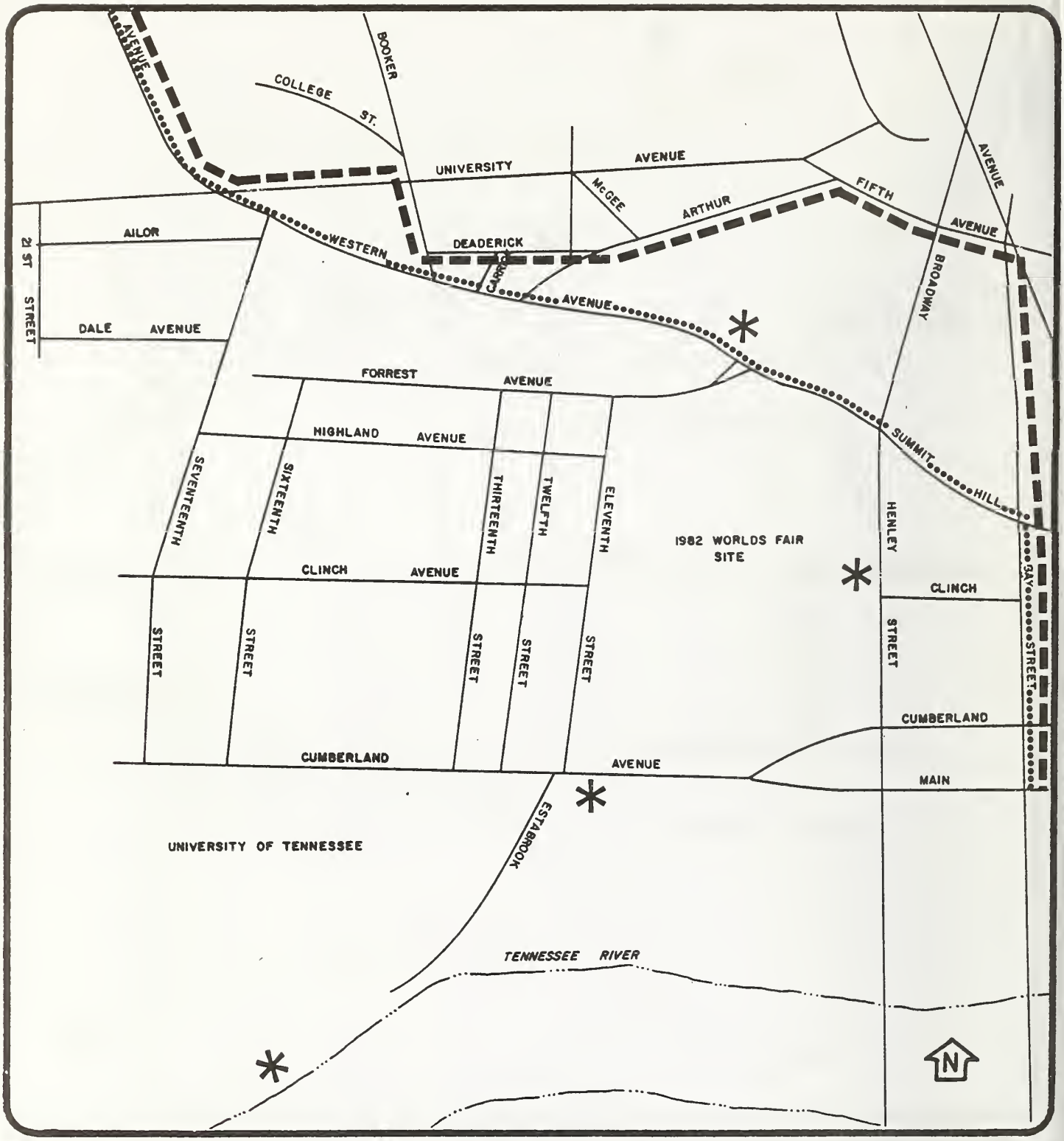

FIGURE 9-B **WESTHAVEN ROUTE REVISION**

..... REGULAR WESTHAVEN ROUTING

▬ ▬ REVISED ROUTING

* WORLD'S FAIR GATES

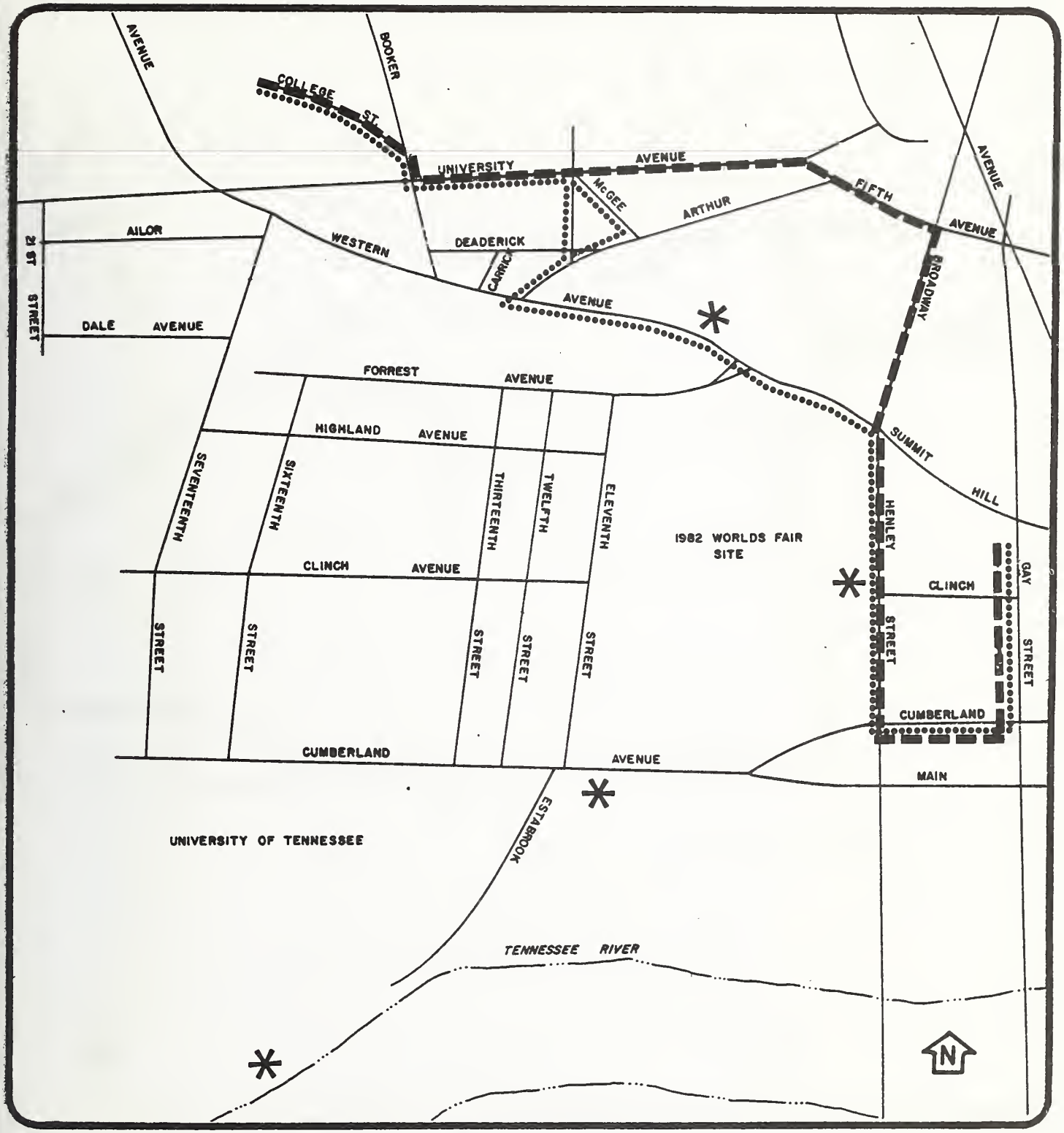

FIGURE 9-C **COLLEGE STREET ROUTE REVISION**

..... REGULAR COLLEGE ST. ROUTING

▬ ▬ REVISED ROUTING

✱ WORLD'S FAIR GATES

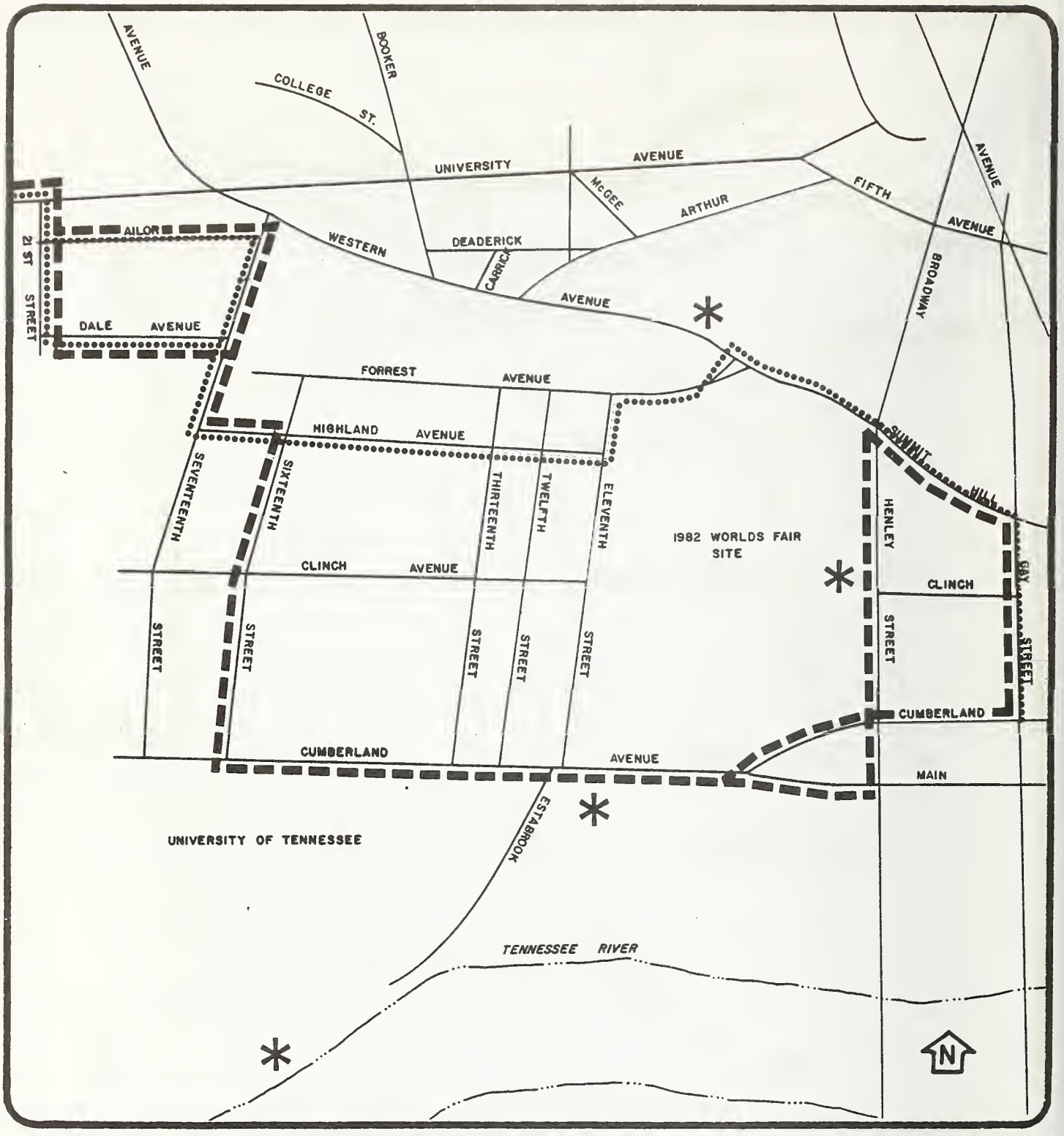

FIGURE 9-D **SUTHERLAND AVENUE ROUTE REVISION**

..... REGULAR SUTHERLAND AVENUE ROUTING

▬ ▬ REVISED ROUTING

* WORLD'S FAIR GATES

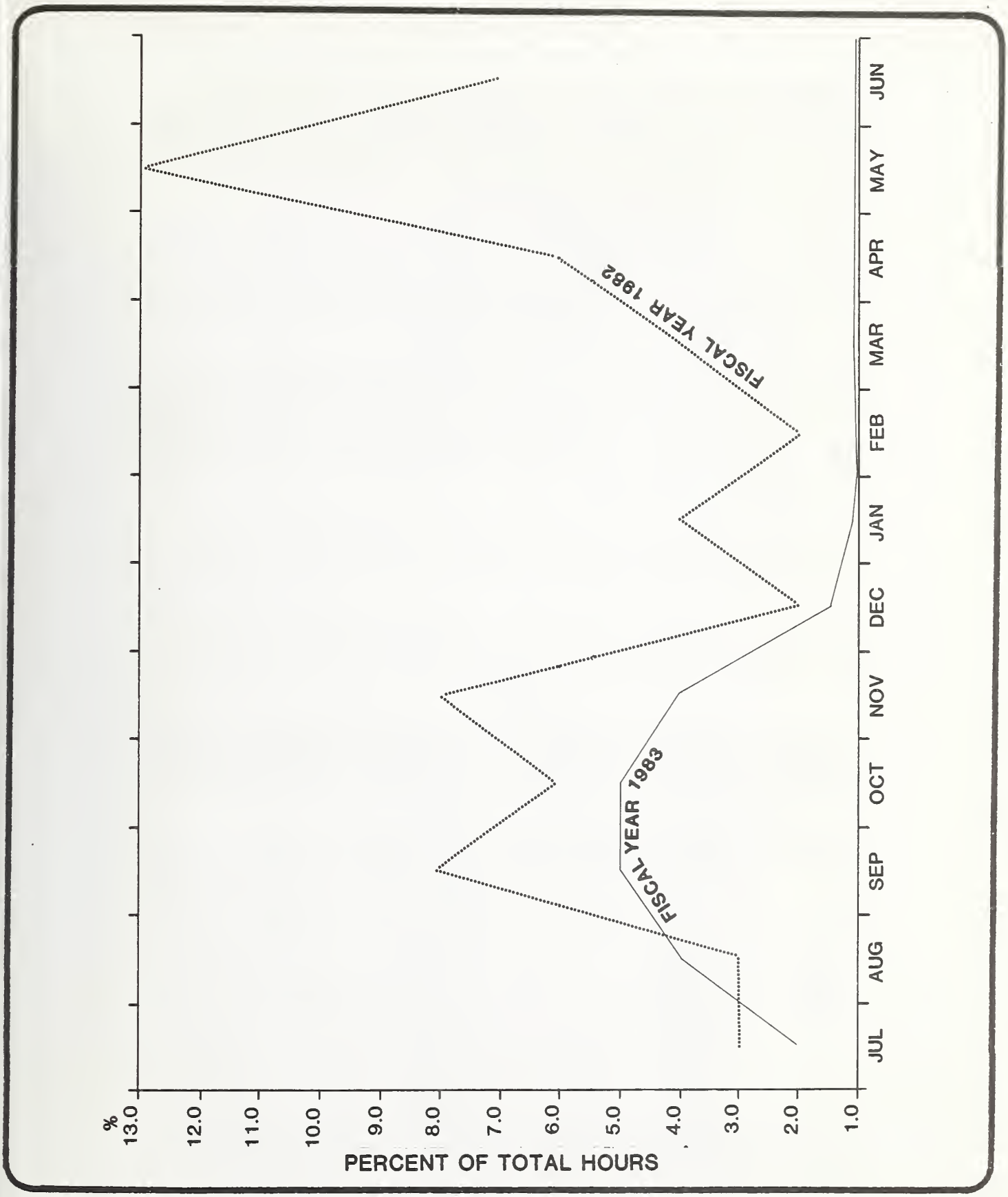

FIGURE 9-E
EMPLOYEE OVERTIME AS A PERCENT OF TOTAL HOURS

An additional change was made on the #7 College Street route within the downtown area. Unlike the thirty-five foot GMC buses, the forty-foot Grumman Flxible buses could not conveniently turn from Gay Street right onto Clinch Avenue. Thus, the route was changed to Cumberland Avenue between Gay and Henley Streets where more space was available for the turn.

