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Transportation Study

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Memorandum

To: Regional Director, Southwest Region

From: Assistant Manager, Southeast/Southwest Team, DSC

Reference: Bandelier National Monument; Pkg. No. 146; Park General;
Special Study; Transportation Study

Subject: Final Report

Enclosed for your files are four (4) copies of the Final Report, Bandelier Transportation Study.

By copy of this memorandum, the superintendent is being furnished with three (3) copies and the Maintenance Division, WASO, with two (2) copies.

[Signature: John W. Bright]
John W. Bright

cc:
WASO-540, w/enc.
Supt., Bandelier, w/enc.



TRANSPORTATION STUDY
BANDELIER NATIONAL MONUMENT

Prepared by:

Elmer J. Hernandez
National Park Service
Denver Service Center
Southeast/Southwest Team

April 1981

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Introduction

CHAPTER I

Introduction

A. BACKGROUND

Bandelier National Monument, lying on the Pajarito Plateau in north-central New Mexico, contains an impressive number of prehistoric Indian ruins. Once occupied by people of the Pueblo culture during relatively late prehistoric times - approximately 1250 A.D. to the late 1500's - the ruins represent the result of a migration, a continuation and modification of an earlier culture developed in the north, and 300 years of rich ceremonial and agricultural existence. The first migrants to Bandelier found, as modern visitors do today, a charming canyon oasis cutting through the high mesa with its tree-lined, spring-fed streams.

The Monument is accessible via New Mexico 4 and U.S. 285 and lies 45 miles from Santa Fe; 12 miles from Los Alamos; 95 miles from Albuquerque; and near the pueblos of Santa Clara, San Ildefonso, and Cochiti (Figures 1 and 2).

Ninety percent of Bandelier is virtually undisturbed, ^{23,267}~~21,100~~ acres of wilderness have been designated. This rugged and scenic land is accessible by more than 60 miles of maintained trails, leading to such features as the gorge of Alamo Canyon, the Stone Lions Shrine, Painted Cave, the Pueblo ruins of San Miguel and Yapashi, and White Rock Canyon of the Rio Grande.

However, the most accessible features of the Monument are the ruins in Frijoles Canyon. These ruins are visited by a loop trail laid out to exhibit a complete sample of the ruins of the Bandelier area. Also located in Frijoles Canyon are the visitor facilities, administrative offices, picnic area, concession operations, maintenance facilities and some employee housing. A campground which is open from March 15 to November 1 is located on the mesa above Frijoles Canyon near the entrance station.

The development in the Canyon is accessible via a major two-way road leading from the entrance on Frijoles Mesa. The parking area in the Frijoles Canyon visitor-use area has an 80-space parking capacity.

Although the capacity of the existing two-way road into the Canyon has not been a problem, congestion regularly occurs in the parking area on peak days during the peak visitor season. When the 80-car parking lot is full, cars are parked along the entrance road or wait in line for a parking space which poses unsafe conditions and detracts from the visitor experience.

To relieve the congestion in Frijoles Canyon, the Master Plan for Bandelier National Monument proposes phasing out parking in the Canyon during the peak visitation season and providing a parking

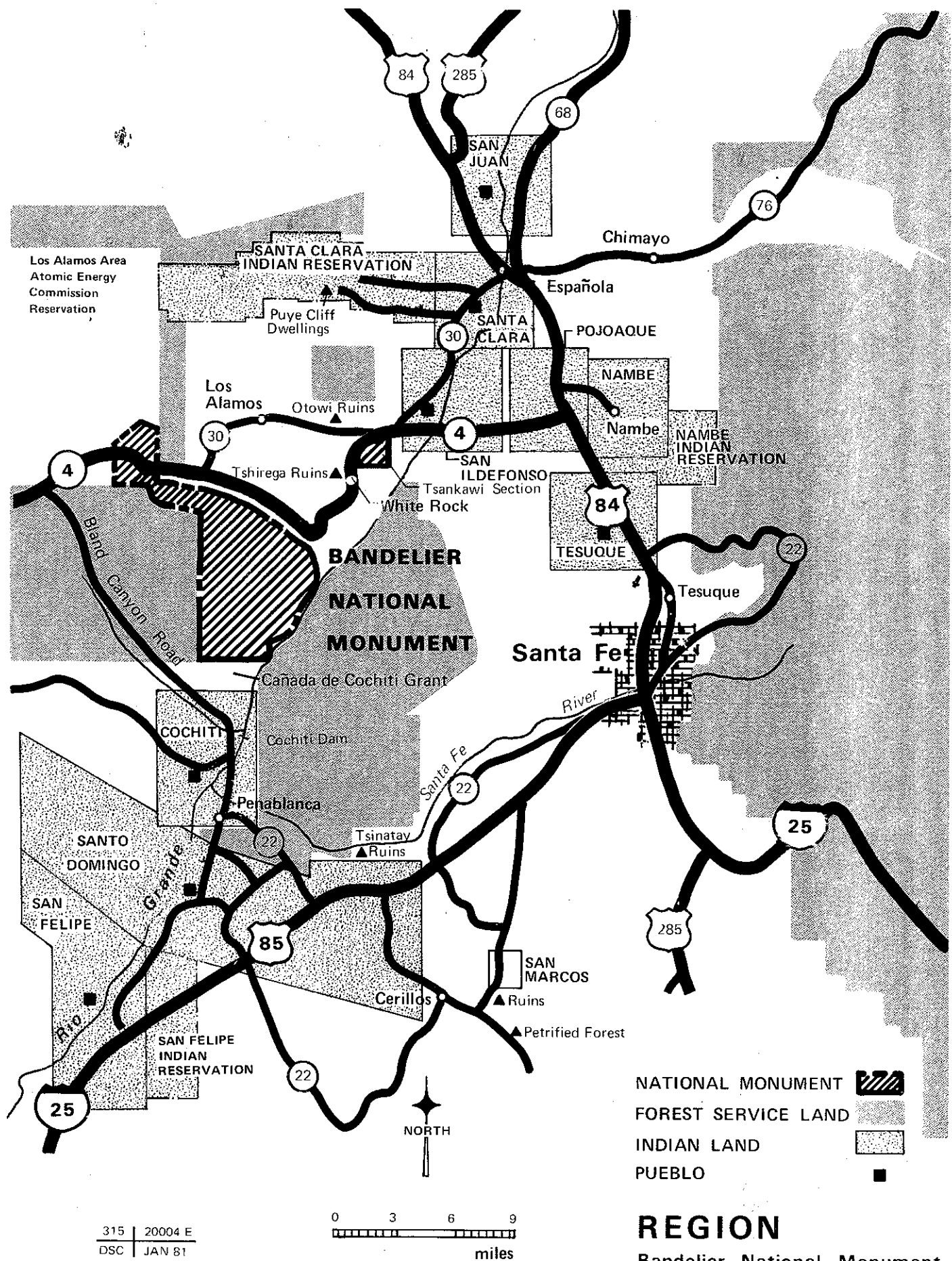
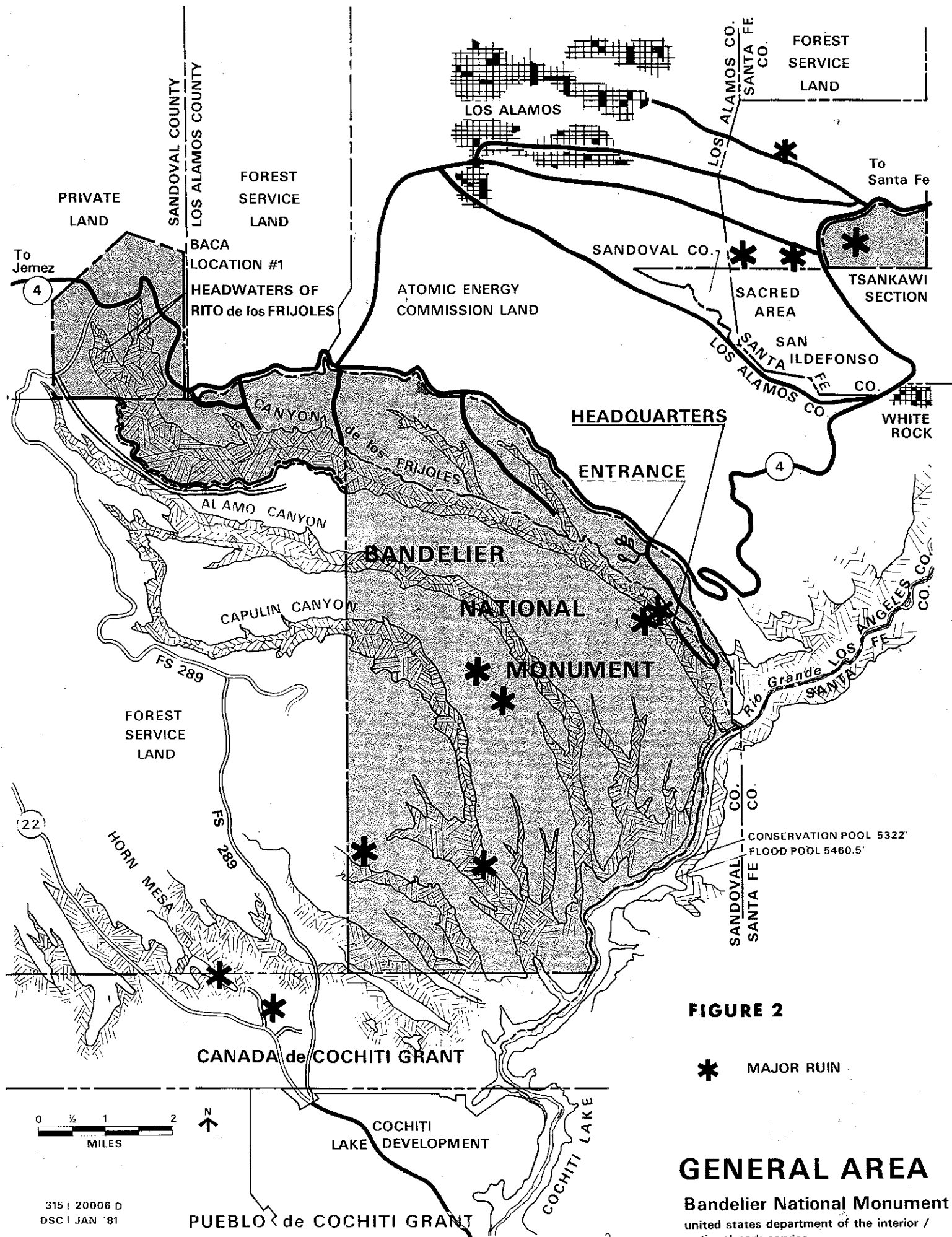