Hours of Service and Service Frequency

Service frequency on K-TRANS routes during the Fair did not differ greatly from the headways existing prior to the Fair. Tables 9-2 and 9-3 list weekday and weekend headways.

One headway that changed was on Route #4 Kingston Pike, which serves a number of lodgings and West Town Mall. Prior to the Fair the Kingston Pike bus ran every 30 minutes at all times during the day. Effective May 1, the Kingston Pike bus ran every 15 minutes. The 15 minute service lasted only until August 30, 1982 when it was changed to 20 minutes.

Headways on Route #10 Sutherland Avenue were 40 minutes both during the peak and off-peak. However, when the Fair started, these headways were changed to 30 minutes.

A few routes experienced changes in headways only during the off-peak hours. Routes #1, #2, #5, and #6 went from 60 minute off-peak headways before the Fair to 30 minutes for the duration of the Fair.

Under the plan of services for the Fair, adopted by KTA, all K-TRANS buses would begin operation at 5:30 A.M. Monday through Saturday and 8:00 A.M. on Sundays. Buses were scheduled to run until nearly 1:00 A.M. seven days a week.

TABLE 9-2: WEEKDAY HEADWAYS, PEAK (OFF-PEAK)

ROUTE	PRIOR FAIR	DURING FAIR	AFTER FAIR
1	20 (60)	20 (30)	20 (30)
2	30 (60)	30 (30)	30 (60)
3	40 (40)	40 (40)	40 (40)
4	30 (30)	15 (20) [20 (20]*	20 (30)
5	25 (60)	25 (30)	25 (60)
6	30 (60)	30 (30)	30 (60)
7	15 (20)	15 (20)	15 (25)
8	40 (40)	40 (40)	40 (40)
9	60 (60)	60 (60)	60 (60)
10	40 (40)	30 (30)	30 (60)

*NOTE: For the period 8/30/82 - 10/31/82

TABLE 9-3: WEEKEND HEADWAYS, PEAK (OFF-PEAK)

SATURDAYS

ROUTE	BEFORE FAIR (4-24-82)	EARLY FAIR (5-1-82)	MIDDLE FAIR (6-12-82)	LATE FAIR (9-4-82)	AFTER FAIR (11-6-82)
1	60	30 (60)	30 (60)	30 (60)	60
2	60	30 (60)	30 (60)	30 (60)	60
3	60	40 (60)	40 (60)	40 (60)	60
4	30 (60)	15 (30)	15 (30)	20	30 (60)
5	60	30 (60)	30 (60)	25 (60)	60
6	60	30	30 (60)	60	60
7	30	25 (30)	25 (30)	25 (30)	30
8	60	40 (60)	40 (60)	40	60
9	60	60	60	60	60
10*		30 (60)	30 (60)	30 (60)	60

*Sutherland Avenue and Kingston Pike were separated during and after the Fair.

SUNDAYS

ROUTE	BEFORE FAIR (4-25-82)	EARLY FAIR (5-2-82)	MIDDLE FAIR (6-13-82)	LATE FAIR (9-05-82)	AFTER FAIR (11-07-82)
1	60	30 (60)	30 (60)	30 (60)	60
2	60	30 (60)	30 (60)	30 (60)	60
3	60	60	60	60	60
4	60	15 (30)	15 (30)	20	60
5	60	30 (60)	30 (60)	60	60
6	DNO	30 (60)	60	**	DNO
7	30	30	30	30	30
8	DNO	60	60	60	DNO
9	DNO	60	60	60	DNO
10	*	30 (60)	30 (60)	30 (60)	*

DNO - Did not operate.

** - Washington Avenue was served by Holston Drive/Rutledge Pike. Dandridge Avenue was served by McCalla via Bethel.

Saturday service for the Fair resembled weekday service except some of the peak headways differed on Saturday. For example, Route #1 Fountain City had 30 minute headways on Saturday whereas there were 20 minute headways during the week. The #7 College Street and McCalla Avenue routes had 25 minute headways during the peaks instead of the normal weekday peak headways of 15 minutes.

Table 9-4 shows the hours of service of K-TRANS. Sunday service started considerably later in the day than weekday or Saturday service. Most service started around 8:30 A.M. The headways were reduced around the middle of the day to help alleviate overcrowding after Sunday worship services.

There were several changes in Sunday service. Effective September 5, #6 Dandridge Avenue and Washington Avenue Sunday routes were served by two different lines during the day. The day service was identical to weekday service provided by #1 Holston Drive/Rutledge Pike and #7 McCalla/ Bethel routes. Late in the Fair, Sunday headways for routes #4 and #5 were increased to 60 minutes all day.

Express service frequencies and special extra service remained unchanged throughout the duration of the Fair. On occasion, several lines required double or triple sections in the mornings around 9:00 A.M. to 10:00 A.M. and in the evenings around 10:15 P.M.

TABLE 9-4: K-TRANS HOURS OF SERVICE (MAY-OCTOBER 1982)

ROUTE	TIME ON	TIME OFF	PERIOD
		WEEKDAYS AND SATURDAYS	
1,2,4,7	5:35-6:05 A.M.	1:00-1:10 A.M.	5/1/82-10/31/82
3,8	5:30-6:10 A.M.	12:15-1:00 A.M.	5/1/82-8/29/82
	5:30-6:10 A.M.	9:00-9:15 P.M.	8/30/82-10/31/82
5,9,10	5:35-6:10 A.M.	1:00-1:20 A.M.	5/1/82-8/29/82
	5:35-6:10 A.M.	12:00-12:10 A.M.	8/30/82-10/31/82
6	5:40 A.M.	1:00 A.M.	5/1/82-8/29/82
	5:40 A.M.	6:40 P.M.	8/30/82-10/31/82
		SUNDAYS	
1,4,6,7	7:55-8:50 A.M.	12:55-1:00 A.M.	5/1/82-10/31/82
2	8:30 A.M.	1:00 A.M.	5/1/82-8/29/82
	8:30 A.M.	11:15 P.M.	8/30/82-10/31/82
3,8	8:15-8:35 A.M.	12:15-1:00 A.M.	5/1/82-8/29/82
	8:15-8:35 A.M.	9:15-9:25 P.M.	8/30/82-10/31/82
5,9,10	8:30-8:55 A.M.	1:00 A.M.	5/1/82-8/29/82
	8:30-8:55 A.M.	12:00 A.M.	8/30/82-10/31/82

TABLE 9-5: COMPARATIVE K-TRANS FAIRBOX REVENUES* FOR 1981 AND 1982

1981

ROUTE	MAY REVENUE	JUNE REVENUE	JULY REVENUE	AUGUST REVENUE	SEPTEMBER REVENUE	OCTOBER REVENUE	TOTAL
1	19,058	18,051	15,937	16,489	16,531	20,979	107,045
2	11,639	10,980	9,856	9,364	12,205	13,988	68,032
3	15,043	13,296	11,512	14,379	13,952	17,619	85,801
4	16,660	14,498	13,820	14,235	15,191	18,647	93,051
5	13,215	12,238	10,083	10,703	11,259	15,002	72,500
6	8,197	8,191	7,407	7,106	10,494	11,164	52,559
7	23,849	22,134	20,642	19,701	19,528	24,206	130,060
8	5,014	4,302	3,756	3,658	3,891	4,899	25,520
9	3,247	2,654	2,131	2,588	3,733	4,495	18,847
10	--	--	--	--	--	--	--
TOTAL	115,922	106,344	95,144	98,223	106,784	130,999	653,416

1982

ROUTE	MAY REVENUE	MAY INCREASE (DECREASE) OVER 1981	JUNE REVENUE	JUNE INCREASE (DECREASE) OVER 1981	JULY REVENUE	JULY INCREASE (DECREASE) OVER 1981	AUGUST REVENUE	AUGUST INCREASE (DECREASE) OVER 1981	SEPTEMBER REVENUE	SEPTEMBER INCREASE (DECREASE) OVER 1981	OCTOBER REVENUE	OCTOBER INCREASE (DECREASE) OVER 1981	TOTAL ROUTE TOTALS	TOTAL INCREASE (DECREASE) OVER 1981
1	$ 27,119	42.3%	$ 30,443	68.6%	$ 27,926	75.2%	$ 25,443	54.3%	$ 24,485	48.1%	$ 24,667	17.6%	$160,083	49.5%
2	15,645	24.4%	15,613	42.2%	13,621	38.2%	13,531	44.5%	13,803	31.1%	14,263	2.0%	86,476	27.1%
3	18,606	23.7%	15,742	18.4%	15,360	33.4%	13,619	(5.3%)	11,672	(16.3%)	12,256	(30.4%)	87,255	1.7%
4	31,000	86.1%	32,987	127.5%	31,628	128.9%	31,235	119.4%	33,608	121.2%	27,936	103.4%	198,394	113.2%
5	15,237	15.3%	15,135	23.7%	13,153	30.4%	12,234	14.3%	12,479	10.8%	15,239	1.6%	83,477	15.1%
6	10,578	29.0%	10,880	32.8%	8,991	21.4%	8,718	22.7%	6,927	(33.9%)	7,052	(36.8%)	53,146	1.1%
7	22,404	(6.1%)	23,705	7.1%	21,805	5.6%	19,146	(2.8%)	18,724	4.1%	22,166	(8.4%)	127,950	(1.6%)
8	6,740	34.4%	5,432	26.3%	3,850	2.5%	4,393	20.1%	3,038	(21.9%)	3,640	(25.7%)	27,093	6.2%
9	7,886	142.9%	6,420	141.9%	5,197	143.9%	4,860	87.8%	5,559	48.9%	6,614	47.1%	36,536	93.8%
10	7,061	--	8,186	--	6,821	--	6,023	--	6,377	--	6,934	--	41,402	--
TOTAL	162,276	39.9%	161,543	54.7%	148,352	55.9%	139,202	41.7%	136,672	27.9%	150,767	15%	901,761	38%

*Figures do not include ticket sales revenue.

TABLE 9-6: ANNUAL COMPARISON OF FAREBOX AND TICKET REVENUES

	1981		
	FAREBOX	TICKETS	TOTAL
May	$115,922	$ 29,965	$145,887
June	106,344	27,207	133,551
July	95,144	14,907	110,051
August	98,223	24,453	122,676
September	106,784	26,197	132,981
October	130,999	46,353	177,352
Total	653,416	169,082	822,498

	1982		
	FAREBOX	TICKETS	TOTAL
May	$162,276	$ 39,067	$ 201,343
June	165,543	33,034	197,577
July	148,352	28,374	176,726
August	139,202	29,702	168,940
September	136,672	29,702	166,374
October	150,767	40,400	191,167
Total	901,812	200,279	1,102,091

EVALUATION OF PATRONAGE AND SERVICE UTILIZATION

Patronage By Route

During the six month period of the 1982 World's Fair revenue for all routes combined was substantially higher than during the same period in 1981. Farebox revenue was up 38% during this period. Farebox and ticket revenues combined for routes was up 34%. All regular routes except one experienced an overall increase in farebox revenue for the period of May through October 1982 over the same period in 1981. Tables 9-5 and 9-6 list farebox and ticket revenue by month and compare it to 1981.

Routes with the highest increases in farebox revenue during the World's Fair were Routes #1 Holston Drive/Rutledge Pike - Fountain City, #4 Kingston Pike, and #9 Chapman Highway, with increases in revenue of 49.5%, 113.2%, and 93.8% respectively. These increases are probably due to the location of hotels and motels along these routes which accommodated many World's Fair visitors.

Only one route, #7 College Street/McCalla Avenue, experienced an overall decrease in farebox revenue over the six month period of the Fair from the same period the preceding year. Lack of a substantial increase may partially reflect demographics along this route. Both the College Street and McCalla Avenue segments of the route serve low income residential areas which did not attract out-of-town visitors. Rerouting both before and during the Fair may also have had an effect on patronage.

The largest percentage increases occurred in the summer months of June, July, and August. This increase over the preceding year can be partly attributed to the number of Fair-related jobs available to high school age children who normally would not be riding the bus on a daily basis during the summer months. Also, families with children attended the Fair while school was not in session. A portion of the total increase in revenue is the result of separating Route #10 Sutherland Avenue from #4 Kingston Pike in April 1982.

Utilization of Service

During the months of May through October, K-TRANS was able to attract new passengers who worked in the downtown area. A dramatic increase in passengers was noted in the mornings and during late afternoon rush hours. For example, the increase on the 5:00 Fountain City bus was so great that an additional section was added to the route. Also, several trips on Route #4 Kingston

Pike received double sections to take care of the extra workers. Much of the increase was attributed to the sudden rise in the price of parking.

The high downtown parking prices also encouraged Fair visitors to use the regular K-TRANS service. The A.M. peak would normally end around 9:00 A.M. Since the Fair gates eventually opened at 9:00 A.M. and the exhibits at 10:00 A.M., the influx of Fair visitors made the A.M. rush continue until 11:00 A.M. In order to handle the extended peak, K-TRANS increased the number of mid-day buses by 31% from before the Fair through August.

The late evening use of service during the Fair had several different patterns. On different occasions, the World's Fair changed the timing of the evening fireworks. The fireworks were a signal that the Fair was about to close. As soon as the fireworks ended, the #4 Kingston Pike, #1 Fountain City, Holston Drive, and Rutledge Pike buses would fill up to the point that double and triple sections were needed. During the months of July and August, the Fair experienced a slump in attendance. The regular route buses were carrying passengers close to capacity, but did not require double sections on a regular basis during these months.

In late July, K-TRANS conducted a passenger count on all routes after the 6:15 P.M. Gay Street departure. Several routes-#3 Davenport, Vestal, Lonsdale, West Haven, and #8 UT Hospital-were determined to be the least patronized. Route #6 Dandridge Avenue/ Washington Avenue also had low levels of patronage. Due to the lack of passengers, all UT Hospital, Davenport Road, Vestal, West Haven, and Lonsdale buses curtailed downtown departures after 8:15 P.M., as of August 30. Dandridge Avenue and Washington Avenue after 6:15 P.M. departures were discontinued, but were served by #7 McCalla/Bethel (Dandridge) and #1 Holston Drive/Rutledge Pike (Washington). Route #5 Sequoyah Hills/Lyons View Pike, #5 Fairmont Boulevard/North Hills, #10 Sutherland Avenue and #9 Chapman Highway stopped operating after their 11:15 P.M. trip was complete.

POST-FAIR IMPACTS

Retention of Route Revision

During the World's Fair, it became apparent that traffic volumes on Summit Hill/Western Avenue had been overestimated. Therefore, Route #3 Westhaven and Route #7 College Street were returned to their original routings. This was the only Fair related route revision to revert to the original routing during or following the Fair. The Kingston Pike/Sutherland Avenue route separation has been maintained, along with the extension of the #4 Kingston Pike route to Downtown West shopping center. The #10 Sutherland Avenue line continues to follow its revised routing on Cumberland Avenue. These revised routings avoid substandard streets and provide increased service along Cumberland Avenue. The #8 UT and Fort Sanders Hospitals line retains its revised routing for similar reasons, in addition to the fact that the City has decided to close the Clinch Avenue viaduct permanently to allow development of the former Fair site.

Service Retentions

K-TRANS was able to provide improved service compared to pre-Fair levels on certain routes. Some evening service was retained, with the last trips leaving downtown on routes #1, 2, 3, 4, 5, 7 and 10 at 8:15. Prior to the Fair the last trip was at 7:15 P.M.

On Route #2, Lincoln Park, the Montrose and Inskip legs of the route were no longer linked as of May 1982. These legs were run separately throughout the Fair and continued to be run this way after the Fair.

Service Reductions

One service reduction was made for the Fair on Sutherland Avenue and retained for post-Fair service. This was the change in the off-peak headway from 30 minutes to 60 minutes.

Headways for routes #1, #4, and #7 were also changed from pre-Fair levels and retained for post-Fair service. The headways on Route #1 Holston Drive/Rutledge Pike/Fountain City were changed from 6 minutes in the off-peak to 30 minutes. The 30 minute headways were retained for post-fair Service. Route #7 College Street/ McCalla Avenue went from 20 minute off-peak headways before the Fair to 25 minutes after the close of the Fair.

Employee Reductions and Retained Employees

A total of 104 new employees were hired specifically for duties during the 1982 World's Fair. Of these, 74 were bus operators, 9 were maintenance personnel, 7 were telephone information operators, 12 were transportation agents at shuttle bus lots, one was a clerical employee, and one was Director of Fair Services. These employees were hired and trained during March and April of 1982 in order to begin operations with a full staff when the Fair opened May 1st. The original number of World's Fair employees was reduced when a few bus operators and transportation agents left the company before the end of the Fair.

As of November 2, 1982, the K-TRANS work force had been reduced by 90 World's Fair employees, representing an 86% increase. Ten of the bus operators and seven of the maintenance personnel were rehired as permanent employees to fill positions created through attrition or positions which had been vacant prior to opening of the Fair.

Table 9-7 illustrates the breakdown of employees in the categories that were affected by the World's Fair and the changes that occurred over the time period.

TABLE 9-7: K-TRANS EMPLOYMENT

CATEGORY	JANUARY 1982	MAY 1982	JULY 1982	AUGUST 1982	NOVEMBER 1, 1982	NOVEMBER 30, 1982	JANUARY 1983
Bus Operators	93	163	159	149	148	99	98
Telephone Information	2	11	10	9	10	4	3
Clerical	3	4	4	4	4	3	3
Maintenance	23	32	32	31	31	30	30
Transportation Agents	0	13	12	4	2	0	0
TOTAL	121	223	217	197	195	136	134

Retained Patronage

K-TRANS continued to realize increases in both regular route farebox revenue and ticket revenue after the close of the 1982 World's Fair. As shown in Table 9-8, regular route farebox revenue was up 88% during the first three months of the Fair over the three months immediately preceding the opening of the Fair. The same revenue figure during the last three months of the Fair remained up 69% over the three month period preceding the Fair's opening. Part of this increase was sustained, as regular route farebox revenue was up 9.9% for the three months following the Fair compared to the same period in the previous year.

Ticket sales rose at a substantial rate throughout the Fair and continued to rise to an even higher sales level after the close of the Fair. Route ticket sales rose 6% from May to October, 1982, and rose another 6% over the next three month period. This boost in ticket sales resulted in a 26.7% increase in the three month period following the Fair from the same period in 1981.

Knoxville citizens apparently responded favorably to K-TRANS advertising run in the early months of 1982 featuring the low cost and convenience of riding K-TRANS and using multi-ride tickets. There was also a general feeling throughout Knoxville that traffic congestions and parking prices would make driving in the downtown area both time-consuming and expensive. These factors, along with patronage from World's Fair visitors, gave K-TRANS a 15.4% increase in revenues for regular routes and expresses combined from November 1981 to November 1982.

One factor which detracted from the total retained patronage was the drop in express patronage which occurred during the World's Fair and continued in the months following. K-TRANS experienced a 36.4% decrease in express revenue from January of 1982 to January of 1983 with no substantial increases occurring during the months in which the Fair was being held (see Table 9-8). Thus, when isolating express revenue from regular route farebox and ticket revenue, the regular route revenue increased 28.1% from November 1981 to November 1982. This decrease can be attributed to three main factors. First is the redeployment of 400 TVA employees from the downtown office. Second, K-TRANS express fares increased from $.90 to $1.30 in October of 1981. Finally, relatively inexpensive and free parking is available in the downtown area. Thus, when isolating express revenue from regular route farebox and ticket revenue, the regular route revenue increased 28.1% from November 1981 to November 1982. Table 9-8 lists revenue figures for November 1981 through January 1983.

TABLE 9-8: COMPARISON OF ROUTE REVENUE FIGURES BEFORE, DURING, AND AFTER THE FAIR

	ROUTE TICKETS	ROUTE FAREBOX	EXPRESS	TRANSFER	RIDE & SHOP	TOTAL
November 1981	$ 25,969.50	$74,150.30	$22,508.70	$2,635.80	$ 231.87	
December 1981	25,931.00	73,476.23	18,542.60	2,731.35	314.94	
January 1982	31,589.50	69,382.68	19,106.10	2,922.20	210.96	
Subtotal	83,490.00	217,009.21				$369,703.73
February 1982	30,707.90	76,334.18	17,693.00	2,808.40	262.36	
March 1982	31,944.50	87,675.49	18,778.50	3,294.25	300.81	
April 1982	31,415.40	88.144.55	20,996.60	2,869.76	254.72	
Subtotal	94,067.80	252,154,22				413,480.42
May 1982	39,067.40	162,275.55	19,432.70	2,847.85	156.93	
June 1982	33,033.80	164,541.60	18,961.10	2,465.37	181.55	
July 1982	28,374.00	148,351.50	18,983.90	2,378.75	203.91	
Subtotal	100,475.20	475,168.65				641,255.91
August 1982	29,702.00	139,202.47	17,198.70	2,358.21	223.58	
September 1982	29,701.50	136,672.40	16,247.90	2,058.03	239.29	
October 1982	40,400.00	150,766.45	15,185.45	1,968.99	268.25	
Subtotal	99,803.50	426,641.32				582,193.22
November 1982	45,667.50	84,064.70	12,948.00	1,943.10	209.40	
December 1982	35,809.50	77,707.75	13,677.30	1,894.87	275.88	
January 1983	24,271.60	76,777.20	12,153.70	2,028.81	205.74	
Subtotal	105,748.60	238,549.65				389,635.05

NOTE: Route ticket revenue increased 75.9% in November 1982 over November 1981. The total revenue increase from November 1981 to November 1982 is 15.4%. The route revenue increase (excluding express decrease) from November 1981 to November 1982 is 28.1%.

K-TRANS SHUTTLE BUS SERVICE

Shuttle buses were operated for both the KIEE organization and for several private operators. Most of the shuttle service operated by K-TRANS was for park & ride lots, although two campgrounds were served as well. Also, several parking lots and campgrounds were located on or near K-TRANS regular routes.

Both KIEE and independent operators contracted with K-TRANS for significant levels of service, particularly during the morning hours just before the Fair opened. K-TRANS developed operating schedules which reflected this demand. K-TRANS also employed additional bus operators. Both operators and vehicles were utilized in such a way that they could be assigned to both conventional K-TRANS service and World's Fair shuttles.

Several problems were encountered. The oversupply of parking facilities in turn resulted in an oversupply of shuttle buses. Equally important was the fact that traffic congestion was less of a factor than expected. Also a complete round trip of shuttle buses took considerably less time than projected. At the Civic Coliseum, for example, a complete round trip including loading and unloading of passengers took only about 20 minutes rather than the 42 minutes as was scheduled.

K-TRANS did not have to lay off any bus operators due to the loss of some shuttle contracts. In May, overtime hours represented 13% of all hours worked based on total hours of service on both shuttles and on the regular route system. By June this had been reduced to 7% (see Figure 9-E). K-TRANS was able to adjust vacation schedules of regular employees and permit more days of vacations to be taken during the summer. Ordinarily, vacations must be spread more evenly throughout the year. In addition, available employees to fill runs meant that K-TRANS could accommodate more requests for time off from its regular drivers.

Financially, the loss of shuttle contracts meant that K-TRANS was losing revenue. K-TRANS generally took shuttle contracts only on a revenue guarantee basis figured on hours of service for each bus. K-TRANS was therefore being paid whether buses being used by the parking lot operator were full or not. Contracts were re-negotiated wherever possible in order to sustain service using a smaller number of vehicles. By the end of the Fair, nearly all of the contracts were re-negotiated or terminated because the demand for parking was less than necessary to sustain the service.

Prior to the World's Fair, K-TRANS had negotiated contracts with Regency Square and KIEE for service to and from shuttle lots. K-TRANS anticipated $737,000.00 in revenue from the Regency Square operation, and $445,936.00 from the KIEE shuttles. K-TRANS actually received $80,262.92 from Regency Square and $296,665.13 from various KIEE shuttle lot operations. On these two accounts alone, K-TRANS experienced a revenue shortfall of $806,007.95 between what was expected and what was received.

MAINTENANCE

During the World's Fair, the K-TRANS maintenance facility operated 24 hours each day in an attempt to keep all buses in the fleet in condition to meet increased service demands. K-TRANS hired and trained nine additional employees for the maintenance staff in March and April of 1982. Seven of these employees were rehired for permanent positions with K-TRANS maintenance facility after the Fair closed.

Following the closing of the Fair, the maintenance facility continues to operate 24 hours each day, except from 12:00 A.M. Friday to 5:00 A.M. Saturday and from 8:30 P.M. Saturday to 8:00 A.M. Sunday. K-TRANS employs 30 maintenance personnel, compared with 23 employees in the period before the World's Fair. The increase in personnel is primarily due to the additional demands of new equipment. Prior to the Fair, the K-TRANS operation was averaging 24.74 maintenance hours per thousand miles of service. During the Fair, 20.12 maintenance hours per thousand miles of service was the average. Following the Fair, the maintenance facility has averaged 25.14 maintenance hours per thousand miles of service as a result of an increase in maintenance personnel and a decrease in miles traveled by buses in the system. While this average is 24.95% higher than the period during the World's Fair, it is only up 1% over the period prior to the opening of the Fair.

Because of the influx of new equipment and underutilization of the fleet due to reductions in shuttle service, the maximum fleet utilization at the P.M. rush hour was 82 vehicles, or 67% of the total fleet during the Fair, Since the Fair closed, the maximum fleet utilization at the P.M. rush hour is 63 vehicles, or 51% of the total fleet. During the Fair, the average number of bus units out of service and awaiting repairs numbered nine per day, which included one bus per week scheduled in the repainting program. Since the Fair, the average number of bus units out of service and awaiting repairs numbers six per day and the repainting program has been completed.

CAPITAL IMPROVEMENTS PROGRAMS

Four different capital improvements projects were initiated preceding the Fair. Some of the items would have been acquired regardless of the Fair. Other items were projected for purchase, but the timetable for acquisition was advanced because of the Fair. Additionally, a few items were acquired specifically for use during the 1982 World's Fair. A description of these capital projects and completion dates are included in Table 9-9.

Vehicles

K-TRANS had an extremely old fleet of buses prior to opening of the 1982 World's Fair. Before delivery of 40 new Grumman Flxible 870 class buses, the average age of a K-TRANS bus was nearly eighteen years. The newest buses were nearly ten years old and the oldest bus had over thirty years of service. Fleet condition was generally acceptable, although maintenance costs were rising sharply. Even the newer buses were beginning to deteriorate because scheduled maintenance had fallen while the shop attended to repairs needed to keep older buses on the streets.

A comprehensive capital improvements program had been recommended as early as 1976, but had not been undertaken due to the lack of local funding. Finally, in 1978 the City of Knoxville authorized application to the U.S. Urban Mass Transportation Administration for ten new buses. K-TRANS and the Knoxville Transportation Authority subsequently recommended that additional buses be acquired and the bus replacement program be accelerated. A second application was filed in late 1979 to purchase thirty more buses, partially on the basis that new vehicles would be needed for the World's Fair. UMTA, the City, and K-TRANS agreed that the two capital projects should be handled together to get the best price on the buses. Thus, the fleet was expanded by 40 buses to provide additional service required by the Fair. After the Fair 40 older buses were placed in the reserve fleet.

Purchase of the forty new buses, which represented half of the existing fleet, would have occurred regardless of whether there had been a World's Fair. The primary impact of the Fair was to speed up the schedule of providing the local contribution necessary to secure federal funding. A more favorable price for new buses was probably obtained by purchasing forty buses in one order rather than the original plan which provided for purchase of ten vehicles per year.

Maintenance

A variety of equipment and supplies were purchased through three grant projects for use in the K-TRANS maintenance facility. Most items were purchased in conjunction with the two earlier grants (1978 and 1979) which provided funding to acquire buses. Acquisition of these items would have occurred regardless of the World's Fair, although purchase was hastened due to the heavier demand on the maintenance facility.

Funding through a third grant project filed in 1981 provided funding to install a fuel tank, a tow truck, additional small pickup trucks and related servicing equipment, and two new cars for use by road supervisors.

TABLE 9-9: REVIEW OF CAPITAL PROJECTS AND IMPLEMENTATION

GRANT PROJECT	DESCRIPTION	COMPLETION
TN 05-0005:	Filed August 1978	
	Ten New Buses	March/April 1982
	New Equipment for a Two-Way Radio System	January/March 1982
	Shop Equipment	January 1982-on
	Bus Washer	January 1982
	Special Vehicles for Handicapped Persons (The LIFT)	December 1980
	System Wide Bus Stop Signs	Summer 1983
TN 03-0017:	Filed November 1979	
	Thirty New Buses	March/April 1982
	Shop Equipment	March/April 1982
	Spare Bus Components	April 1982-on
TN 03-0024:	Filed February 1981 (information project)	
	Bus Stop Signs (downtown replacement)	Spring 1983
	Work Processing Equipment	February 1983
	Temporary Bus Stop Signs	July 1982
TN 03-0021:	Files August 1981 (World's Fair Capital Improvements Projects)	
	Pedestrian Walkway	April 1982
	Passenger Shelters	March 1983
	Supervisory Vehicles & Shop Truck	May 1982
	Related Shop Equipment	May/August 1982

Signing Program

K-TRANS bus stop signing consisted almost exclusively of signs which had been installed well in advance of the opening of the World's Fair. Only a few signs were installed specifically for use during the Fair. Three grant projects contained funding for improvements or replacement of signs, but installation was not possible until after the Fair had closed.

One grant project was not approved until after the Fair had begun. Funding was not available for the other two projects until the cost of other project elements had been confirmed. K-TRANS updated existing signs and added portable signs which were sufficient to meet information needs by passengers at points where signs were to be installed.

Pedestrian Overpass

A special World's Fair transportation grant project was developed by the City of Knoxville. The largest item in the project was the construction of a pedestrian overpass over Henley Street (U.S. 441) a major downtown thoroughfare. The intent of the pedestrian overpass was to link an "East-West Mall" redevelopment project to the Fair and on-site Exhibition Center.

Passenger Shelters & Amenities

Ten passenger shelters were included with the pedestrian overpass to provide new passenger services during the 1982 World's Fair. However, these were not installed until 1983 because the staff was occupied on other projects of higher priority.

Other Capital Items

The K-TRANS two way radio communications system was replaced in early 1982 with a new and more technologically advanced system. Replacement of an older system was projected several years before and new equipment was included in the 1978 capital improvements project.

Conclusions

Capital projects intended to assist the transit system specifically in serving the World's Fair were generally developed too late to make any significant contribution toward improving conventional transit services. Although several project elements of the "World's Fair Grant" were beneficial to K-TRANS, many of the elements were not completed until after the Fair had closed. Capital projects filed well in advance of the Fair were the most

successful. The primary impact of the 1982 World's Fair was to quicken the pace in completing projects which had already been programmed. Careful advance planning and programming of capital needs is strongly recommended for any event of the magnitude of the 1982 World's Fair.