FIGURE 1



area on the mesa above Frijoles Canyon. Visitors would then be transported to the Canyon via a transportation system.

B. STUDY PURPOSE

The purpose of this study is to analyze the existing problems and to develop transportation alternatives which will help to alleviate the problems in the future.

Chapter 2

CHAPTER 2

Visitation and Traffic Analysis

A. VISITATION

Recreational use of Bandelier National Monument has fluctuated greatly during the last decade. Table 1 illustrates the annual recreational visitation to the Monument over the last decade. Visitation has fluctuated from a low in 1969 of 133,413 visitors to as high as 283,225 in 1976. The annual growth rate has also varied significantly over the last decade, ranging from an increase of 68% between 1974 and 1975 to a decrease of approximately 52% from 1976 to 1977. This decrease can be attributed to several factors: The fire and flooding in the Monument which occurred during the peak visitor season and severely affected visitation for the remainder of the year; the Monument was closed to all visitors for a portion of the month of June 1977; and, the method of counting visitors changed.

Over the last decade, the average rate of increase in visitation has been approximately 7.3% per year. In order to determine if the 53% decrease in 1977 seriously affected the average rate of increase, visitation over the last two decades was analyzed. This analysis showed an average rate of increase of 7.4% per year. Therefore, for purposes of projecting future visitation an average rate of increase of 7% will be used.

Table 2 illustrates monthly visitation from 1969 to 1978. The table shows the monthly visitation as a percentage of annual visitation. Peak visitation generally occurs in July with an average of 17.6% of annual visitors. The months of June and August also have high visitation, at 16.7% and 17.1% respectively. Visitation during the month of May is also significant at 13.5% of the annual visitation. Visitation during the summer months of June, July and August accounts for approximately 52% of the annual visitation (Figure 3).

The average daily visitation as a percent of the monthly visitation is shown in Table 3. The average weekday and average weekend day during the summer months are 2.8% and 4.5% respectively of the monthly visitation. Similarly, the average weekday and weekend day for the non-summer months (other nine months) are 2.5% and 5.2% respectively of the monthly visitation.

Figure 4 shows the hourly distribution of Monument visitors for the average weekday and average weekend day. The distribution indicates that for the average summer weekday, the peak arrival is 11% of the daily visitation and occurs between 11 a.m. and noon. The peak departure is 14% of the daily visitation and occurs between 5 p.m. and 6 p.m. For the average summer weekend day, the peak arrival and departure are 15% of the daily visitation. The peak arrival occurs between noon and 1 p.m. while the peak departure occurs

TABLE 1

HISTORY OF ANNUAL VISITATION

<u>Year</u>	<u>Annual Visitors</u>	<u>Absolute Change</u>	<u>Percent Change</u>
1969	133413		
1970	201215	+ 67802	+50.8%
1971	209466	+ 8251	+ 4.1%
1972	213043	+ 3577	+ 1.7%
1973	171135	- 41908	-19.7%
1974	148218	- 22917	-13.4%
1975	248479	+100261	+67.6%
1976	283225	+ 34746	+14.0%
1977	136431	-146794	-51.8%
1978	153849	+ 17418	+12.8%

$\frac{+66.1}{9} = 7.3\%$ Average annual growth over
last nine years

TABLE 2

Monthly Visitation

As a Percentage of Annual Visitation

	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1969	1.3	0.9	3.0	6.2	14.4	16.7	17.1	17.5	8.8	8.2	3.9	2.0	100.0
1970	1.5	1.9	3.9	4.7	12.1	15.1	19.5	19.6	9.5	6.4	3.5	2.3	100.0
1971	1.3	2.2	4.6	8.5	14.5	18.6	17.3	16.8	5.7	6.2	3.1	1.2	100.0
1972	2.3	2.7	6.2	10.2	16.9	16.3	16.8	14.0	6.0	5.2	1.5	1.9	100.0
1973	1.2	1.5	2.8	6.9	12.2	21.6	16.1	17.8	8.5	7.3	2.4	1.7	100.0
1974	1.4	1.5	6.6	8.5	12.7	15.0	16.9	17.3	8.2	7.4	3.0	1.5	100.0
1975	0.3	0.3	1.7	4.3	14.0	17.0	23.0	23.7	6.6	5.4	2.4	1.3	100.0
1976	2.3	1.6	3.2	4.9	12.5	25.2	21.3	15.4	5.3	4.2	2.3	1.8	100.0
1977	2.8	3.2	5.3	9.0	14.6	8.7	11.8	14.5	10.1	10.0	5.3	4.7	100.0
1978	4.2	2.6	8.6	7.7	11.4	12.2	16.3	14.7	6.7	8.9	4.2	2.5	100.0
Average	1.9	1.8	4.6	7.1	13.5	16.7	17.6	17.1	7.5	6.9	3.2	2.1	100.0