MARKETING

K-TRANS marketed transportation services during the 1982 World's Fair as an extension of an existing marketing program. This includes advertising K-TRANS service, providing schedule information by telephone, on signs, and through printed schedules and maps.

Background and Original Concept

There was a proposal developed by K-TRANS for a comprehensive intra-city transportation marketing and information program for all operators, whether related to K-TRANS services or not. This was never accomplished because the grant for a transportation information project was approved too late to implement any but a few elements of the original project.

Three factors prevented implementation of the consolidated transportation information project as it was originally envisioned. First, federal "front" money needed to initiate the project was not available. The original plan envisioned a start-up date of October 1, 1981 in order to develop the service. The City of Knoxville did not actually receive a grant contract until September, 1982, about five weeks before the close of the Fair. The second reason is that the Fair's management sought a much more active role in transportation than was expected in early 1981. Third, the City of Knoxville did not get involved in coordinating intra-city transportation. In order for a consolidated transportation information service to function on a "revenue financed" basis, it is necessary for there to be some means to compel operators to participate. In the absence of outside support, K-TRANS withdrew from its efforts to provide a consolidated transportation information service. Although the concept of a consolidated information service periodically resurfaced, no efforts were made to implement the concept.

The marketing and information program implemented by K-TRANS consisted of an enlargement of existing services. These included the telephone information service, the printed bus schedules, and the bus stop signs.

Telephone Information

Enlargement of the telephone information service was the largest and perhaps most important aspect of the program. Prior to the World's Fair, staff time required to answer both information lines and business lines represented about 2½ positions. Phones were answered from early in the morning until the close of business hours on weekdays, with the dispatcher handling calls on evenings and Sundays. With the beginning of the World's Fair, it required ten positions with staff exclusively committed to telephone information at all hours. As shown on Table 8-2 and Figure 8-2 on pages 136 and 137 of the Phase I Report, the number of calls increased greatly during the Fair.

Calls began to increase in March (prior to May 1 opening) as parking lot operators in the downtown area began raising prices. The complexity of calls also became a factor in the assignment of personnel. Knoxville residents who had not used K-TRANS service before generally required more information than did other callers. Out-of-town visitors also required considerably more assistance.

Advertising

K-TRANS marketing activities included radio advertising program. The first phase occurred in April prior to the Fair's opening. During this period, parking lot operators in the downtown area raised prices and this fact was emphasized in K-TRANS advertising. Considerable press attention was also given to anticipated parking shortages and traffic jams. K-TRANS directed its advertising to these concerns and presented its services as a solution to the problems. A second series of radio advertisements ran July through October and emphasized the telephone information service as a source for answers to specific transportation questions.

Newspaper advertising was also run prior to opening of the Fair. A multi page section was published in a special insert of the Knoxville News Sentinel Sunday edition which appeared immediately prior to opening of the Fair. This section showed all weekday schedules operated by K-TRANS. Although many schedule changes occurred just after the Fair opened, it clearly demonstrated the extent of K-TRANS service which was being offered and helped people who were unfamiliar with the K-TRANS system understand where service was being offered. Other advertising was run in the University of Tennessee Daily Beacon. Low cost parking in the UT area was virtually eliminated during the Fair and the ads encouraged students to ride the bus. Newspaper advertising was also run in several neighborhood newspapers. However, this was primarily intended to support the radio ad campaign.

Signs

The K-TRANS bus stop signing program was essentially in place prior to opening of the Fair. Signs at major points in downtown Knoxville already illustrated routes with a route map and schedule times. Temporary signs were placed where special signs were necessary. Portable signs were used to meet additional signing needs. The system which proved to be the most effective was a Transi-Tube type sign which was mounted on a steel fence post with a bus brake drum base.

Several signs were placed in locations where it was either impractical or undesirable to place a permanent sign. The relatively high cost of the Transi-Tubes and the shop time required to fabricate the heavy base was more than offset by the flexibility of the design. Transi-Tubes have a large working area for information and contained full route and schedule information along with a system map where practical. The heavy base made the signs difficult to steal and none were lost. K-TRANS continues to use the temporary signs which were made during the Fair.

Bus Schedules

Bus schedules were a weakness in the information program. Funding to support the expanded route system was not finalized until relatively late. Consequently, the K-TRANS Transportation Department was unable to develop quality public schedules. Minor revisions in schedule times also occurred relatively frequently during the first few weeks of the expanded service until the Transportation Department was able to work out problems. Schedules, although functional, were consequently not as attractive and informative as had been hoped.

Publication of inadequate public schedules proved to be less of a problem than an annoyance. The telephone information service was able to overcome whatever shortcomings existed with the public schedules. Publication of bus schedules is a major undertaking, particularly since schedules are likely to change frequently during the first few weeks, making it difficult to know what is worth printing on a "permanent" schedule. Adequate time is essential to develop workable running and public schedules.

Maps

Maps are generally seen as an expensive but extremely desirable means of advertising. K-TRANS therefore negotiated an agreement with a private company for a joint map production venture. The joint participation project with the Sunsphere, theme structure for the 1982 World's Fair, included K-TRANS, Hardee's restaurants whose specialty food division operates the restaurants in the Sunsphere, the Sun Oil Company which operated an exhibit

and ride at the Sunsphere, and the Sunsphere's owner and developer. The "K-TRANS/Sunsphere Street Guide to Knoxville" was the result. The Sunsphere purchased 2,500 maps with the understanding that K-TRANS would distribute about two thirds of them to Knoxville residents. The Sunsphere distributed the remaining supply.

K-TRANS agreed to make the maps available on buses (which constituted distributing Sunsphere advertising to passengers) and to include a mention of the Street Guides in radio advertising which K-TRANS was running at the time.

K-TRANS produced a second run of the route maps in October, 1982 following signing of a contract between UMTA and the City of Knoxville. This was also a joint participation project between K-TRANS and private businesses. K-TRANS acquired the maps using funding in the grant. A local radio station, WIMZ AM & FM, was selected on the basis of written proposals to promote the map. WIMZ also secured the support of a local convenience food and gasoline store chain, the Smoky Mountain Markets, to distribute the maps and to purchase advertising for additional advertising value. K-TRANS consequently received advertising value from either WIMZ or Smoky Mountain Markets roughly equal to the value of maps which K-TRANS had planned to produce anyway.

Evaluation of Marketing Activities

K-TRANS marketing and information efforts were generally effective. Among the most successful aspects of the information program were the joint participation projects with private businesses.

Where marketing activities were less effective than desired, it was often a result of insufficient lead time. The primary result of insufficient planning time for the information program was a much greater dependence upon the telephone information service than desired. This service was valuable in that it provided person to person contact in response to questions from people who are unfamiliar with transit service. Even if printed materials had been available far in advance of the Fair's opening day, the telephone information service would likely have been the backbone of the marketing and information program.

However, the telephone information service is extremely expensive and possibly the least cost-effective system of disseminating information where other options are available. Additional lead time to develop other aspects of the information program might have reduced the number of calls which needed to be handled by the phone service.

FUNDING FOR EXPANDED K-TRANS SERVICES

Costs of operating the K-TRANS system increased due to increased services associated with the 1982 World's Fair. The largest and most significant increase in costs occurred during the three months preceding the World's Fair when K-TRANS was incurring costs associated with preparation for the Fair, but before revenues offset the expenditures.

Total operating expenses for K-TRANS were under $4.16 million in fiscal year 1981 (July 1980 - June 1981). For fiscal year 1982 (July 1981 -June 1982), costs had increased to $4.85 million, an increase of 16.6%. FY 1982 contained expenses associated with preparation for the Fair along with two months of operation of the expanded regular route system.

Total operating revenues increased from $1.89 million in FY 1981 to $2.42 million in FY 1982. This represents an increase of 28%. Revenues also reflect the increased regular route service as well as receipts from operation of contract parking lot shuttle service.

Expenses for the period of time beginning July 1, 1982 and continuing through June 30, 1983 are not final as of this time. K-TRANS projects expenditures to increase to just under $5.5 million. Operating revenues are projected to decline slightly to $2.33 million. This primarily represents the end of profitable shuttle contracts in July and August of 1982. The K-TRANS operating deficit increased substantially because shuttle service was providing some cross subsidy to the regular route system.

The operating loss increased from $2.27 million in FY 1981 (July 1, 1981 -June 30, 1982) to $2.43 million in FY 1982. Projections by K-TRANS are that the operating deficit will further increase in FY 1983 to about $3.43 million. Figures do not include non-operating income however, this contribution is minimal.

The City of Knoxville's contribution from the General Fund toward operating purposes remained stable at $910,000, as it has since FY 1979. Other contributions toward the operating loss include receipts to the City of Knoxville from the collection of a state fuel tax in the amount of $150,000. The State of Tennessee has also contributed between $65,000 and $74,000 each year. K-TRANS constructed its local contribution to maximize UMTA assistance.

K-TRANS anticipated that service expansions would be necessary for the Fair and that secure and committed funding would be essential. UMTA's Atlanta regional office staff discovered a substantial surplus in allocations to the State of Tennessee for support to

transit systems in cities of under 200,000 population. This surplus occurred because allocations had been made to two Tennessee cities which did not have transit systems. UMTA and TDOT then reviewed the possibilities of "re-allocating" apportionments to Knoxville.

Knoxville had been classified as a city of under 200,000 in the 1970 census. By 1980, growth here as in other "sunbelt" states had brought the Knoxville urbanized area to well above this level. The Urban Mass Transportation Act permitted a "re-allocation" from cities of under 200,000 to cities which had just gone over that mark in the 1980 census. The Governor of Tennessee acted to make the "re-allocation" and $1.5 million was transferred into Knoxville's "account".

The 1.5 million dollars extra allocation enabled K-TRANS to initiate a number of improvements which would have been otherwise impossible. Additionally, it provided K-TRANS management with the flexibility needed to develop a broad variety of services.

Probably the most important long term aspect of the additional funding was that of giving K-TRANS the opportunity to develop a larger patronage base which will be needed to sustain transit operations and revenues in future years.

LABOR

Incidental to opening of the World's Fair was the expiration of the labor agreement between K-TRANS and its employees who are represented by Local 1164 of the Amalgamated Transit Union. An older 30 month agreement expired on December 31, 1981 and both K-TRANS and Union representatives began negotiations for another two-year agreement well in advance of the expiration date.

The subsequent agreement represented a continuation of past practices on wages and benefits. Benefit improvements in the area of major medical and dental insurance coverage, and in the pension plan, met with mutual agreement. More unusual issues related to job security and the World's Fair.

Job security was less of a formal issue than an indirect one. Discussions of service reductions during the summer and autumn of 1981 were clearly an influence in the Union's negotiations. The Union expressed two general points. First, they sought preference on any new work for existing employees as well as preference when overtime work was available. Second, the Union was interested in assurances that existing employees would not be replaced at the conclusion of the Fair with newly hired employees.

K-TRANS management favored giving existing employees the first opportunity for new work and overtime in accord with existing seniority practices. Thus, negotiations focused more on technical aspects of the contract than on resolving major, substantive disagreements. Permanent job security was more difficult to address since K-TRANS (the Knoxville Transit Division of American Transit Corporation) contracts with the City to operate the municipal bus service.

Contract negotiations were notable in their lack of controversy and attention to technical details. Due to bi-lateral schedule conflicts, negotiations could not be concluded prior to December 31, 1981. Both parties agreed to an extension of the existing contract until a new one could be concluded. A severe winter storm further hampered negotiations. Nonetheless, they were successfully concluded on January 20, 1982. The solution to the employment of staff for the duration of the Fair was accomplished through a "side letter" agreement. The key issues resolved through this "side letter" were:

(1) Employees would be considered as "temporary" and not "Part-time" for the period immediately preceding the Fair and during the Fair.

(2) The integrity of the bargaining unit would be maintained during the Fair.

(3) Existing seniority practices would be recognized in the assignment of overtime, work schedules, etc.

(4) An unlimited number of temporary employees could be hired in all job classifications.

(5) A pay rate equal to 65% of top wages in a classification would be paid to "temporary" employees.

OTHER K-TRANS SERVICES

Charters

K-TRANS has always been available to provide charter service for groups and events in and around Knoxville. Groups chartered K-TRANS buses to provide transportation to the Fair site from motels. Conventions used K-TRANS charters to get to the Fair site and around town. K-TRANS' revenue from charters rose dramatically in the months during the World's Fair.

During May through October of 1981, revenues to K-TRANS from charters totaled $20,600 for the six-month period, or approximately $3,400 per month. In the six months immediately preceding the World's Fair, the revenue that accrued to K-TRANS from charters

totaled $37,600, or an average of about $6,300 per month. During the six month duration of the Fair, charters totaled $65,500, or an average of about $10,900 per month. Revenues to K-TRANS from charters increased 74% during the Fair over the preceding period. Revenues to K-TRANS from charters increased 74% during the Fair over the preceding six month period and 218% during the Fair over the corresponding six month period in 1981.

Shuttles for Special Events

Some special events which involved K-TRANS were the "Star Spangled Spectacular", a giant fireworks show in Neyland Stadium and a National Football League Exhibition Game, also played in Neyland Stadium. The regular University of Tennessee football season also started while the Fair was in progress.

The "Star Spangled Spectacular", the professional football game, and the first two games of the UT football season were all held at night. Major conflicts occurred when exhibits at the Fair closed at approximately the same time as these events ended at the stadium, usually about 10:00 P.M. Major traffic problems occurred on Cumberland Avenue, which was used by cars coming from the downtown parking areas, campus parking, Fort Sanders area parking, K-TRANS shuttle and charter buses, and private charter buses. Traffic increased by approximately 33 percent during the Fair on this route.

Traffic problems created by daytime special events such as UT football games in October were not as extensive as those during the evening. One reason was that large amounts of Fair traffic did not occur during the day. Fair activities were still in progress while traffic from football games was filling the streets during the early evening hours. Thus, the traffic load on both city streets and major highways was staggered.

Other major traffic problems occurred near the parking areas in which K-TRANS operated shuttle parking service for special events.

Outside Maintenance

K-TRANS has a policy of performing maintenance functions, for a fee, for equipment that is owned and operated by other passenger carriers. Bus parts are also sold in emergency situations. Most of the tour buses and independent carriers serving the 1982 World's Fair were without maintenance facilities in Knoxville and the K-TRANS maintenance facility was called upon to provide services ranging from bus washing to engine repair and supply of emergency parts.

In the six months immediately preceding the World's Fair, the total revenue that accrued to K-TRANS from performance of outside maintenance totaled $1,250.85, or an average of about $210 per month. During the six-month duration of the Fair, outside maintenance revenue totaled about $2,900, or about $500 per month. Revenues to K-TRANS from outside maintenance sales increased 35% during the Fair over the preceding six-month period. Access to maintenance facilities in the Knoxville area was important to outside carriers during the World's Fair.

The LIFT

The LIFT staff was not equipped to handle tourist transportation in addition to their regular passengers. In the spring of 1982, The LIFT had 4 vehicles, operated 12 hours per day, 5 days per week, and carried an average of 72 passengers per day. This figure was up from 62 passengers per day in the previous six-month period. Therefore, the decision was made to prioritize trip destinations by servicing trips to medical facilities first followed by trips to educational institutions, employment, and social service agencies, and then shopping and recreational trips. Of the 10,572 trips made between January, 1981, and November, 1982, only 44 trips were to other than medical, educational or employment destinations. This policy essentially excluded trips to the World's Fair from The LIFT program's service area.

It is recommended that paratransit needs be considered when planning for an event on the scale of the 1982 World's Fair. Local transit providers should be consulted regarding their paratransit capacity and their ability to service requests from special travel groups. It is suggested that a coach equipped with a lift and wheelchair lockdowns, perhaps providing space for two ambulatory passengers, would serve the needs of special tour groups attending such events.

Chapter Ten:

SELECTED BUSINESS EXPERIENCES

A variety of transportation operations were initiated to serve visitors to the Fair. A series of interviews were conducted to help determine why they decided to provide service, what they expected, and what actually occurred. Services covered range from those which were never started, those which were terminated early, and these which operated the duration of the Fair. Some of the operators interviewed were more successful than others. Conclusions are drawn from these investigations and suggestions offered for future special events.

PARKING LOT OPERATIONS

The primary motivation for most of these who entered the parking lot business during the Fair was to make a profit. However, other reasons prompted some operators, such as a Fair area businessman who feared traffic congestion would adversely affect his business. He transformed part of his property to parking in an effort to make up for the anticipated revenue losses.

Preparations

The acquisition, grading, and graveling of land for temporary parking lots was the largest part of preparations according to operators interviewed. Other items included providing lighting on the lots and insurance. Specifications for these preparations were listed in the City design standards for temporary parking lots.

Because of the minimum lot size requirement in the temporary parking lot ordinance, parcels too small to be developed individually were, in several cases, acquired and developed as a larger unit. Most operators attempted to develop as much land for parking as possible to increase their potential revenue. Negiotiations were sometimes difficult because landowners felt their land was valuable due to the presence of the World's Fair. The key one operator claimed was to acquire one large tract of land and tack on smaller parcels.

Several types of deals were arranged to acquire the land. While most parcels were rented, some landowners received a cut based on the total number of cars parked. The amount of rent for the land differed, but one operator paid $1000 per month for about one-tenth of an acre of vacant land. Another operator paid $50,000 during the Fair to rent a five acre parcel. Costs varied dramatically depending on proximity to the Fair and the relationship of the property to other land in assembling an adequately large tract.

Thus, there were various approaches by individual operators to preparing their temporary parking lots. Costs of preparations tended to be variable depending on the location of the land and how much clearing it needed. One operator even had to fence off an existing park on the land he acquired and restore it after the Fair.

Land preparation costs varied significantly depending on site-specific conditions. As examples, one five acre lot reportedly cost $50,000 for grading and graveling. Another lot had $30,000 in grading and graveling costs for one acre, plus $2,000 to rent lights, install fencing and acquire permits and insurance. Overall, grading and graveling were the major expenditures in preparations next to acquisition of land.

Insurance was felt to be very costly by several operators interviewed. It cost one operator $3,000 per lot during the Fair for insurance. Alternative approaches were suggested such as some type of group policy for all "official" lots. This would have been difficult to acquire, however, since all were operated as separate businesses.

Operations

While most of the parking lot operators interviewed managed their own lots, one hired a management firm. He did not have prior experience in the parking lot business and felt he would be getting in over his head. The management firm provided paving at entrances and exits, lot attendants, lot attendant booths, signs, insurance, and counters. The management firm collected the money and the parking lot operator was paid on a sliding scale. The owner received 50% of the monthly revenues. If the total net revenue at the end of the Fair exceeded a certain level, the owner received an additional 17%, or 75% of total revenue. If the total net revenue exceeded a higher level, the owner received an additional 15%, or 90% of total revenue. The management firm also provided the owner with a certified statement of revenue on the 15th of every month and a certified statement of the number of cars parked in the lot every day.

The number of lot attendants varied among the operators interviewed because it depended on such factors as the flow of traffic, whether cars were being charged as they came in or left, and where entrances and exits were located. One of those interviewed had 12 attendants in an average week for approximately 600 parking spaces. Another operator had four or five lot attendants present for approximately 200 parking spaces during very busy times.

The lot attendants were hired from various places. One operator went through the Fair personnel office and the Council on Aging to employ lot attendants. According to one operator, the lot attendants made approximately $5 an hour, which was minimum wage plus fringe benefits. Another paid $20-$30,000 in personnel cost during the Fair. The shifts varied during the Fair according to parking demand at particular lots. As an example, one lot had an 8:30 a.m. to 5:00 p.m. shift and a 5:00 p.m. to 1:00 a.m. shift 7 days a week.

Whose interviewed stressed the importance of employing lot attendants who would work the duration of the Fair. Attendants at one lot were paid a bonus of 10% of their gross wages if they worked from the first day of the Fair to the last day without unscheduled interruption.

Money handling was an important element of parking lot management. Operators felt it was important to make mid-day deposits to deter robbery as large sums were accumulated. At least one lot reportedly had no set schedule for money collection so it would be difficult to stake out the lot and determine what times to rob it.

The fee charged by these operators varied throughout the Fair, except for operators of KIEE "official" lots. The average fee charged by the operators interviewed was approximately $6 per day, the same as the KIEE fee.

The fees varied during the day, with higher fees charged in the morning and lower fees in the evening. The fees ranged between $3 and $10 per day and were based on what other nearby lots were charging. Some operators would simply walk outside and look across the street to see what other lots were charging. Others would get in their car and drive around to see what other lots were charging.

While certain elements of the business (e.g. lot attendants) were common to all operators interviewed, other elements varied. For example, the lots did not all charge the same fee nor did they all provide shuttle bus service.

Results

Approximately half the spaces in the lots of operators interviewed were occupied on an average day. All of the lots operated for the duration of the Fair and ranged in size from 50 to 400 spaces. There were some lots that achieved higher occupancies, such as one with 200 spaces which had 160 cars on an average day and some that achieved lower occupanices, such as one with 200 spaces which parked 50 cars on an average day.

Transportation cost were the major component of one "official" lot operator's expenses, totaling $90,000 during the course of the Fair. The termination of the KIEE contract with K-TRANS and TEI for shuttle bus service forced operators of official parking lots to contract privately for shuttle bus service. This had the effect of increasing the cost to the operator from $1.40 per car parked per day to $2.25. One operator stated if he had it to do all over again, he would have negotiated differently and insisted on a no termination contract as opposed to the ten day termination provision in the KIEE contract.

While none of the operators interviewed claimed to have lost money, none felt their financial outcome met their expectations. One operator, stated he made a 3.9% profit on gross revenue. Parking is considered a service industry for which 10% is a reasonable profit.

Conclusions

Visibility Visibility was very important and one operator suggested tall signs visible from the interstates and other major access routes would help attract business. Vistors were unfamiliar with the area and did not know where parking was located.

Ironically one operator said he lost business to lots further away from the Fair site. There were several parking lots located along the same approach to his lot. In his experience, people would park in these lots, unaware that they could continue down the road and park closer to the Fair.

Flagmen also provided visibility for parking lots. However, many operators complained the flagman obstructed the flow of traffic by standing in the streets trying to persuade drivers to park in the lot. Also, other gimmicks such as a Laurel and Hardy promotional routine obstructed the flow of traffic by distracting drivers.

Location Open areas were believed to be more attractive by several operators than buildings or other structures. One parking lot was located in an old warehouse and the operator felt it detracted from business. The warehouse was enclosed and not aesthetically appealing.

Surrounding land uses were an important factor in the success of parking lots. One operator who had a lot near the downtown area said it was located in a bad area of town which discouraged people from parking there. The operator of a lot located in an old warehouse district felt people were not compelled to park in such an area. On the other hand, one operator who leased a church parking lot felt the surrounding land uses were an asset. He believed the location of the parking lot on church property and in a low crime area made people feel safe about parking their car in the lot.

Most operators were willing to speculate that their location would be one of the successful ones.

Access. Access was important, both in the distance of a parking lot from a Fair gate and in the quality of the roads which led to it. One operator attributed the success of his lot to the fact that it was the closest parking area to one of the gates. Another operator who had a lot close to downtown, but not on a major artery, thought the inaccessible nature of his lot made it fare poorly.

While the quality of a road a parking lot is located on or near is important, the traffic flow on the road must be considered. It was anticipated that lots located in South Knoxville would attract traffic coming to the Fair from Gatlinburg. Instead, most of that traffic traveled other routes to reach the Fair.

Traffic congestion was not a major problem for any of the operators interviewed. It was suggested by one operator that providing a sheet of paper or postcard to drivers with directions out of the parking lot to major access routes would reduce congestion even further.

"Official" vs Unofficial lots.

There were good and bad points concerning "official" lots according to operators interviewed. On the positive side, "official" parking lots were seen as a type of "good-will center" where people could go for information and assistance. Visitors knew "official" lots were legitimate and connected with Fair operations.

On the negative side, there was some animosity between operators of "official" and unofficial parking lots. An operator of an "official" lot felt operators of unofficial lots would not put up adequate signing since nearby "official" lots were well signed and attracted traffic to the area. Also unofficial lots near "official" lots could compete unfairly by lowering their price below the $6 "official" parking fee.

On the other hand, an operator of an unofficial lot felt operators of "official" lots were given preferential treatment. He said they were not inspected very closely for conformance to temporary parking lot specifications. One "official" parking lot was cited by an operator as having a steeper grade than allowed for temporary parking lots and a driveway which was not in conformance with regulations.

Other

Although not directly related to parking lot operations, one problem cited by nearly every parking lot operator interviewed was people leaving pets in their cars. One operator even kept dogs in his air-conditioned office. In a few cases the humane officer was called. At future events it is suggested that people be forewarned not to leave their pets in cars and kennels or directions to nearby animal shelters should be provided.

SHUTTLE BUS SERVICE

Specific perceptions of demand for shuttle service led various operators to pursue different markets or approaches. Some operators attempted to provide service for Fair vistors staying in and around nearby communities, while others concentrated on lodgings along major access routes or parking areas.

Preparations

Most of the bus operators interviewed were already in the transportation business and, thus, had vehicles, drivers, and maintenance facilities available. Their committment in terms of money, labor, facilities and equipment was limited.

The number of buses owned by these operators ranged from 3 to 44 buses. However, these were not necessarily the number of buses which ran every day. The buses had an average seating capacity of 40 passengers.

One operator who did not already own shuttle buses purchased used heavy-duty buses and refurbished them. This included painting, putting in new upholstry, and installing air conditioning.

Preparations were not a major component of providing shuttle bus service for the operators interviewed since most were already in the transportation business. This reduced their investment and, hence, their risk in providing service.

Operations

Provision of frequent service was a goal of most of the shuttle operators interviewed. One operator ran buses every 30 minutes and another ran every two hours.

However, demand for transportation to the Fair was not consistent throughout the day. This was reflected in one operating schedule which consisted of several morning runs for the opening of the Fair, a lunch run, an early evening run, and a late evening run when the Fair closed.

While some operators covered a large area in an attempt to maximize the number of places they served, other operators serviced only a few places with a large concentrations of Fair visitors. For example, one operator interviewed had agreements with 50 campgrounds, hotels, and motels whereas another had agreements with only six campgrounds, hotels, and motels. The rationale for serving as many places as possible was that the potential number of riders was increased. The rationale for serving a few large areas was that it provided an established area where a group of potential riders was assured.

Another aspect of serving only a few large areas was that it allowed the operator to estimate ridership. Operators who served many areas could not really know how many riders they would carry each day. Operators who served only a few areas could accurately project the number of riders based on the number registered at the motel or campground.

The price of round trip tickets ranged from $4 to $10. The average ticket price was $5 for an average trip length of 15 to 20 miles one way. Children under 12 usually rode free or at a reduced cost. One operator charged two dollars more to ride in the air conditioned buses. Some of the hotels, motels, and campgrounds sold tickets to their patrons for shuttle bus service.

Advertising was not actively pursued by the operators interviewed. The campgrounds, hotels and motels advertised the shuttle bus service by selling tickets and some operators put up posters. Tickets for one operator were also sold at a World's Fair Information Center (not operated by KIEE).

Results. Demand for shuttle bus service remained stable for the first three months of the Fair and then declined, according to operators interviewed. One operator ran two runs per day and ceased operating at the beginning of July. He originally ran two buses each run. When the occupancy decreased to ten passengers on each bus in June, he used two buses to bring people to a central point and then only one bus would make the trip to and from the Fair. Another operator who originally had 25 buses was only running three buses by August. Another who had 44 buses available consistently ran only 11 of the buses.

Parking lot operators near the Fair site who began reducing their prices were blamed by one operator for the decline. When people saw the low parking prices they quit riding shuttle buses.

Operators observed that the days at the beginning of the week were the highest demand days. As the week progressed, patronage steadily decreased and the weekends were the lowest demand days. Holidays were also low volume days for the shuttle bus business. It was speculated this was because they served mostly out-of-town visitors who avoided the Fair on weekends and holidays for fear of large crowds.

Operational procedures differed among those interviewed. Hours of operation as well as the number of places served varied. These differences had effects on the financial outcomes of the shuttle businesses.

Conclusions

The shuttle bus operators interviewed all thought there was an oversupply of shuttle bus service. They also felt the Public Service Commission moved too slow in approving applications. The time element forced many operators to go ahead and commit resources before official verification that they would be granted operating authority. It was suggested that applications at future special events be approved early enough to allow for adequate lead time.

Many operators emphasized the importance of knowledge concerning attendance projections, mode split, and the number of reservations at campgrounds, hotels, and motels. This information is vital to determine ridership levels and the number of shuttle buses needed.

The more successful operators were those which served only a few places that accommodated large groups of people rather than trying to serve as many places as possible. Also the more successful operators were those that concentrated on serving areas near interstates and other major access routes. Since out-of-town people were unfamiliar with the area, they would stay at lodgings near these routes.

Experience was another critical factor in success. The more successful operators were those that were already in the transportation business. Many of them suggested that other people at future special events should not consider providing shuttle bus service unless they knew the business.

In addition, the more successful operators expanded their existing fleet by only a small number of buses. The advice given by operators for future special events was to utilize what you already have and expand as needed. Those with no existing fleet were advised to start with only one or two buses.

TAXI SERVICE

Taxi service did not emerge as a major component of transportation services during the Fair. There was an overabundance of taxi operators and limited demand. Operators claimed they suffered from a lack of visible cab stand space close to the Fair gates, despite the fact that space existed near each gate.

There were two types of increases in taxi service offered at the beginning of the Fair. One type of increase was the entry of existing out-of-town and new taxi operators into the local market. One such operator interviewed had a fleet of 55 cabs.

The other type of increase was the expansion of existing fleets by local taxi operators. One local taxi operator interviewed increased his fleet from 20 to 30 cabs and another operator increased his fleet from 14 to 114 cabs.

Demand

The taxi operators interviewed attributed the excess supply of taxis to overly optomistic projections of 500 to 600 taxis needed during the Fair. Instead, there was only enough demand for about 100 taxis. Competition from shuttle buses and the expanded local transit service also decreased taxicab patronage.

Demand for taxi service was directly related to the daily attendance figures at the Fair. High attendance days were high volume days for taxi companies. One taxi operator reported a 25 percent increase in service at the beginning of the Fair, with July and August being slow months.

Most of the taxi operators interviewed reduced the number of cabs in their fleets within the first few months of the Fair. One operator decreased his fleet by 50 percent after the first 30 days of the Fair. Another operator had only half the original number of cabs by the last two months of the Fair.

Fares

The maximum metered price for taxis set by the City is $1.25 meter drop charge and 10¢ for every 10th of a mile. While most taxi operators charged this rate, one operator charged 50¢ per mile. Some operators charged less than the maximum metered price for outlying areas eight or ten miles from the Fair site. Another operator sold round trip tickets.

While there were some complaints by customers of being overcharged, the City Taxicab Inspector said he received very few complaints. Overcharging and fare competition were not perceived as problems by taxi operators interviewed.

Cab Stands

The location and number of cab stands close to gates was another problem. The taxi operators interviewed felt the stands should have been located closer to the gates and that access lanes for taxis should have been provided directly to the gates.