FIGURE 3

1969-1978

AVERAGE MONTHLY PERCENT VISITATIONS

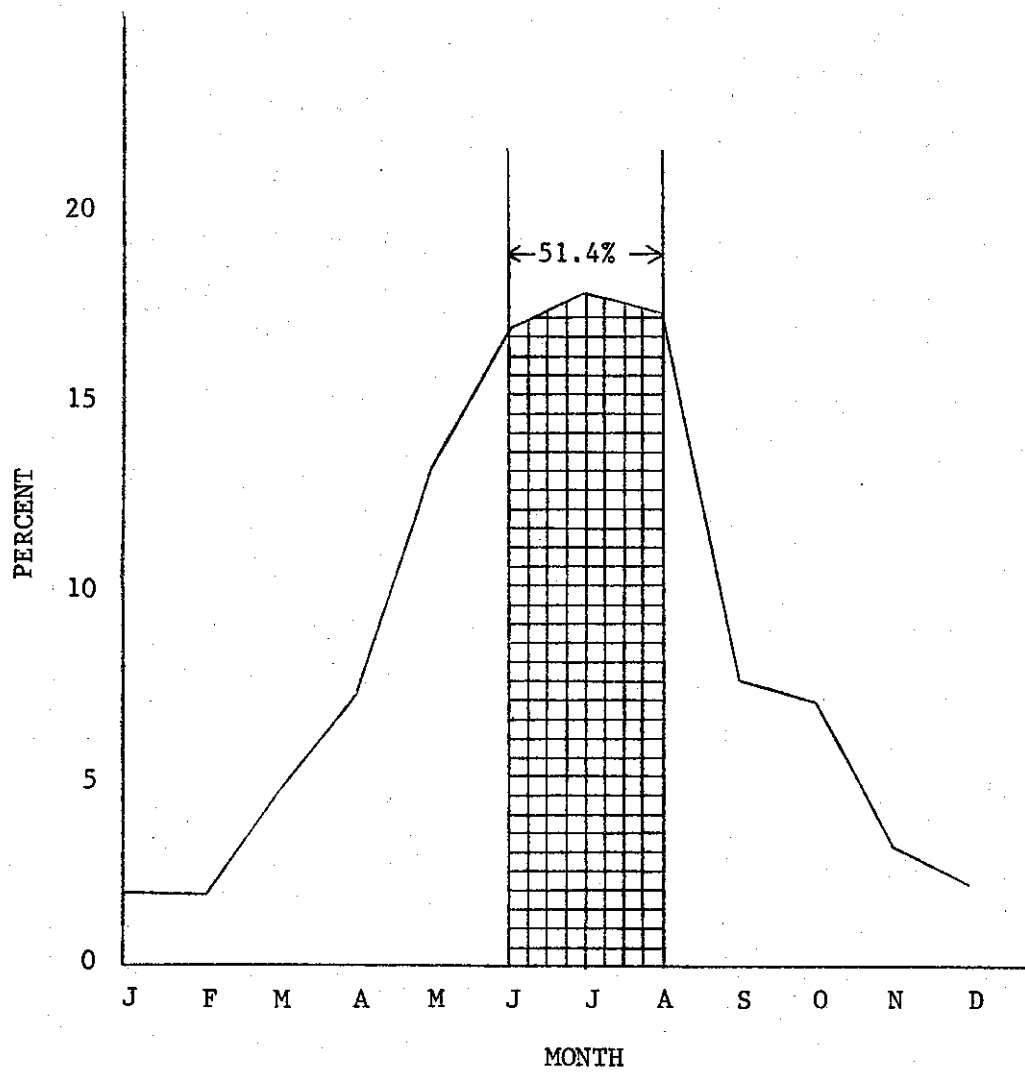


TABLE 3

AVERAGE DAILY VISITATION AS PERCENT
OF MONTHLY VISITATION

<u>Month</u>	<u>Average Weekday as % of Month</u>	<u>Average Weekend Day as % of Month</u>
January	2.7	4.5
February	3.0	4.5
March	2.6	4.7
April	2.2	6.5
May	2.8	4.5
June	2.8	4.7
July	2.7	4.3
August	2.8	4.5
September	2.3	6.0
October	2.1	5.6
November	-	-
December	-	-
Annual Average	2.6	5.0
Summer Average (June, July, August)	2.8	4.5
Non-Summer Average (Other Nine Months)	2.5	5.2

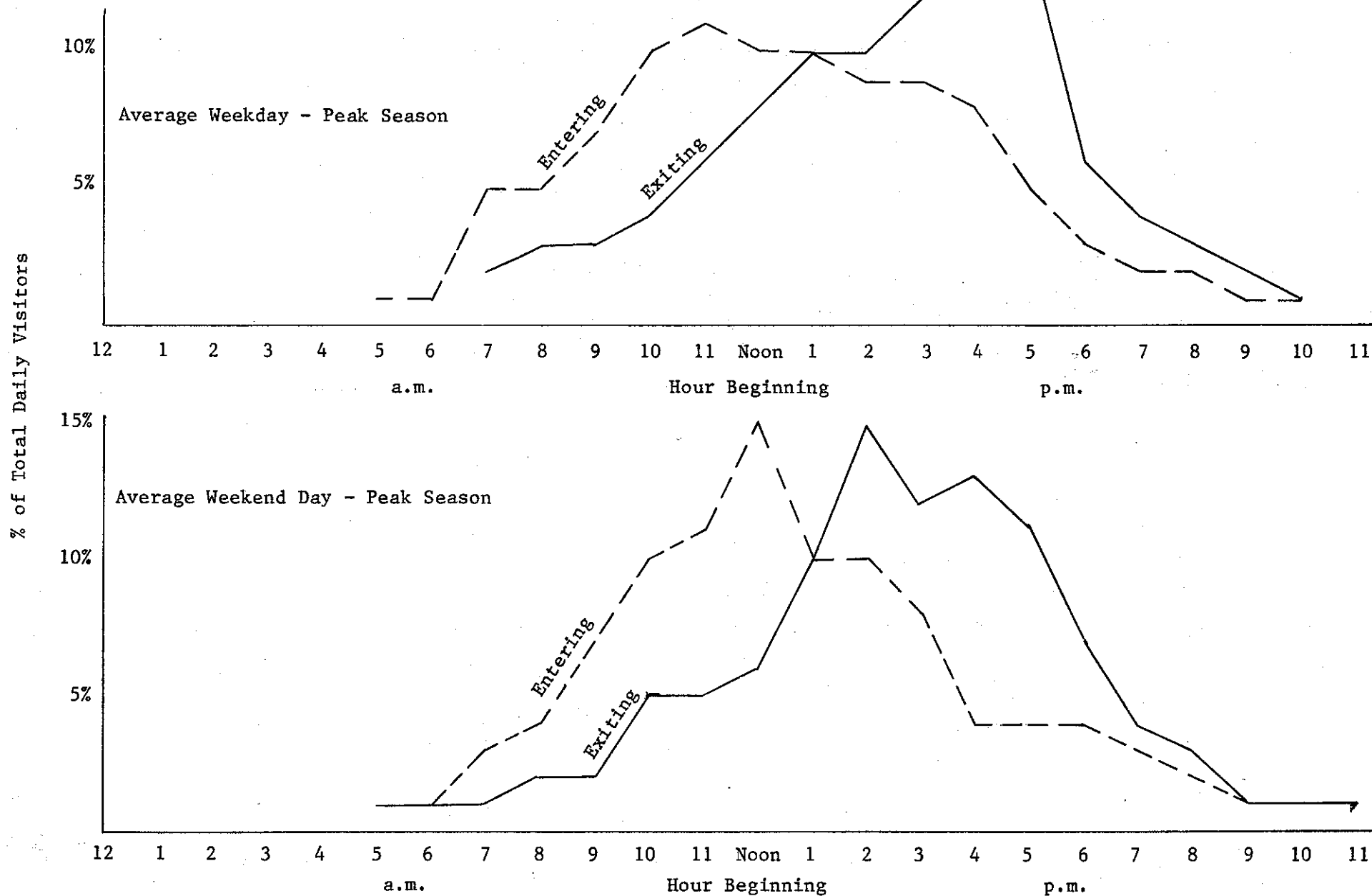


FIGURE 4 -- HOURLY DISTRIBUTION OF MONUMENT VISITOR

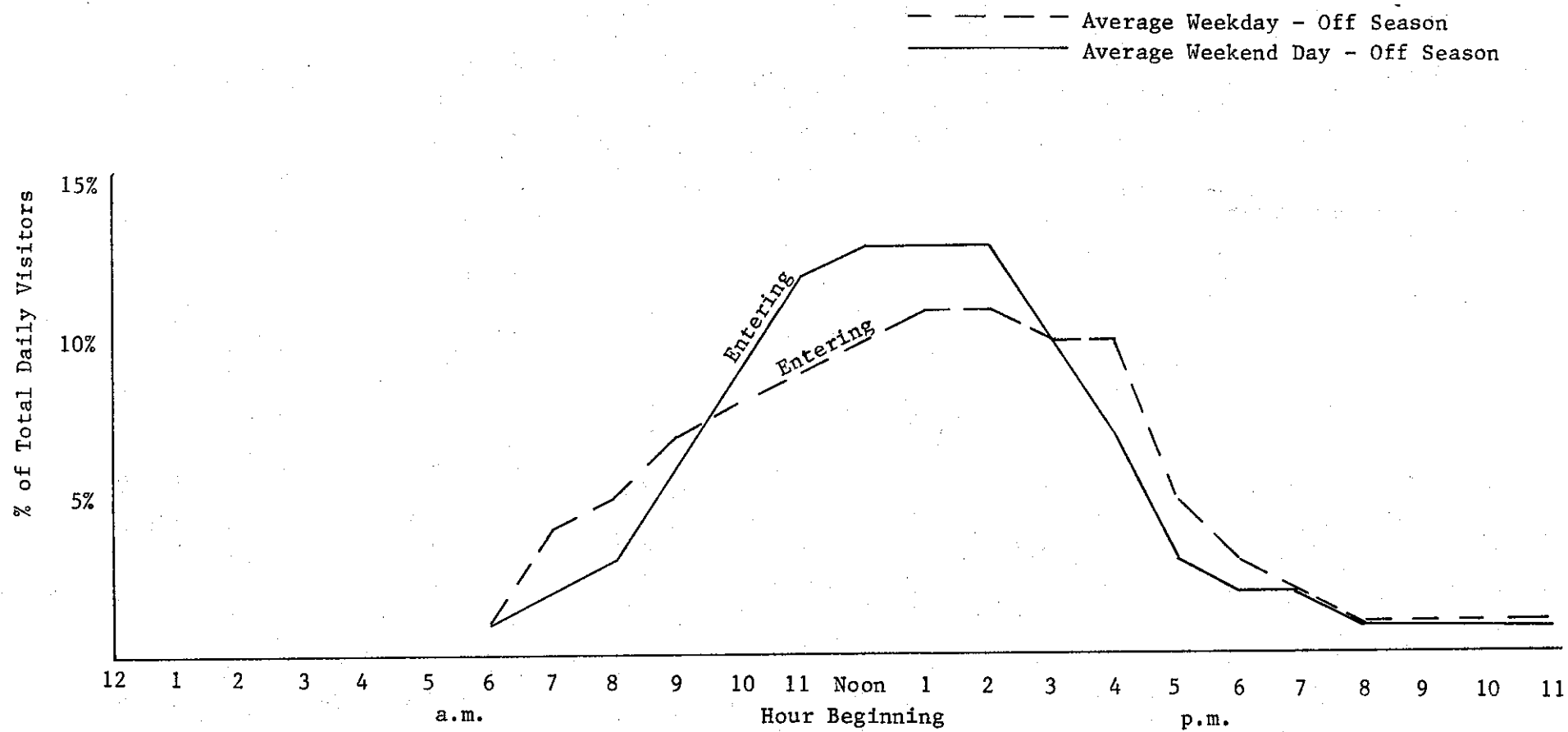


FIGURE 5

HOURLY DISTRIBUTION OF MONUMENT VISITOR

between 2 - 3 p.m. Departure rates were not available for the non-summer months, however, the arrival rates are shown in Figure 5. The peak arrival rate for the non-summer weekday and weekend day is 11% between 1 - 3 p.m. and 13% between noon and 3 p.m., respectively.