The South Gate was particularly important to one taxi operator. It was the gate closest to the amusement area, which stayed open until midnight. There was no cab stand space provided by the City in the immediate area of this gate. Therefore, a taxi operator leased enough private property from a railroad for ten to twelve cab spaces along Neyland Drive.

Marketing

There was very little marketing conducted by taxi operators. One operator tried unsuccessfully to sponsor tours to Gatlinburg. He concluded that tours of nearby areas were unproductive because people were only interested in going to the Fair.

Conclusions

The successful taxi operators seemed to be those which increased their fleet by only a few cabs. Most of the successful operators also concentrated on serving their regular customers, supplementing that business with Fair service when possible. This seems to be reflected by the statements of many operators that they would use fewer vehicles if they had it to do over.

Access to gates and corresponding cab stand space was very important to taxis. Many operators interviewed felt there had been inadequate planning for taxi service at the Fair. They suggested access lanes at the gates should be considered for future special events.

TRANSPORTATION SERVICES TERMINATED EARLY

There were several transportation services which were terminated prior to the end of the Fair. This was mostly due to lack of demand or excessive costs involved with the business. Examples of two such services are helicopter and ferry boat service.

Helicopter Service. A few individuals attempted to offer helicopter service for sightseeing tours and commuters. Significant demand for service never materialized due to the high cost of the trip. This type of transportation was also considered noisy, obtrusive, and unsafe leading KIEE management to arrange for a restricted airspace zone to be established around the Fair site. (see also: Phase I Report, pp. 147-48).

Ferry Boat Service. Ferry boat service, including service to some parking lots, transportation to and from the Fair, and tours did not do well at the Fair. It was difficult to fill the large passenger capacity of the vessels. Also, the cost of the service was more expensive than other types of transportation and took longer to travel the same distance. Even the best of the ferry services were not able to offer the low cost or speed of other transportation services.

TRANSPORTATION SERVICES NEVER IMPLEMENTED

There were several transportation services never implemented. Horse-drawn carriages and a monorail system are two examples. Their inclusion here is intended to relate the reasons why certian transportation services never operated. They are important for planners of future special events to take into consideration when planning transportation services.

Horse Drawn Carriages

There were three proposals for horse drawn carriage service around the World's Fair site. One of these involved operating three carriages, each of which seats four passengers in addition to the driver. The carriages would have brakes installed due to the hilly terrain of Knoxville and be pulled by Belgian draft horses.

The three companies proposing service submitted applications for authority to operate. Confusion resulted from the fact that there was no agency specifically responsible for this type of transportation. The applications were sent to the City Division of Public Transportation Services, although this Division is usually only responsible for motorized vehicles. All three applications were denied on the recommendation of the City Police Department and City Engineering Department.

There were several reasons for denial of the applications. It was believed intolerable traffic congestion in downtown Knoxville would result from the horse drawn carriages. The proposals claimed the carriages would travel at 12 to 16 M.P.H. over four to five blocks on an average day. One operator stated the carriages could travel faster than this on and around the University of Tennessee campus.

In addition, the carriages would travel over several steep and narrow streets. As a result the carriages would be traveling slower than normal to climb the upgrade and narrowness of the streets would prohibit vehicular traffic from maneuvering around the carriages.

There was also the problem of the horse manure nuisance. In response to this, the carriages were to be equipped with diapers to catch the horse droppings.

All three companies appealed the denial to the Knoxville Transportation Authority (KTA). At the appeal, the City stated it would not oppose the licensing if the following three conditions were met: (1) the nature of the ride would be for amusement and not public conveyance, (2) the area of operation would need to be defined and this area should be completely outside the Central Business District and (3) the applicants must show that the animals will be treated in a humane fashion and that traffic would not be hindered.

The Police Department stated the horse-drawn carriages were incompatible with the objective of the Fair traffic plans, which was to move traffic as fast and efficiently as possible. The proposed carriage routes were the same ones intended for major traffic movement. This posed the additional problem of passenger safety in boarding and on the road. The KTA substained the DPTS denial of the applications for operating authority.

A similar type of service operated in Cincinnati, Ohio and provides an example of the impacts of such a service. The regulations pertaining to the service were that it operate only on specified routes between 6 p.m. and 10 p.m., load and unload only at designated points, and provide sanitation.

The advantages of the service were that it had good public acceptance and increased shopper traffic. The problems associated with it included proper lighting of the carriages (both front and rear), frightened horses (horn blowing, etc.), observance of boarding points and traffic having to change lanes to pass.

Monorail

There was a proposal to relocate a monorail system from Love Field in Dallas, Texas to Knoxville, Tennessee. The sponser proposed that the monorail be relocated as a permanent transit system to operate between the Coliseum and University of Tennessee, with intermediate stops in downtown and the Fair site. After studying the proposal, it was determined it would not be feasible or desirable to relocate the monorail to Knoxville.

Among the reasons for this were the inability to cover capital, operating, and management costs with system revenues during or after the Fair. The sponser proposed no detailed performance schedule and the system could only provide one-half of the capacity required for Knoxville. The relocation required the system to be refurbished and expanded and a new control system to be developed. The City also required a performance bond and it was questionable whether such bonding could be obtained.*

While some transportation services may appear desirable for their speed or aesthetic appeal, these factors have to be weighed against other considerations such as the cost or the effects on traffic flow.

CONCLUSIONS

The more successful operators interviewed were those who only started on a small scale or expanded their service only slightly. These operators were able to utilize all of their equipment efficiently and did not have a large investment in the service. Also the more successful operators were those with prior transportation experience.

Several operators stated demand for services fluctuated. It vaired according to season, day of week, and time of day.

* U.S. Department of Transportation, UMTA, Assessment of the Titan/PRT Proposal to Knoxville, Tennessee, prepared for House Subcommitte on Transportation Committee on Appropriations, August 15, 1980.

Fees for services among the operators interviewed varied. Parking prices were especially competitive. It is difficult to determine the appropriate charge since costs for providing service differed among operators.

Transportation services are inter-related. Changes in operation in one service affected the other services.

Access and location were determining factors in the success of most parking operators interviewed. Since many visitors were unfamiliar with the area, they went to the most visible parking lot or the closet lodging with shuttle bus service.

Chapter Eleven:

REGULATIONS AND AGREEMENTS

There were many City Ordinances, agreements, and other regulations which affected transportation related services supporting the 1982 World's Fair. They outlined procedures to be followed and/or specified the type of service provided. This chapter discusses the provisions in some of these regulations and agreements and how effective they were in regulating service.

ORDINANCES

Several City Ordinances had impacts on Fair-related services. Some of the ordinances pertained to transportation services existing prior to the Fair and others were created specifically to address services proposed for the Fair.

Existing Ordinances

City Taxi Ordinance. Taxi service was one component of the transportation services offered during the Fair. The City Division of Public Transportation Services is responsible for granting Certificates of Public Convenience and Necessity to taxicab operators.

According to the City Taxicab Ordinance No. 0-99-81, applicants must pay a fee of $100 per car for the certificate and registration stickers to be affixed on each vehicle used. They must also file a return with the Business Tax Office for the minimum gross receipt tax. There is also a $15 per vehicle maintenance inspection fee.

Each taxicab must display a chart of meter rates published by the Division of Public Transportation Services. However, charges by the hour for tours are negotiable between the taxicab company and the driver/passengers. Ridesharing is also allowed and a passenger is not required to pay an additional charge if the taxicab deviates from its intended destination to pick up a subsequent passenger.

While most of the provisions of the Ordinance were adhered to by taxicab operators during the Fair, there were some complaints by passengers that they were overcharged. However, the City Taxicab Inspector did not perceive the number of complaints filed to be in an excessive amount.

There was also discussion that the City Division of Public Transportation Services should have limited the number of certificates it granted to taxicab operators. The Director of the Division felt this was not within the scope of the responsibilities of the Division and the City Taxicab Ordinance contained no provisions relating to limiting the number of certificates issued.

City Shuttle Bus Ordinance. The City Shuttle Bus Ordinance No. O-46-82 provides for the issuance of Certificates of Convenience and Necessity by the City Division of Public Transportation Services for the operation of shuttle buses. Shuttle service is defined as "service provided by a self-propelled motor vehicle... picking up groups of passengers at one or more points of origin, with a common purpose and common point of destination, and return to the same point or points of origin..." The City has jurisdiction over shuttle bus service operating within a seven mile radius of the City limits.

Some of the criteria in determining whether to approve an applicant include services being furnished by other carrier or carriers in the territory, type of service to be provided by the applicant, the financial condition and character of the applicant, the public demand and need for the proposed service, what, if any, permission the applicant has to pick up and discharge passengers on private property, and the effect the proposed service will have on other transportation services.

The Certificate of Public Convenience and Necessity specifies the exact terms of the grant, points of origin and destination, and the amount of insurance coverage. The applicant must pay a $200 registration fee per vehicle used and a shuttle registration sticker is affixed to the bumper of each vehicle.

The applicant must have insurance limits of at least the minimum extent required by the State of Tennessee for common carriers and each shuttle vehicle must be inspected.

Fair Related Ordinances

Temporary Parking Lot Ordinance. The City Zoning Ordinance was amended in September 1981 by adding Section 18 to Article V (Ordinance No. O-223-81) to allow for the development of temporary parking lots. It stated specifications for the development of temporary parking lots to ensure they met minimum standards. The temporary parking lots were defined as "a facility used for off-street parking in accordance with the terms of this ordinance which shall cease to be used for parking on or before November 30, 1982."

The enabling clause stated the zoning districts in which land could be converted into temporary parking lots. Applications were submitted to the Division of Engineering with a $500 non-refundable fee. The Director of the Division approved or denied applications.

Factors to be considered in approving the applications included:

(1) Impact on traffic congestion and other development in the area.

(2) The need for the lot at the site under consideration.

(3) The drainage plan and reclamation plan offered by applicant.

(4) Standards set forth by the Knox County Health Department.

(5) Impact upon adjacent residential properties, even though subject property is within an acceptable zoning district.

(6) Displacement of valuable housing stock.

(7) Such other factors relating to the health, safety and welfare of the City as in the Director's opinion are in the public's interest.

There were minimum lot requirements that included the lot be no less that 15,000 square feet and, if the parking lot was outside a two mile radius of the intersection of Henley Street and Clinch Avenue, it had to be within 500 feet of a transit route or else the operator had to make arrangements for some kind of public transportation. Overnight parking was prohibited on temporary parking lots.

The applicant was required to submit a performance bond to ensure that the land was reclaimed after the Fair. There was much concern that the temporary parking lots would negatively impact neighborhoods or the lots would be used for commercial uses in nonconforming areas. The original intent of the term reclamation was to have the lots returned to their use and appearance before the Fair. However, since many of these lots were formerly junkyards or other unsightly areas they have been termed reclaimed even though they were not restored after the Fair. In most instances the gravel lots look better than what existed before the Fair.

Another issue concerning the reclamation bond is that the City Council envisioned the temporary parking lots being developed in rural areas and reclamation consisting of returning the lots to grassy fields. However, it turned out the temporary parking lots were located in industrial and commercial areas with reclamation having a different meaning.

Strict enforcement of the reclamation bonds has not occurred. Even though many of the temporary parking lots remain, this is an improvement over how they looked before the Fair. Also, most of these property owners have stated they have not decided what they are going to use the land for and need more time before the reclamation bonds are enforced. There is very little pressure for enforcement because there have been no complaint calls about the temporary parking lots.

City Temporary Campground Ordinance. The City Zoning Ordinance was amended on December 8, 1981 by adding Section 19 to Article V (Ordinance No. 0-271-81) to allow for the provision of temporary campground facilities. It stated specifications for the development of temporary campgrounds to ensure they met minimum standards. These were defined as "an organized camp in which provisions are made for the accommodation of travel trailers, truck coaches or campers, tent campers, tents and vehicles in accordance with the terms of this ordinance and which shall not begin operation before April 1, 1982 and shall cease operation on or before November 30, 1982."

According to the Ordinance, the campground must be located on a tract of land two acres or larger in size and can be located in a Planned Residential, Commercial, Office or Industrial Use District with a few exceptions.

The Plans Review Office of the City Community and Economic Development Department reviewed the applications which had to include a survey or plan of the proposed Temporary Travel Trailer Campsite and a reclamation proposal. Within 48 hours of filing of the survey or plan, notices were required to be posted at the proposed campsite containing the name of the developer, a general description of its intended use, and the proposed duration of its use. This informed surrounding property owners of the intended use and objections could be filed with the Plans Review Office.

The applicants were required to meet all applicable codes, regulations, and standards governing building, electrical, plumbing, mechanical, and health and safety matters. Each applicant paid a $500 non-refundable fee for review of the survey or plan and issuance of permits.

Performance bonds were required to ensure reclamation of the land after the Fair. The amount of the bond was determined by the Director of Engineering.

The applicants were permitted to have one office building at the campsite. Additional structures were allowed if they were included in the approved plan.

PUBLIC SERVICE COMMISSION

All shuttle buses which operated during the Fair outside a seven mile radius of the City limits were required to apply to the Tennessee Public Service Commission for operating authority. The applicant had to pay a $50 application fee and submit a detailed route description and financial statement of assets and liabilities. They also were required to list the equipment they would use and whether it was to be leased or owned as well as a table of the fares they would charge, a time schedule of service, and proof of insurance liability.

After the application was filed, all carriers operating in the area of proposed service were notified that the application has been filed with the PSC and a hearing date was scheduled. At the hearing, Public Service Commissioners determined whether to grant operating authority based on the applicant's experience in providing the service, the need for the proposed service, and comments from other carriers at the hearing.

According to a staff member of the Transportation Division, the Tennessee PSC received approximately 200 applications to provide shuttle bus service at the Fair. Of those, only six or seven were denied. The only change in procedure by the PSC was to hold special hearings in Knoxville at which as many applications as possible were heard. The applications were heard in the order in which they were filed.

AGREEMENTS

There were many types of agreements related to Fair transportation. The agreements were similar to the Ordinances in that they specified the service to be provided and any conditions pursuant to the provision of service.

Remote Parking Shuttle Bus Contracts

KIEE contracted with two shuttle bus service providers, K-TRANS and TEI, to operate shuttle bus service between KIEE "official" parking lots and the Fair. The agreements between KIEE and K-TRANS* and TEI* discussed the scope and description of services to be rendered. This included a listing of every parking lot to be served and a description of the exact route each shuttle bus would follow as well as a listing of stop locations.

K-TRANS and TEI were responsible for furnishing the vehicles, drivers, maintenance of the vehicles, and other personnel as needed. KIEE provided uniforms for the TEI drivers. One point KIEE had to consider in the K-TRANS agreement was that K-TRANS buses carry advertising on the interior and exterior surfaces. KIEE allowed K-TRANS to continue selling advertising space provided it would not imply any of the advertising was endorsed by KIEE.

TEI was paid on the basis of how many hours the buses ran. The basis was as follows:

Number of Hours of Operation Per Bus Per Day	Dollars Per Bus-Hour
Up to 11 hrs. and 15 min.	$24.35
From 11 hrs. 16 min. to 13 hrs. 20 min.	$22.65
Over 13 hrs. 20 min.	$21.65

TEI and K-TRANS submitted invoices to KIEE and were required to provide information on the number of passengers transported, proof of ridership (passes and tickets), time sheets for each day's operation showing bus numbers, routes served, and total time of route operation, and total number of hours accumulated by each driver.

KIEE could implement route or schedule changes with a three day written notice. KIEE could terminate the contract with a ten day written notice.

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*Agreement between Knoxville International Energy Exposition and Knoxville Transit and Knoxville Transportation Authority, April 28, 1982.

*Agreement between Knoxville International Energy Exposition and Transportation Enterprises, Inc., April 19, 1982.