Table 4 details states of origin in descending frequency of visitors to the Monument. It is interesting to note that with the exception of Hawaii and Rhode Island, every state in the union is represented. This indicates a wide-spread popularity of the Monument. New Mexico provided most of the visitors (over 50%) to the Monument.

Based on the average annual growth rate of 7% (Table 1) projections of future visitation estimates were made. Table 5 illustrates these projections for 1980, 1985, and 1990. Projections were made for July, the average summer month, and the average non-summer month. As shown on the table, visitation projections for July and the average summer month are similar. This is expected because visitation during the summer months is rather uniform. An average weekday and average weekend day are illustrated for July, the average summer month, and the average non-summer month. Although the summer months are the most critical in determining transportation needs, the average non-summer month is illustrated for comparison purposes.

The month of May was included in the non-summer months since visitor use characteristics for May are most similar with the non-summer months. However, visitation during May is considerably greater than the non-summer months but not nearly as great as for the summer months. Therefore, special consideration to visitation in May will be given in further analysis.

Visitation to the Monument during the summer months and month of May has at times exceeded the capacity of available parking. Therefore, it should be emphasized that visitation estimates assume that no restrictions will be placed on the growth within the time period under study.

By 1985 it is estimated that 247,000 visitors annually will visit the Monument. It should be noted that the estimated 1985 visitation has not yet reached the peak visitation years of 1975 and 1976. The drop in visitation between 1976 and 1978 was significant and it will take several years at a uniform growth rate (7%) to reach the 1976 level.

B. TRAFFIC

The visitation projections discussed in the previous section can be translated into traffic volume data by applying the modal split and auto occupancy factors (people per car) as shown in Table 6.

As shown in the table, 98% of the visitors during the summer months arrive by private automobile. The remaining 2% arrive by bus. During the remainder of the year (non-summer months), the number of visitors

TABLE 4

STATES OF ORIGIN

1. New Mexico - 51.2%	26. Minnesota - Less than .5%
2. Texas - 13.2%	27. Nebraska - Less than .5%
3. Colorado - 4.6%	28. North Carolina - Less than .5%
4. California - 4.6%	29. Alabama - Less than .5%
5. Oklahoma - 2.6%	30. Arkansas - Less than .5%
6. Illinois - 1.9%	31. Connecticut - Less than .5%
7. Arizona - 1.7%	32. Maine - Less than .5%
8. New York - 1.5%	33. Oregon - Less than .5%
9. Ohio - 1.5%	34. Utah - Less than .5%
10. Kansas - 1.4%	35. Canada - Less than .5%
11. Missouri - 1.2%	36. Kentucky - Less than .5%
12. Michigan - 1.1%	37. Mississippi - Less than .5%
13. Florida - 1.0%	38. Nevada - Less than .5%
14. Pennsylvania - 1.0%	39. South Carolina - Less than .5%
15. Louisiana - Less than 1%	40. Wyoming - Less than .5%
16. New Jersey - Less than 1%	41. Alaska - Less than .5%
17. Wisconsin - Less than 1%	42. Montana - Less than .5%
18. Iowa - Less than 1%	43. New Hampshire - Less than .5%
19. Tennessee - Less than 1%	44. Vermont - Less than .5%
20. Virginia - Less than 1%	45. West Virginia - Less than .5%
21. Washington - Less than .5%	46. Foreign - Less than .5%
22. Georgia - Less than .5%	47. Delaware - Less than .5%
23. Idaho - Less than .5%	48. District of Columbia - Less than .5%
24. Indiana - Less than .5%	49. Massachusetts - Less than .5%
25. Maryland - Less than .5%	50. North Dakota - Less than .5%

TABLE 5

VISITOR PROJECTIONS

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Annual Monument Visitors <u>1/</u>	176,100	247,000	346,500
<u>Month of July:</u>			
Monthly Monument Visitors <u>2/</u>	31,000	43,500	61,000
Avg. Weekday Visitors <u>3/</u>	835	1,175	1,650
Avg. Weekday Peak Hour Visitors <u>4/</u>	92	129	182
Avg. Weekend Day Visitors <u>5/</u>	1,335	1,870	2,625
Avg. Weekend Day Peak Hour Visitors <u>6/</u>	200	280	394
<u>Average Summer Month:</u>			
Monthly Monument Visitors <u>7/</u>	30,100	42,200	59,300
Avg. Weekday Visitors <u>9/</u>	845	1,180	1,660
Avg. Weekday Peak Hour Visitors <u>4/</u>	93	130	183
Avg. Weekend Day Visitors <u>10/</u>	1,355	1,900	2,670
Avg. Weekend Day Peak Hour Visitors <u>6/</u>	203	285	401
<u>Average Non-Summer Month:</u>			
Monthly Monument Visitors <u>8/</u>	9,510	13,300	18,700
Avg. Weekday Visitor <u>11/</u>	240	332	468
Avg. Weekday Peak Hour Visitors <u>4/</u>	26	37	51
Avg. Weekend Day Visitors <u>12/</u>	495	692	972
Avg. Weekend Day Peak Hour Visitors <u>13/</u>	64	90	126
<u>Month of May:</u>			
Monthly Monument Visitors <u>14/</u>	23,800	33,300	46,800
Avg. Weekday Visitor <u>11/</u>	595	832	1,170
Avg. Weekday Peak Hour Visitors <u>4/</u>	65	92	129
Avg. Weekend Day Visitors <u>12/</u>	1,240	1,730	2,435
Avg. Weekend Day Peak Hour Visitors <u>13/</u>	161	225	336
<u>1/</u> Assumes 7% annual growth factor			
<u>2/</u> 17.6% of annual monument visitors			
<u>3/</u> 2.7% of monthly visitors			
<u>4/</u> 11.0% of daily visitors			
<u>5/</u> 4.3% of monthly visitors			
<u>6/</u> 15.0% of daily visitors			
<u>7/</u> 17.1% of annual monument visitors			
<u>8/</u> 5.4% of annual monument visitors			
<u>9/</u> 2.8% of monthly visitors			
<u>10/</u> 4.5% of monthly visitors			
<u>11/</u> 2.5% of monthly visitors			
<u>12/</u> 5.2% of monthly visitors			
<u>13/</u> 13% of daily visitors			
<u>14/</u> 13.5% of annual monument visitors			

arriving by private auto is approximately 94%. It should be noted that during the month of April approximately 12% of the visitors arrive by bus and approximately 15% during May. This can be attributed to tours by school groups.

Table 6 also illustrates people per car factors for the summer and non-summer months. The factors for the average summer weekday and average summer weekend day are 3.3 and 3.4 respectively. For the non-summer months, the average weekday factor is 3.0 and the average weekend day factor is 3.3.

To determine visitor use patterns in the Monument a study was made of vehicles entering and exiting the Monument. This was done during the summer months and all vehicles entering and exiting were recorded. A cumulative graph of the percentage of vehicles entering the Monument during a 24-hour period was made. A graph of exiting vehicles was also made. Graphs for the average summer weekday and average summer weekend day are shown on Figures 6 and 7 respectively.

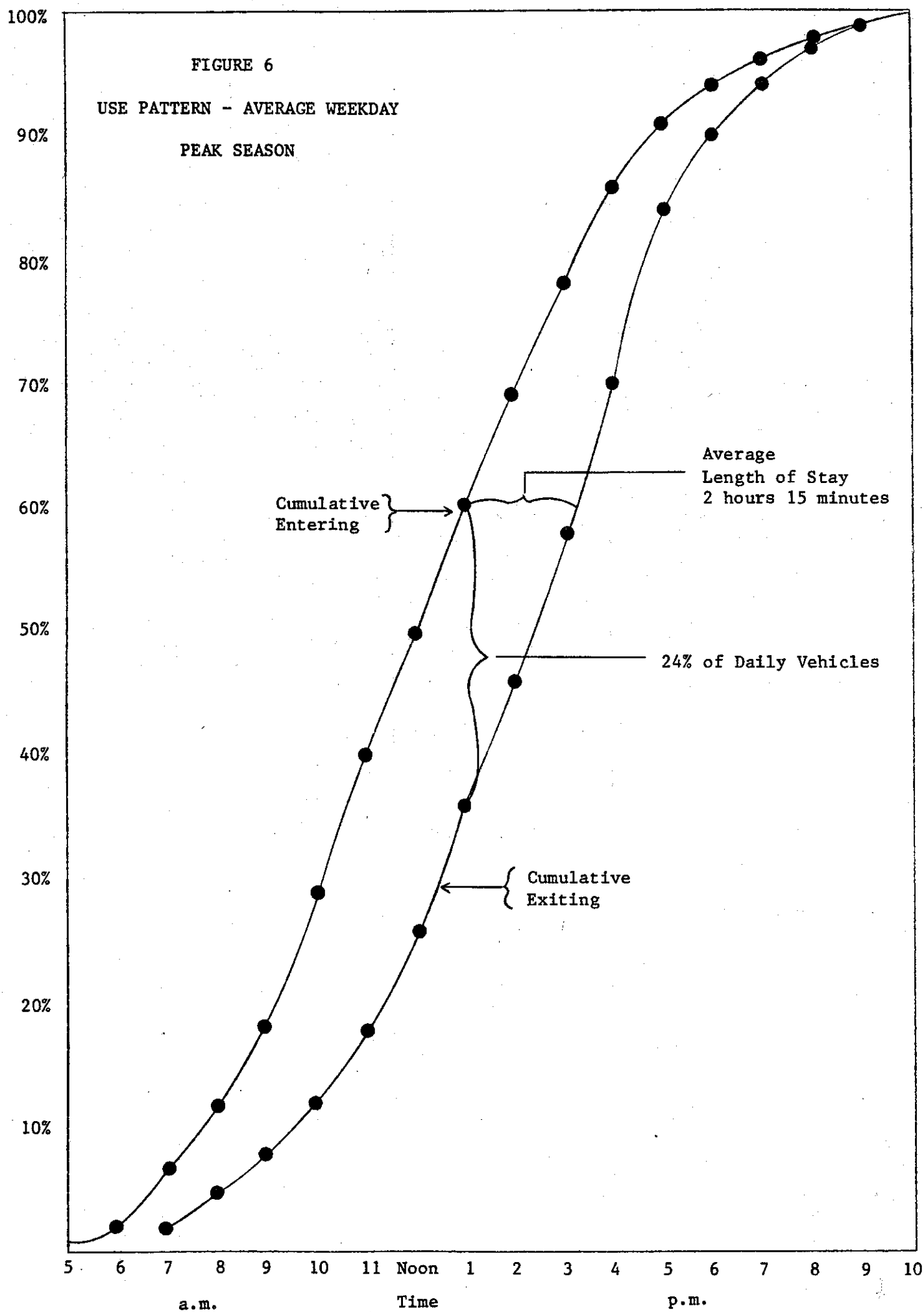
Considerable information can be obtained from the cumulative graph of arrivals and departures. Any vertical line drawn between cumulative vehicles entering and cumulative vehicles exiting is a measure of the number of cars within the Monument at that particular time. Also, any horizontal line is a measure of the average length of stay for these cars. For example, during the average summer weekend day 30 percent of the daily vehicles will be in the Monument at noon. These cars can be expected to stay an average of 2 hours and 30 minutes. The graphs for the average summer weekday and average summer weekend day show average lengths of stay of 2 hours and 15 minutes and 2 hours and 30 minutes respectively.

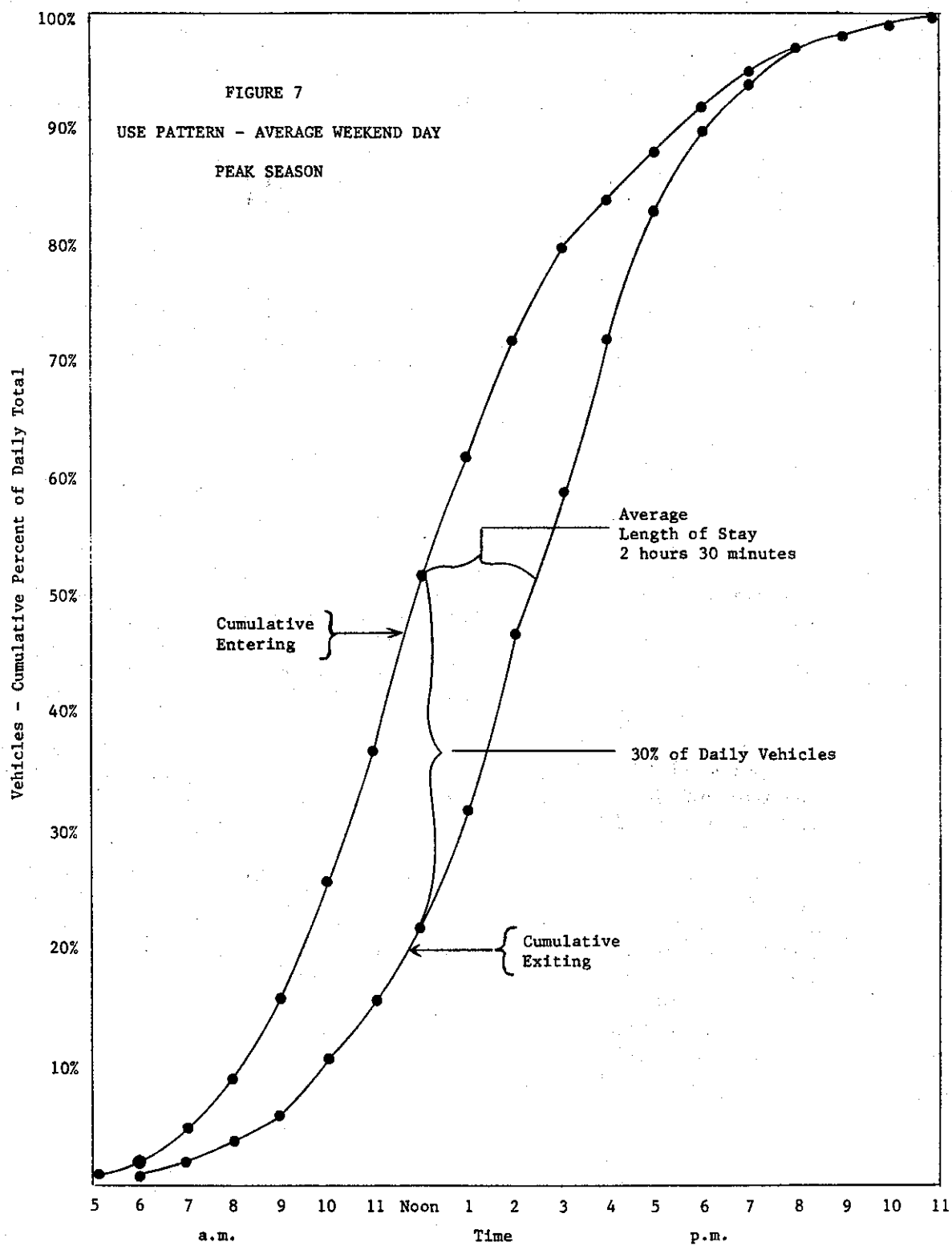
TABLE 6

MODAL SPLIT AND AUTO OCCUPANCY

Month	% of Monument Visitors by Car	% of Monument Visitors by Bus	Auto Occupancy (Persons per Car)	
			Weekday	Weekend Day
June	96.7	3.3	3.3	3.3
July	99.0	1.0	3.4	3.5
August	<u>97.8</u>	<u>2.2</u>	<u>3.3</u>	<u>3.5</u>
Average	98.0	2.0	3.3	3.4
Other Nine Months	93.7	6.3	3.0	3.3

Vehicles - Cumulative Percent of Daily Total





The capacity of the entrance road has been estimated at 300 vehicles per hour in both directions. The capacity will vary depending on operating conditions; however, it is effected primarily by roadway and traffic factors. Roadway factors include lane width, lateral clearance, shoulders, vertical and horizontal alignment, etc. Traffic factors include percent trucks, buses, traffic interruptions, etc.

Based on the traffic and parking projections shown on Table 7, approximately 770 vehicles can be expected to enter the Monument during the average summer weekend day in 1990. Since 15 percent of the daily vehicles arrive during the peak hour one can expect 115 vehicles on the entrance road in the peak direction during the peak hour of travel on an average summer weekend day. This indicates that approximately 2 vehicles would enter the Monument each minute during the peak hour, assuming a regular arrival pattern. Departures during this same time period are 6 percent of the daily vehicles or approximately 45 vehicles. Therefore, total vehicles on the entrance road would be approximately 160 vehicles.

As stated earlier, the capacity of the entrance road is approximately 300 vehicles per hour in both directions. The 1990 peak hour demand is well below the capacity, therefore, capacity of the road should not be a problem.