The agreements also listed the insurance requirements and reasons allowed for unavoidable delay. The agreement between TEI and KIEE listed the specifications for vehicles to be used by TEI. The buses had to be equipped with two passenger doors and have a seating capacity of at least 44 passengers. TEI was responsible for any operating permits or taxes.

The major difference between the two agreements was that K-TRANS was an already existing transportation service provider in Knoxville. It was also necessary for KIEE to get the approval of the Knoxville Transportation Authority on the K-TRANS agreement. Since TEI was not an established operator in Knoxville, KIEE had to provide lot space for parking and servicing buses and conducting office operations. Payment was based on total operating cost instead of incremental costs. There was also a minimum commitment per bus.

KIEE had difficulty terminating the contracts when low demand was making service unprofitable. Although KIEE had ten day termination rights according to the contract, remote parking lot operators objected strongly. They claimed they had expended resources to provide service because of KIEE's commitment. It required several attempts on the part of KIEE to finally terminate the parking lot and shuttle contracts. (See Phase I Report for additional explanation.)

There were three other types of parking related KIEE agreements. One type was lease agreements whereby KIEE leased land for parking lot and bus terminal operations. Another kind was agreements with operators to manage "official" KIEE lots. The other type of contract was with Central Parking Systems Inc. to operate KIEE's own visitor lots.

Agreements Between K-TRANS and Parking Lot Operators for Shuttle Bus Service

Many parking lot operators had agreements with K-TRANS to provide shuttle bus service between their lot and the Fair.* The agreements discussed the scope and description of services to be rendered. The agreements included a listing of service hours broken down by time periods and number of departures during each time period from the parking lot and from the Fair site.

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*Agreement between Preston Haag, Trustee and Knoxville Transit and Knoxville Transportation Authority, April 28, 1982.

*Agreement between M.F.M. Ltd. and Knoxville Transit and Knoxville Transportation Authority, April 28, 1982.

*Agreement between Wood Properties, Inc. and Knoxville Transit and Knoxville Transportation Authority, April 28, 1982.

The parking lot operators were required to provide loading and unloading areas on their lots for the buses. K-TRANS was responsible for furnishing the vehicles, drivers, maintenance, and supervision. There was a stipulation that no school buses would be used and there would be no stops along the route.

One parking lot operator paid K-TRANS $1.50 per person per round trip and $1.00 for children under twelve years of age. Another operator sold round trip tickets for 75¢ per ticket and paid K-TRANS $28.12 per hour of bus service. The parking lot operator and K-TRANS shared equally in revenue from ticket sales which exceeded $28.12 per hour of service.

K-TRANS submitted to these parking lot operators an invoice statement on a weekly basis. K-TRANS also supplied information concerning the number of passengers transported as determined by ticket sales, number of buses provided, and hours of bus service provided per bus. K-TRANS could terminate the contract with a five day advance notice if the parking lot operator did not pay the invoice within ten days after the payment due date.

K-TRANS Agreement With the Transit Union

K-TRANS obtained an agreement with Amalgamated Transit Union #164 concerning the hiring of temporary personnel for the 1982 World's Fair.*

The temporary bus operators were paid $3.35 per hour during training and $7.02 per hour after completion of training. They were not subject to progression and were not eligible for time or pay guarantee nor holiday pay. They received seniority for the purpose of choosing runs by picking numbers from a hat upon completion of training.

K-TRANS reserved the right to keep any temporary operators on a permanent basis at the end of the Fair.

OTHER REGULATIONS

Tri-Shaws

Tri-shaws had to obtain a license to operate from both the City Business Tax and County Business Tax Offices. Each of these offices charged $18.50 for the licenses. While the licenses granted the tri-shaws the authority to operate, they were subject to any applicable Federal, State, County, or City Ordinances, Codes, or Laws.

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*Letter of Understanding between Knoxville Transit, Division of ATC (K-TRANS) and Amalgamated Transit Union #1164.

Ferry-Boats

Ferry Boat operators were required to have their vessel documented by the Coast Guard and obtain a license to operate. If the boat was classified as a pleasure craft the operator had to pay a $100 application fee.

CONCLUSIONS

The special regulations and agreements pertaining to Fair transportation were effective. They were adhered to and there were few complaints.

It will be necessary to create ordinances or codes for certain temporary services provided during special events. The City Temporary Parking Lot and Temporary Campground Ordinances allowed for the provision of these services during the World's Fair in Knoxville.

State agencies like the Public Service Commission can expect a substantial number of applications for temporary authority to operate transportation services. This may necessitate changes in procedures to process the large number of applications.

The hiring of temporary employees where the regular employees are unionized will probably require some negotiation. K-TRANS had a letter of agreement with the transit union concerning the hiring of temporary employees.

One notable feature of the contract between KIEE and shuttle bus operators was the termination of the contracts due to lack of demand. It should be remembered that this type of service is dependent on demand which is difficult to predict for special events.

Chapter Twelve:

IMPACTS OF TRANSPORTATION SERVICE PRICING

The prices charged for transportation services during the World's Fair were discussed in context in various chapters of the Phase I and this report. Here, the secondary or side effects of prices are analyzed and their impacts identified. Other economic issues, including decision-making under uncertainty and impact of imperfect knowledge; establishing market-clearing prices in real-time; own-price and cross-elasticity of demand; and the choice between regulated and free entry to and exit from markets are considered, as well. The two main sections of the chapter deal with parking prices and shuttle bus prices.

PARKING PRICES

Chapter 5 of the Phase I report and Chapter 6 of this report outline the parking situation at the Fair and the key decisions which resulted in the "official" parking lot system and its uniform $6.00 fee. The description and analysis of the visitor parking plan and its implementation in Phase I (pp. 75-77) provides a useful introduction to this economic analysis.

In summary, Fair management was interested in assuring an adequate supply of visitor parking, as well as uniform pricing, hours of operation, and advance information about lot locations. By reducing the visitors' uncertainty about parking availability and cost, the Fair itself could be more effectively promoted and the goals of the transportation plan better realized.

The $6.00 "official" parking price was based on the Fair's projected costs to construct and operate the entire transportation system, including roadway improvements, parking lot paving, shuttle bus services, employee and VIP parking, a radio system, signage, equipment, and other system elements. This decision had several unforeseen results, some of which appeared on the supply side of the market and some on the demand side. The equilibrium price appears to have been below $6.00, but significant variations existed.

Supply Impacts

The magnitude of the initial excess supply of parking was documented in the Phase I report. The existence of the $6.00 parking fee for "official" lots attracted numerous entrepreneurs who, like KIEE itself, considered the cost of developing and operating their proposed lots carefully but were unaware of the extent to which others were making similar plans.

The supply issue was complicated for any potential parking entrepreneur by several factors. These included: the proximity of a parking lot site to a Fair gate, access to the site from a major approach route, and the number of competitors along the same approach. The occupancy rates on which an entrepreneur could base his decision to enter the parking market would be affected by these factors, yet it was difficult to judge in advance how the particular market segment in which any given parcel was located would respond. Excessive optimism in the private sector about demand characterized the pre-Fair parking supply. The Fair's own demand estimates also erred on the high side, as discussed in Chapter 6.

The reality of excess supply was readily apparent within the first week of the Fair. Two responses were possible and both were observed: (1) Prices were lowered and (2) some parking was withdrawn from the market. Both types of actions moved the parking market closer to equilibrium.

Price Reductions. Three types of price reductions were observed. First, the base level of prices was reduced in those sub-markets characterized by excess supply and a high degree of competition. This situation prevailed in the Dale Avenue/Blackstock Avenue corridor leading to the North gate, the Fort Sanders neighborhood/Grand Avenue lots, the area east of the CBD and the Business Loop; and the remote lot areas in the Chapman Highway corridor south of the river. Prices near the Southwest gate were firmer, since the University of Tennessee controlled all the "unofficial" lots within walking distance of the gate. Prices in the CBD adjacent to the East gate also held near the $6.00 mark, with a tendency toward premium prices (above $6.00) on very busy days.

The second type of price reduction observed was a tendency on the part of the "unofficial" lots to lower prices for the evening hours. A $2.00 to $3.00 charge for cars entering after 5:00 or 6:00 P.M. was common; the University reduced the price in its lots to $1.50 for evening hours.

The third type of price reduction was observed primarily in the CBD lots although it was practiced to some extent along Dale Avenue. The more experienced operators began the day with high prices--in some cases as high as $8.00-$10.00. By 10:00 A.M. however, they reduced the prices to the level they judged necessary to fill their lots, based on how quickly the lots filled in the period prior to the 10:00 A.M. opening time.

Market Exit. As the problem of excess supply became more obvious, and experience indicated that price cuts could not fill all lots, operators began to leave the market. One of the earliest, and most dramatic, departures was a major "unofficial" lot well east of the downtown in the Coliseum area. The operator had invested well over $100,000 in developing 2,500 spaces, and had initially attempted to charge a $6.00 parking fee, plus 75¢ per person for the shuttle bus ride to the East gate. The added charge for the bus service was quickly dropped (an implicit price reduction), but by the end of May it became obvious that the market could not support 4,300 spaces east of downtown (including 1,800 at the Coliseum garages). The private operator withdrew from the market shortly after Memorial Day; KIEE and the Coliseum agreed to cancel the "official" status of the latter effective July 10.

Near the North gate, several of the more distant parcels in the KIEE-operated complex never opened; one such area close to the gate, was converted to bus parking. "Unofficial" lots more than one-half mile from the gate tended to close, though a few competed by lowering prices. The latter phenomenon was also observed along Chapman Highway, with "free" shuttle bus service frequently appearing as an implicit price reduction.

A Note About Elasticity

The Phase I report suggested that Phase II would include a discussion of the elasticity of demand; that is, the change in demand based on changes in the price of parking. Unfortunately, it has not been possible to draw strong inferences about price elasticity due to the lack of data.

A brief explanation of elasticity will help illustrate why this lack of data precluded use of the concept. Own-price elasticity of demand is defined as the percent change in the quantity of commodity A demanded associated with a one percent change in the price of A. Cross-elasticity of demand is defined as the percent change in the quantity of A demanded associated with a one percent change in the price of B.

In order to apply the elasticity model, the change in quantity demanded must be observed following a change in price, while all other factors remain constant. In fact, on any given day the overall demand for parking at the Fair (due to attendance, visitor origin, etc.), the number of available spaces, and the general level of prices in a given submarket, all fluctuated. It is therefore impossible to isolate the impacts of changes in price on the demand for parking, even if better data were available.

The lack of data results from the fact that, with one exception, only "unofficial" lots changed parking fees. No records showing the impact of price changes on demand for space could be obtained by the team preparing this report (it is suspected that none exist).

"Official" lots, with one exception, held the $6.00 rate at all times during the Fair. Thus, there was no variation in price to correlate with variations in demand. The exception was an experiment in which an "official" lot, the Parking Barn on Dale Avenue about two blocks from the North gate, was authorized to reduce the parking fee to $4.00 to meet competition from "unofficial" lots in the vicinity. Results of the experiment indicated that demand was inelastic; that is, total revenue (adjusted for daily attendance) was lower at $4.00 than at $6.00. The experiment was terminated and the $6.00 rate restored.[1]

At first glance, the experiment described above appears to be an illustration of own-price elasticity. However, if one asks where the 22 percent of new parkers came from, it appears that the gain at the Parking Barn was at the expense of other nearby lots. In fact, the experiment was initiated in large measure as a response to a loss of market share. Viewed in this light, it appears that the real issue is cross-elasticity. In examining the effect of price changes at individual lots, we are looking at goods (a parking space in Lot A versus a space in Lot B) which are close substitutes for one another, but not identical because of locational differences.

IMPACT OF PARKING PRICES ON THE FAIR

The "official" lots faced the worst of all possible worlds, in a narrow sense. When parking was scarce, official lots in choice locations were a "bargain" and could not maximize profits by raising price. When parking was plentiful relative to demand,

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[1] The formula for calculating elasticity is: $E = \frac{\%\text{ change in quantity}}{\%\text{ change in price}}$ In the experiment cited, a 22 percent increase in demand was associated with a 33 percent price decrease, for an E = -0.67. By definition, any E - value (ignoring the minus sign) lower than 1.0 is inelastic demand. That is, with E less than 1, raising price will increase total revenue.

"official" lots could not even reduce evening prices, to bring in more customers. Remote lots, with one exception, were in an even worse position, since bus service expense raised their operating costs and they could not adjust by closing on weekends, when additional downtown space made them redundant.

In a broader sense, however, the Fair's larger purposes were served. Plentiful parking certainly helped induce people to visit the Fair (or at least kept them from being deterred), resulting in higher total revenue to the Fair than if parking had been barely adequate.

Table 12-1 summarizes projected and actual financial outcomes of the Fair's transportation operations. The April forecast was made after development costs were almost entirely known but before any revenues were received. The June forecast reflects the first month's operating experience, and the November summary indicates the final results.

Reasons for the Deficit

Although previous estimates, even as late as February, 1982, had predicted that all of the Transportation Services operations at the Fair would break even, it was apparent even before the Fair opened that this would not be so. KIEE management said in early 1982 that it would rather have its support systems lose money than break even financially with a system that failed to function properly. This was an example of a very functional system which did not break even. The April estimate projected higher shuttle bus operating costs which were the result of a change in the original agreement between K-TRANS and KIEE. The price ultimately demanded for remote employee parking was higher than the earlier forecasts had anticipated, as was the cost of leasing the land needed for the employee shuttle bus turn around area. Costs to develop both bus terminals and the parking lots developed by KIEE were also higher than anticipated, due to a combination of unforeseen subsoil conditions and adverse weather early in the spring. To make matters worse, time was on the side of the contractors rather than KIEE, in the sense that the longer the KIEE management delayed making decisions, the higher the price the contractors could charge, given KIEE's desire to have all construction completed by opening day.

The April revenue estimate reflected some of the additional private lots that had begun to appear by the end of March. KIEE parking revenues in April were projected at $2,900,000. The February forecast was $3,800,000.

The June budget estimate reflected several other changes in the situation, all of them adverse to the profit picture. Last minute expansion of the land area available for the north bus terminal had significantly increased the cost of developing that

TABLE 12.1: TRANSPORTATION SERVICES OPERATING FORECASTS AND RESULTS

	APRIL FORECAST	JUNE FORECAST	NOVEMBER SUMMARY
	(All figures X $1000)		
Visitor Parking			
Site Leasing and Development Costs	$ 481	$ 611	$ 611
Shuttle Bus Costs	1,350	860	555
Administrative Costs	165	173	163
Total Visitor Parking Costs:	$ 1,996	$ 1,644	$ 1,329
Visitor Parking Revenues	2,900	1,175	800
Revenues Less Costs	$ (904)	469	529
Other Transportation Services Costs			
Employee, VIP Lot Leasing and Development Costs	$ 656	$ 781	$ 644
Lot Operations	375	395	320
Administrative Costs	36	39	39
Total Other Parking Costs:	$ 1,067	$ 1,143	$ 920
Employee Parking Revenues	118	72	43
Net Other Parking Costs	$ 949	$ 1,143	$ 920
Bus Terminals			
Site Leasing and Development Costs	$ 440	$ 645	$ 720
Operating Costs	240	240	225
Administrative Costs	60	99	99
Total Terminal Operation Costs	$ 740	$ 984	$ 1,044
System Access Costs	214	254	274
General + Administrative Expenses	123	150	150
Net Total: Other Transportation Services Costs	$ 1,077	$ 1,388	$ 1,468
Net Income (Deficit) from Transportation Services	$(1,122)	$(3,000)	$(2,957)

site, although the improved operation made the extra cost worthwhile. Both bus terminals had developed significant deterioration in the most heavily traveled portions of the paving, requiring repairs and suggesting that maintenance costs for pavement would be a continuing item through the life of the Fair. The latter proved untrue due largely to decreased bus volume. Virtually no maintenance was needed on bus terminal paving after the end of June.