Parking demands were determined from the traffic estimates using the parking accumulation curve (Figure 8) and are illustrated in Table 7. As stated previously, parking for 80 vehicles is available in the Canyon. The table shows that during the typical July weekend day and average summer weekend day in 1978 parking demand exceeded available space. The capacity will be exceeded during all summer week days beginning in 1984. The table also shows that by 1990 approximately 230 spaces will be needed at peak accumulation during the average summer weekend day. The non-summer weekend day parking demand will exceed the existing 80 spaces by 1990.

As noted earlier, visitation during the month of May merits special consideration as it is a transition between the non-summer and summer seasons. Parking demands for the month of May are also shown on Table 7. Although the parking accumulation curve (Figure 8) is for the summer months, it was felt to be adequate and representative for May. Visitation by bus during May accounts for 15% of the visitation; therefore, parking requirements do not include these visitors. As shown on the table parking will be inadequate on all weekend days in May but will be adequate for all week days until 1990.

TABLE 7

TRAFFIC AND PARKING PROJECTIONS

<u>Year</u>	<u>Average Day</u>	<u>Daily Monument Visitors</u> ^{1/}	<u>Daily Vehicles</u> ^{2/3/}	<u>Peak Hour Peak Direction Vehicles</u> ^{4/}	<u>Peak Parking Accumulation</u> ^{5/}
1978	July Weekday	675 <u>6/</u>	195	20	45
	July Weekend Day	1075 <u>6/</u>	305	45	90
	Summer Wkdy	620 <u>6/</u>	185	20	45
	Summer Wknd Day	990 <u>6/</u>	285	45	85
	Non-Summer Wkdy	245 <u>6/</u>	75	10	18
	Non-Summer Wknd Day	505 <u>6/</u>	145	20	45
1980	July Weekday	835	245	25	60
	July Wknd Day	1335	380	55	115
	Summer Wkday	845	250	30	60
	Summer Wknd Day	1355	390	60	115
	Non-Summer Wkdy	240	75	10	18
	Non-Summer Wknd Day	495	140	20	40
1985	May Wkday	595	170	20	40
	May Wknd Day	1240	320	40	95
	July Weekday	1175	340	35	80
	July Wknd Day	1870	530	80	160
	Summer Wkday	1180	350	40	85
	Summer Wknd Day	1900	550	85	165
1990	Non-Summer Wkdy	332	105	10	25
	Non-Summer Wknd Day	692	195	25	60
	May Wkday	832	235	25	55
	May Wknd Day	1730	445	60	135
	July Weekday	1650	480	50	115
	July Wknd Day	2625	740	110	220
1990	Summer Wkday	1660	490	55	120
	Summer Wknd Day	2670	770	115	230
	Non-Summer Wkday	468	145	15	35
	Non-Summer Wknd Day	972	270	35	80
	May Wkday	1170	330	35	80
	May Wknd Day	2435	630	80	190

TABLE 7 (cont.)

- 1/ Calculated as illustrated in Table 7
- 2/ Modal Split: 99% cars - July
98% cars - Average summer month
93.7% cars - Average non-summer month
85.1% cars - May
- 3/ Vehicle Occupancy: 3.4 - July weekday
3.5 - July weekend day
3.3 - Summer weekday
3.4 - Summer weekend day
3.0 - Non-summer weekday
3.3 - Non-summer weekend day
- 4/ 11% of Daily Vehicles - July, summer and non-summer weekday
15% of Daily Vehicles - July and summer weekend day
13% of Daily Vehicles - Non-summer weekend day
- 5/ 24% of Daily Arrivals - Weekdays
30% of Daily Arrivals - Weekend days
- 6/ Based on actual data

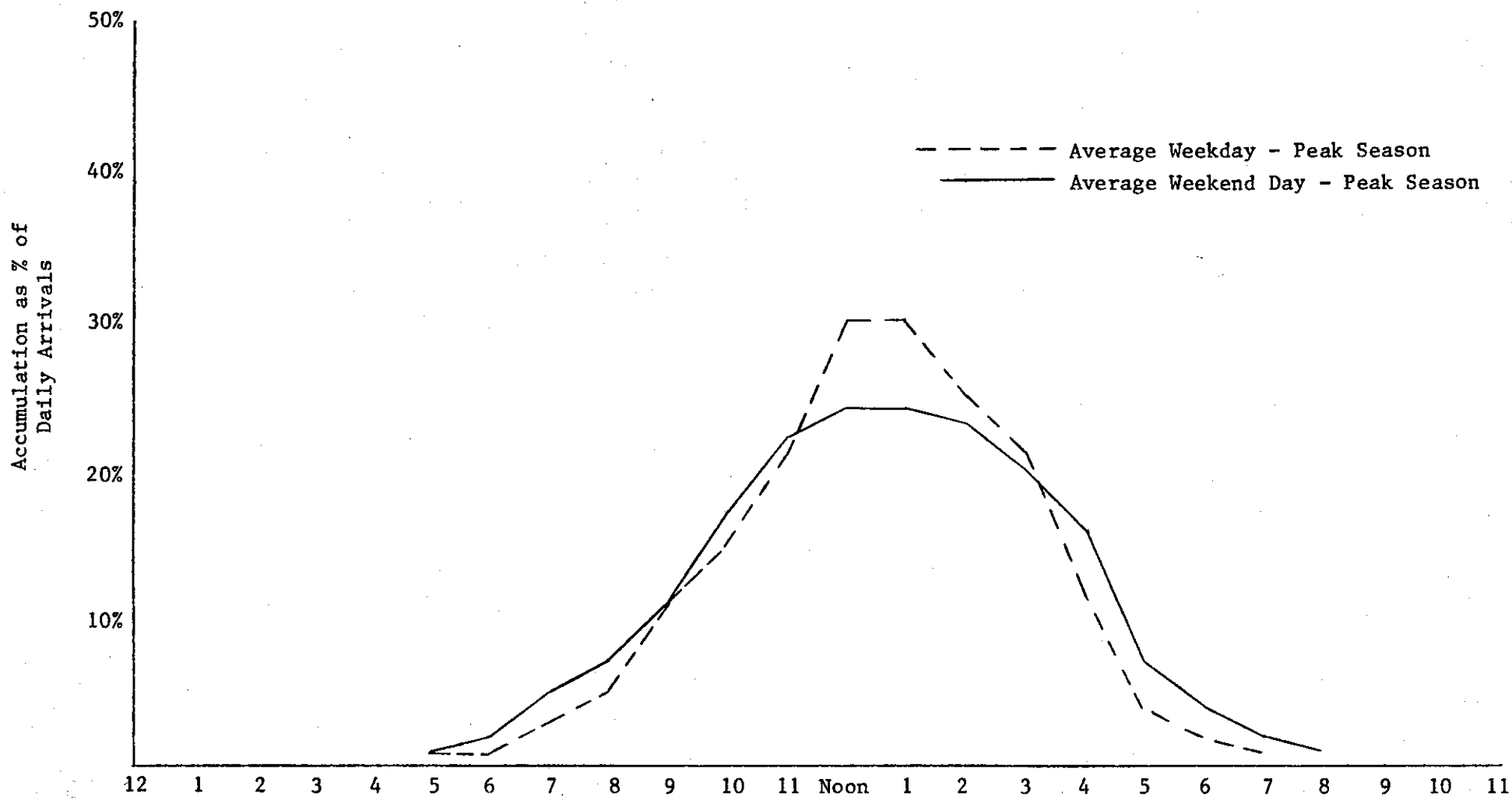


FIGURE 8

PARKING ACCUMULATION

Chapter 3

CHAPTER 3

Transportation Alternatives

A. OPERATIONAL CONCEPTS

Several alternative transportation concepts which could respond to the traffic related problems were defined. These concepts range from complete automobile access to total transit.

1. Private Vehicle Access

This alternative would operate under existing conditions which would allow all visitors to travel to the visitor center area and park their vehicles in Frijoles Canyon. Since the existing parking area in the Canyon has a maximum of 80 spaces, this alternative would require expansion of the existing parking area.

As shown in Table 7, approximately 230 spaces will be needed at peak accumulation by 1990. These 230 spaces do not include spaces for buses and Monument vehicles. It is assumed that 10 spaces would be needed for buses and Monument vehicles for a total of 240 spaces. Since 80 spaces are available in the existing parking area, 160 additional spaces would be needed by 1990.

It is proposed that the parking area be located to the south of the visitor center in the general vicinity of the picnic area (see Figure 9). Previous studies by the National Park Service indicate that the required spaces could be accommodated in this area. Construction of the parking area would require approximately one and one-half acres and would cost about \$176,000.

2. Transit Shuttle Service

It is proposed in the Master Plan for Bandelier National Monument to construct a parking area on Frijoles Mesa and then provide the visitor transportation to and from the canyon. Several transit alternatives, in addition to the Master Plan proposal, were evaluated.

Basically the routes for all the transit alternatives would remain the same, only the location of the terminal area and distance to and from the visitor center in the canyon would vary. Several locations were evaluated as potential sites for the transit terminal area. Two potential sites were located on the mesa above Frijoles Canyon and a third was located near the intersection of N.M. 4 and the Monument entrance road.

As shown on Figure 9, Sites A and C are basically equal distances from the visitor center. Site A, the Master Plan proposal, is located on the west side of the entrance road. Site C is located on the east side of the entrance road directly opposite Site A. Both Site A and Site C are about 2.5 miles from the visitor center. Site B, located near N.M. 4 is approximately 3.5 miles from the visitor center.

For all alternatives, exclusive transit service would be instituted during operating hours. An exception to the exclusivity would be made to permit access to the visitor center for groups in charter buses and the handicapped in private vehicles. This would eliminate the necessity of securing special equipment to accommodate the wheelchair visitor. These visitors would use the existing parking area in the canyon.

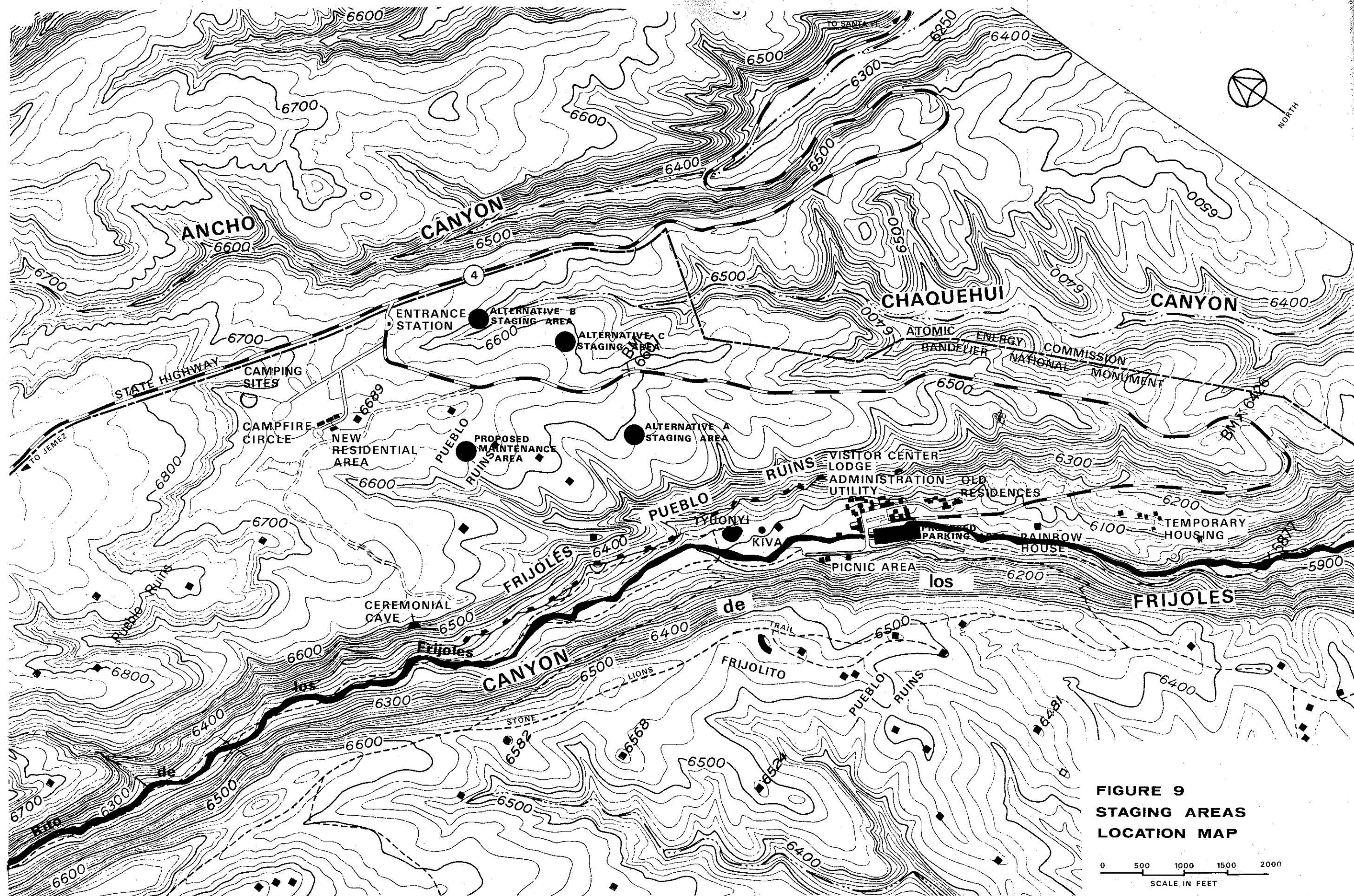
3. Partial Transit/Partial Vehicle Access

Under this concept, locations for the transit terminal area would be as previously described. However, as visitors arrive to the Monument they would be allowed to use the visitor center parking area until it filled. All vehicles entering the Monument after the visitor center lot filled would be diverted to the transit terminal area. If space became available at the visitor center parking area it would remain vacant as no traffic would be directed to the visitor center after reaching capacity.

This concept was not considered feasible because the visitor center parking area can only accommodate 80 cars which is approximately 15% of the daily vehicles entering the Monument during a summer weekend day in 1985. As was shown in Chapter 2, approximately 15% of the visitors will arrive between 9 and 10 a.m. Although this concept would reduce the number of daily bus trips, it would require constant monitoring to inform the visitor when the visitor center lot is full and would provide for a mix of auto and bus traffic on the entrance road which could pose a danger to the visitor.

Recommendation

It is recommended that a total transit service be implemented at the Monument. The necessary transit requirements from each of the sites (A, B and C) will be detailed.



B. TRANSIT VEHICLE TYPES

Several vehicle types that can be used for the Bandelier transit service were identified. The vehicle types ranged from small vans (15-20 seats) to large conventional buses (45-55 seats).

1. Vans and Smaller Vehicles

Vans and smaller vehicles were not considered appropriate because of their low productivity of drivers which results in high unit costs.

2. School Buses

School buses are one of the most economical vehicles, costing in the range from \$15,000 to \$32,000. School buses fall into two categories: the small school bus and the regular school bus. The small school bus generally has a seating capacity of 12 to 36 passengers. The regular school bus has a seating capacity of 44 to 72 passengers.

The seating capacities stated above are for school children and must be reduced by about 33% to comfortably seat adult passengers. In certain park operations the appearance of the vehicle would not be conducive to a park-type atmosphere. However, the school bus would be appropriate for the type of service recommended at the Monument. Since a total transit service is recommended, the National Park Service would not be in a position where it would have to attract riders. Also, although the view may be somewhat obstructed because of window arrangements, it would not noticeably detract from the quality of the visitors experience because the primary resource at the Monument is the ruin's in Frijoles Canyon. Comfort should not be a problem since the trip length is rather short.

3. Small Heavy-Duty Buses

These buses are available in two variations. The first variation consists of the transit coach only. The vehicles are generally from 31 feet to 35 feet long and costs range from approximately \$80,000 to \$105,000. These vehicles have a capacity of from 30-38 passengers and can accommodate about 15 standees. The second variation consists of the transit coach which can be fitted with a trailer unit(s). The coach has a seating capacity of 25 passengers plus 15 standees. The trailer unit has a seating capacity of 30 passengers and can also accommodate about 15 standees. The cost for the power unit and trailer are \$96,000 and \$60,000 respectively.

4. Large Heavy-Duty Buses

These vehicles are also available in several variations and are the typical vehicle found in urban or suburban transit application. In urban transit use, buses are equipped with two automatically operated doors and low back seats. In suburban or long distance use, buses are equipped with a single door and all transverse high or low back

seats. These vehicles were not considered appropriate for use at Bandelier because of their large size which is not suitable on the narrow entrance road and the inflexibility of operation as passenger volumes fluctuate because of size.

5. Electric Buses

The electric battery powered bus offers a quiet operation which is basically pollution free. However, there is no long term use experience with these vehicles and the battery units must be changed and charged after approximately four hours of operation.

Recommendation

Based on the vehicles considered for the transit service at Bandelier, school buses and small heavy-duty buses were found to be the most suitable. Of the small heavy-duty buses evaluated, a unit similar to the ones shown in Figure 10 manufactured by Chance Manufacturing Company, Inc. was found to be the most suitable. This unit can be fitted with a trailer if necessary, although it is not expected that a trailer unit would be needed. A school bus similar to the one shown in Figure 11 is also recommended.

Both types of buses will be analyzed in detail in the remaining sections of the report. The capital costs of the school bus are considerably less than the small heavy-duty buses; however, the small heavy-duty buses would provide more comfort to the visitor and are more conducive to a park type atmosphere. Characteristics of the buses evaluated are illustrated in Figure 12.