The June estimates also reflected higher bus terminal operating costs, based on experience to date with the number of people needed to operate the terminals during busy times. On the other hand, shuttle bus services had already been cut back, so some saving was forecast in that area.

Perhaps the most damaging condition reflected in the June forecast was the low demand for, and hence revenue from, official parking spaces. Earlier forecasts had expected that the main official lot complex near the north gate would fill up practically every day of the Fair, generating revenues of nearly $5,000 per day. These estimates were revised downward substantially in the June forecast. Estimates for revenues from other official lots were also adjusted downward.

In the final analysis, the deficit was fairly close to the $3,000,000 projected in June, although the absolute levels of both revenues and expenses were lower than the June forecast. As bus terminal volumes declined and familiarity with terminal on the part of the bus drivers increased, it proved possible to operate the terminal with fewer employees and ultimately to close the shuttle bus terminal entirely. Staffing hours in the close-in visitor and VIP parking lots were reduced, reflecting the availability of parking and hence a diminished need to enforce parking restrictions.

Shuttle bus services were reduced even below the levels anticipated in June and ultimately the remote official parking lot shuttles were terminated. The employee remote parking lot contract and its associated shuttle service were also terminated. Despite these cost reduction measures, revenues from parking continued to fall below forecasts, so that the ultimate effect was merely to hold the deficit at the $3,000,000 level projected in June.

Impact on Private Operators

The ability of private operators to adjust prices to market conditions was a mixed blessing. By keeping prices relatively high on busy days, operators certainly acted to maximize profits. However, the need to meet the competitive (lower) price resulted in revenues which barely covered operating expenses for some marginal lot operators on slow days. And, the initial excess

supply forced many to make an early exit from the market. Given the substantial front-end cost for lot development encountered by many operators, it is almost certain that operators of the 5,000 spaces withdrawn from the market by mid-summer suffered significant capital losses. An approximation of the investment involved may be calculated as follows:

Site acquisition--six to nine months lease @ 40¢ sq.ft. -	- $140 per space
Site Preparation (no major demolition or grading(40¢ sq.ft. (typical)	- 140 per space
Permits, Insurance, Administration	- 20 per space
Total Investment:	$300 per space

Impacts on private operators were not uniformly distributed, of course. In general, the closer a lot was to a gate, the higher the probability that the operator could command the $6.00 price; the further the lot, the higher the likelihood of price-cutting. However, prices were also sensitive to the supply within the submarkets around each gate and approach routes.

The University of Tennessee's decision to enter the parking business also affected private sector operations and KIEE itself. During the summer months there was substantial excess supply of parking near the Southwest gate. However, except for the low evening rate, the University did not engage in daily or hourly rate changes. In the absence of price-cutting by the two major operators (the University and KIEE), the private operators near the Southwest gate were able to avoid some of the price competition which erupted at other locations.

Conclusions

Despite incomplete information, some conclusions about the wisdom of attempting to establish parking rates well ahead of an event may be drawn. The Fair's intent was to insure that an adequate supply of parking would be available to accommodate Fair visitors, at a price known in advance, and in lots conforming to high standards in keeping with the Fair's overall image. This may be viewed as an attempt to reduce uncertainty for visitors. In the end, reducing uncertainty turned out to be costly, as it has at prior World's Fairs.

The fixed $6.00 rate failed to allow for adjustment to some realities of the marketplace. With hindsight, an evening rate (e.g., $2.00 after 6:00 P.M.) would certainly have increased cars parked at "official" lots at little or no cost, given that "unofficial" lots were resorting to price competition.

The fragmentary evidence of elasticity, however, does not indicate that "official" lot operators were hurt by the inability to lower daytime rates to meet the competition. An operator who cut his rate from $6.00 to $4.00 would have needed 50 percent more cars just to maintain the same revenue as before the price cut. It is by no means clear that price reductions (including evening hours) would have been advantageous to "official" lot operators. The Fair itself was a victim of its desire for consistent, predictable pricing. Lower prices in "official" lots operated by others would have increased the Fair's revenue, since their contracts called for per-car fee payment, unless KIEE would have agreed to lower the fee. Keeping the price at $6.00 was probably the best strategy for those lots the Fair itself controlled (at the North and Southwest gates), since price-cutting at those locations would almost certainly have yielded lower total revenue.

Another cost of reducing uncertainty, cited in the Phase I report, was associated with the remote "official" parking lots requiring shuttle bus service. Despite evidence that such ventures had all failed at previous World's Fairs, the Fair opted to make commitments to remote lot operators early on, to insure the adequacy of the parking supply. In so doing, Fair management committed to a relatively high-cost operation to serve lots which were located (as it turned out) in very poor competitive positions. Had it been possible to defer the commitments, few, if any, remote lots would have been needed or committed to by KIEE.

It also is apparent that the $6.00 price was above the equilibrium level. Over the run of the Fair, on the average, the equilibrium price was probably in the $4.00 range, except in downtown where it was close to $6.00. Given its desire to break even on parking, KIEE undertook to develop some parking lots which had higher per-space costs than others which ultimately came on the market, expecting to recover their costs at the $6.00 price. Had KIEE attempted to set an equilibrium price without regard for their own costs, it is likely that none of the remote lots would have received "official" designation. The amount of "official" parking would, then, have been reduced by almost 3,500 spaces. However, it is not clear that an announced price of $4.00 would have encouraged as much parking development as was required. In a sense, the equilibrium price is the crucial question for future special events, along with a corollary issue of whether parking and transportation operations should be expected to break even.

Conclusions about parking pricing in Knoxville may be summarized as follows:

1. Where demand was high relative to a lot's capacity, the lot would probably fill at any price up to and including $6.

2. Where demand was low relative to the lot's capacity, price-changing could influence the number of vehicles parked, but was not likely to increase revenue above what it would have been at the higher price.

3. Since most people parked along their approach routes without searching for cheap parking from one gate area to another, prices could be different in different areas at the same time.

4. Price variations affected lot occupancy when those with different prices were in sight of each other; there were no apparent impacts when lots were not visible from one another.

5. Future special events planners should try to determine the equilibrium parking price because of its impact on setting the official lot price, encouraging private lot development and determining potential revenues to help support the overall transportation system.

It is important to remember that transportation services are peripheral, not central, to a special event. The purpose of transportation services is to create adequate, economical access to the event. Viewed in that context, losses the Fair incurred outside the gates may well have been offset by added spending inside. The ease of access may have resulted in longer average stays at the Fair as well.

BUS SERVICE PRICES

Shuttle bus prices must be examined in relation to parking prices. Shuttles serving outlying communities, hotels, and motels offered Fair visitors a choice of mode. Hence, bus service and Fair parking were substitute goods for some visitors. The fate of shuttles serving remote parking lots was not in the operator's hands. Once the choice was made to park in a remote lot, the shuttle ride was a complementary good needed to accompany the rental of the remote parking space. Until that decision was made, remote parking and the accompanying shuttle bus trip competed with close-in parking (and possibly with a shuttle bus from the point of origin).

Shuttle from Outlying Communities, Hotels, and Motels

Shuttle bus services from origins other than remote parking lots were marketed in a variety of ways. Greyhound, Trailways, and a number of bus lines within a 200-mile radius of Knoxville promoted package trips to the Fair. A typical package involved a one-day trip to the Fair with admission to the Fair and the cost of the bus ride included in the package. Some representative fares are given in the table below.

TABLE 12-2: SELECTED ONE-DAY FAIR BUS EXCURSION PACKAGE PRICES

Origin	Initial Price	Final Price	Date of Service Termination
Asheville, NC	$39.95	Not Given	Not Given
Atlanta	59.95	Not Given	May 15, 1982
Bristol, TN	31.95	$24.95	July 6, 1982
Chattanooga	31.95	$21.90	August 31, 1982
Johnson City, TN	30.95	$22.45	Not Given
Nashville	45.95	$31.95	July 31, 1982

Discounting started in July, in most cases. As a point of reference, it should be noted that Trailways was pricing the Fair admission at retail, so that the cost of the bus ride from Chattanooga, for example, started at $22.00 and ended at $11.95. During the same time period, the normal round-trip fare between Chattanooga and Knoxville was in the $17-18 range.

In most cases, the cost of this type of package was somewhat higher than the out-of-pocket cost of driving to the Fair and parking for the day, but well below the fully-allocated cost of private automobile operation. For an individual traveling alone or with one companion, this type of shuttle bus presented a valid alternative. The cost of the bus trip over and above the out-of-pocket cost of driving and parking may be viewed as the premium that users of these services were willing to pay to avoid potential inconveniences associated with driving in unfamiliar territory, encountering anticipated congestion near the Fair, and possibly having to park at a location much further from the Fair gates than the bus terminal. These services also provided a relatively low-cost opportunity for individuals without access to an automobile.

Trailways, Inc. aggressively marketed a shuttle service from Gatlinburg to the Fair. This service originated at a park-and-ride lot on the outskirts of Gatlinburg, and offered frequent service between Gatlinburg and the Fair for $10 round trip. The price included only the cost of the bus ride; tickets could be purchased just prior to boarding the bus. The frequency of service provided was curtailed after the first few weeks of the Fair, when the anticipated volume of riders did not materialize. However, the service did continue, albeit at a reduced level, for the duration of the Fair.

With hindsight, it appears that this service was actually in a less favorable competitive position than some of the longer-distance shuttles. Gatlinburg is a resort community. Most Fair visitors who stayed there had arrived either on tour or charter buses or in their own automobiles. In either case, most of them had an alternative means of transportation to the Fair. For those with private automobiles, an out-of-pocket cost of approximately 10¢ per mile for operation of a private vehicle translated to an outlay of $15 for driving to and from the Fair and parking in one of the "official" lots. Even with a half-fare tariff for children under 12, a group of more than two people was financially better off driving to the Fair than taking the bus. Although some families paid the price for shuttle transportation on the first day of their visit to the Fair, many of them noticed that traffic on the approach routes flowed well and that parking was readily available immediately adjacent to the shuttle bus terminal. As a result, repeat shuttle business from visitors spending more than one day at the Fair was rare.

Other shuttle operators serving the Gatlinburg market were more prone to tie their service to exclusive pickup arrangements at specific motels or campgrounds. In some cases, the motel operators sold individual tickets on a commission basis; in others the shuttle bus ride to the Fair was part of a pre-sold lodging package. While some of these services charged less than the Trailways tariff, and provided more convenient pickup and dropoff points in Gatlinburg, they were at the same competitive disadvantage with respect to the relative price of driving and ease of parking.

Conclusions on Shuttle Services

Given auto occupancy rates and bus operating costs, it appears unlikely that any price for shuttle bus service from outlying communities could have enabled operators to break even and carry large numbers of people. The prices recommended by the PSC for the service appeared to be related to the PSC's perception of the cost to provide service rather than the demand curve. Even so some operators claimed they would have needed load factors in excess of 100% to break even at the PSC-recommended rates.

On the other hand, comments from some shuttle bus operators indicated that there is a small market segment with relatively inelastic demand for whom shuttle bus service will always be a viable choice, at virtually any price. This market is composed of people who do not wish to drive to the Fair, due to fear of congestion, unfamiliarity with the route, not having a car, not being able to drive, etc. The residual group of shuttle operators who continued service throughout the Fair were, in all likelihood, serving primarily this market. Since the market is fairly small, a viable shuttle service must also have fairly low costs in order to survive. Operators with low capital investment and low fixed costs were the most viable in Knoxville.

Remote Parking Shuttles

As noted, the demand for shuttle bus service from a remote parking lot is complementary to the demand for parking in the lot. One or two parking lot operators attempted to separate parking and shuttle bus costs, and to advertise very low parking rates, in some cases without plainly indicating that the bus ride cost extra. Research indicated that even in those cases, the bus operator's revenues were established by some agreement with the lot operator (unless the lot and the bus were operated by the same person or firm) and did not depend on bus ridership.

The "official" remote lot operators who contracted on their own with bus operators after KIEE cancelled the remote lot contracts had to pay more per car parked for the bus service than KIEE had charged them. Given the overall parking situation in Knoxville, and judging by experience at past World's Fairs, financial success is no more likely for remote shuttle bus operations than for remote parking lot operations.

Remote parking lot operators, as noted above, attempted to employ a pricing strategy which separated the cost of the parking and the cost of the shuttle. It is difficult to judge the success of this marketing strategy, and no attempt was made to collect data from the operators who used it. In one case, an unofficial lot operator was directly opposite an official lot. It became clear that the obvious price competition which existed between the two was not the most important difference. A concealed aspect was the unofficial lot operator's attempt to control his costs by reducing the level of his shuttle bus service to barely tolerable frequencies--in some cases to the half-hour or forty minutes it took for one bus to make a round trip. By contrast the "official" lot shuttle service operated every 10 minutes during the early days of the Fair, then every 12 to 18 minutes as service was reduced in the Fair's attempt to cut costs. Unfortunately, quality of service was impossible for a Fair visitor to judge before selecting a lot.

THE ROLE OF THE PUBLIC SERVICE COMMISSION

Many bus operators felt that the PSC should have restricted market entry to provide some degree of economic security for those authorized to operate. The PSC apparently viewed its role somewhat differently. The rates they recommended appeared to strike a balance between the cost of providing service for the bus industry in Tennessee and the interests of consumers. They were reluctant, for several reasons, to deny entry to any operator who appeared fit.

First, there was really no good way to accurately predict the size of the market. Thus, there was no basis for determining how many carriers should be authorized to serve. Second, for valid political reasons, they did not wish to be placed in a position of having to decide which firms might profit by the Fair and which would be denied entry to the market entirely. Third, the current trend to deregulation and free entry probably affected their decision to not limit carriers. Therefore, the decision of the PSC to limit its intervention to establishing rates was a very prudent one.

At the same time, the shuttle operators who were established carriers in the Knoxville area felt that the PSC should, at the very least, have given some preferential consideration to established firms. This view also has some merit. Established firms, local to an area, have a slightly greater stake in protecting their reputations than outsiders who come in solely to serve a special event. It is likely that the assurance of adequate supply achieved by allowing all comers to serve the market could have been achieved by allowing local operators to lease equipment (which was permitted anyway), encouraging them to serve, and maintaining a reasonable pricing structure. However, under existing law, contracts between non-local operators and hotel/motel/campground operators could not have been barred, so the outcome of such a strategy is unclear.

Conclusions on PSC

Although the consequences of the strategy pursued by the PSC were painful to many operators, no other policy short of very strict entry regulation would have achieved any better results, and it is not clear that entry regulations would have been preferable, because:

1) the size of the market would have to be accurately estimated,

2) the "best" carrier(s) would have to be selected, and

3) some means would have to be available to assure that the chosen carrier(s) maintained compliance with the standards established.

The underlying problem was the inability to predict the market size. Under the circumstances, it is probably not appropriate to suggest a stronger role for the PSC or other regulatory body than vigorous enforcement of criteria for fitness to serve. It was suggested that the PSC could have helped the market regulate itself, by requiring a cut-off date for licensing 2-3 months in advance and posting a running total of the number of buses for which licenses had been applied. By this the potential carrier could estimate how large his competition would be.

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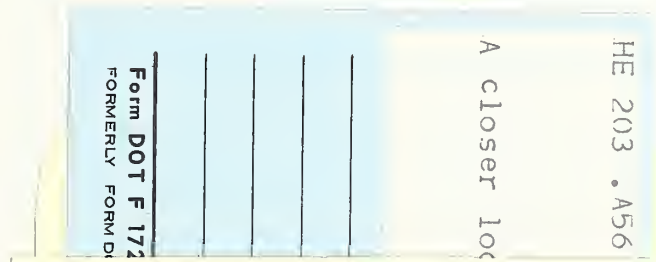

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