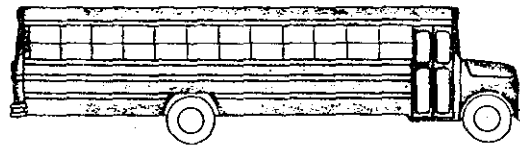
FIGURE 10

SMALL HEAVY-DUTY BUS

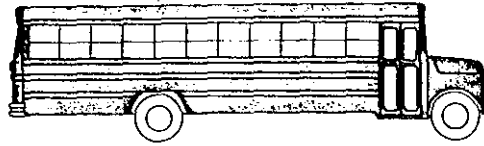
RT-50

26 Foot Diesel Transits Coach
Accessible to the Mobility Impaired

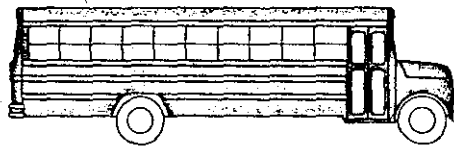




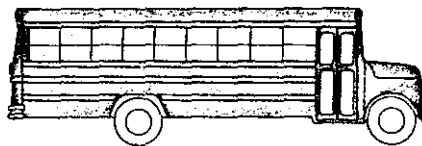
72 passengers



66 passengers



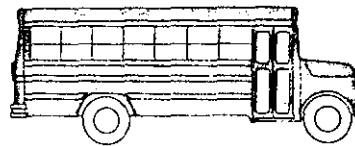
60 passengers



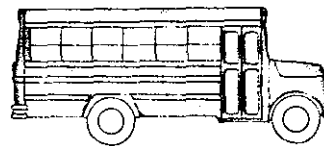
54 passengers



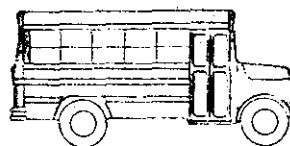
48 passengers



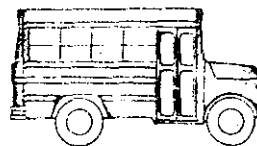
42 passengers



36 passengers



30 passengers



24 passengers

FIGURE 11

FIGURE 12

CHARACTERISTICS OF ALL HEAVY DUTY TRANSIT BUSES AND SCHOOL BUS

Manufacturer: City Cruiser - Transportation Manufacturing Corporation,
Roswell, New Mexico
RTS - General Motors, Pontiac, Michigan
FLX 870 - Flexible/Grummen
RT50 - Chance Manufacturing, Wichita, Kansas
School Bus - Wayne Corporation, Richmond, Indiana

Physical Data: Passenger Capacity	City Cruiser	30 seats + 15 standees
	RTS	39 seats + 15 standees
	FLX 870	37 seats + 15 standees
	RT50	25 seats + 15 standees
	School Bus	32 seats + 10 standees
Length	City Cruiser	31 feet
	RTS	35 feet
	FLX 870	35 feet
	RT50	26 feet
	School Bus	24 feet
Width	City Cruiser	8 feet
	RTS	8 feet
	FLX 870	8 feet
	RT50	8 feet
	School Bus	8 feet
Height	City Cruiser	9 feet, 6 inches
	RTS	9 feet, 10 inches
	FLX 870	
	RT50	9 feet, 4 inches
	School Bus	7 feet, 3 inches (inside)
Turning Radius	City Cruiser	32 feet
	RTS	32 feet
	FLX 870	39 feet
	RT50	29 feet
	School Bus	29 feet
Fuel Tank Capacity	City Cruiser	90 gallons
	RTS	95 gallons
	FLX 870	
	RT50	50 gallons
	School Bus	60 gallons

FIGURE 12 (cont.)

Economic Data: Initial Cost	City Cruiser	\$ 80,000
	RTS	\$100,000
	FLX 870	\$ 95,000
	RT50	\$ 96,000
	School Bus	\$ 21,000
Estimated Life	City Cruiser	10 years
	RTS	10 years
	FLX 870	10 years
	RT50	10 years
	School Bus	10 years
Annual Depreciation	City Cruiser	\$7,200
	RTS	\$9,000
	FLX 870	\$8,600
	RT50	\$8,600
	School Bus	\$1,900
Performance Data: Speed	City Cruiser	25-35 mph
	RTS	25-35 mph
	FLX 870	25-35 mph
	RT50	25-35 mph
	School Bus	25-35 mph
Motive Power	City Cruiser	Diesel
	RTS	Diesel
	FLX 870	Diesel
	RT50	Diesel or Propane
	School Bus	Gasoline
Fuel Consumption	City Cruiser	7.7 mpg
	RTS	4.0 mpg
	FLX 870	4.5 mpg
	RT50	8-11 mpg
	School Bus	5.0 mpg

C. TRANSIT SYSTEM OPERATING CHARACTERISTICS

Tables 8 and 9 provide a comparison of service and operating characteristics between the transit system alternatives. Three alternatives for the transit system were considered, however, only Alternatives A and B are shown on Table 8. Alternative C characteristics (not shown on Table 8) are basically the same as for Alternative A with only the location of the staging area differing.

It was felt that estimates for one year only would not give sufficient information to make neither immediate nor long range decisions regarding transit system implementation. Therefore, ridership and equipment estimates as well as capital and operational expenses will be detailed for six years from 1980 through 1985. 1980 was chosen as the date for service initiation because parking requirements in 1980 will exceed available space by about 44 percent during the peak accumulation. The weekday parking requirements however, will not be exceeded until 1984.

Table 8 identifies the characteristics of the routes and shows peak hour visitation statistics which dictate vehicle requirements. Depending on the alternative, the routes range from 2.5 to 3.5 one-way trip miles. Using an average operating speed of 25 mph, the one-way running times were determined to vary from six minutes to nine minutes. Allowing for terminal and stop times, the total round-trip travel times range from 22 minutes to 28 minutes. This results in an average travel speed of 13.6 mph to 15 mph. The peak hour demand represents 1980-1985 average summer weekend demand as projected in Table 5. An average passenger capacity of 30 passengers per unit was assumed to determine the number of vehicle trips during the peak hour. Applying this capacity to the peak hour demand, it was determined that seven trips per hour would be required in 1980 and nine trips per hour would be required in 1985 for each alternative. Headways during the peak hour would be 8.6 minutes and 6.7 minutes in 1980 and 1985 respectively. Based on the length of time required to complete a round trip, it was determined that Alternative A would require three vehicles and Alternative B four vehicles in 1980. This would increase to four units for Alternative A and five units for Alternative B in 1983.

Table 9 illustrates the conversion of the projected daily Monument visitors to the resulting estimated ridership that would occur to various hours of the day for future operational years. It is assumed for this projection, that visitation patterns throughout the day would not dramatically deviate from present patterns.

The average summer weekend day was selected as the design day rather than a July weekend day, because it was more representative of the demand and a transit system would be sufficiently flexible to adjust to the few peak days by increasing the number of standees on the vehicles.

TABLE 8

SERVICE AND OPERATING CHARACTERISTICS

	1980		1981		1982		1983		1984		1985	
	Alt. A	Alt. B	Alt. A	Alt. B	Alt. A	Alt. B	Alt. A	Alt. B	Alt. A	Alt. B	Alt. A	Alt. B
Trip Length (one way), mi.	2.5	3.5	2.5	3.5	2.5	3.5	2.5	3.5	2.5	3.5	2.5	3.5
Operating Speed, mph	25	25	25	25	25	25	25	25	25	25	25	25
Running Time (one way), min.	6	9	6	9	6	9	6	9	6	9	6	9
Terminal Time (total), min.	10	10	10	10	10	10	10	10	10	10	10	10
Round Trip Time, min.	22	28	22	28	22	28	22	28	22	28	22	28
Average Travel Speed, mph	13.6	15	13.6	15	13.6	15	13.6	15	13.6	15	13.6	15
Passenger Demand (peak hour)	199	199	213	213	228	228	244	244	261	261	279	279
Passenger Capacity	30	30	30	30	30	30	30	30	30	30	30	30
Vehicle Trips/Peak Hour	7	7	7	7	8	8	9	9	9	9	9	9
Headways (peak hour), min.	8.6	8.6	8.6	8.6	7.5	7.5	6.7	6.7	6.7	6.7	6.7	6.7
Total Vehicles Required	3	4	3	4	3	4	4	5	4	5	4	5
Spare	1	1	1	1	1	1	1	1	1	1	1	1

NOTE: Minimum of 5-10 minute intervals between shuttles

Maximum of 12 minute intervals between shuttles at non-peak hours

TABLE 9

RIDERSHIP ESTIMATES FOR SHUTTLE SYSTEM

HOUR	SUMMER WEEKDAY							HRLY PCT.	SUMMER WEEKEND DAY							HRLY PCT.	MAY WEEKEND DAY							HRLY PCT.
	1980	1981	1982	1983	1984	1985	1980		1981	1982	1983	1984	1985	1980	1981		1982	1983	1984	1985				
7-8a	41	44	47	51	54	58	5	40	43	46	49	52	56	3	21	23	24	26	28	30	2			
8-9	41	44	47	51	54	58	5	53	57	61	65	70	74	4	32	34	36	39	41	44	3			
9-10	58	62	66	71	76	81	7	93	99	106	114	122	130	7	63	68	72	77	83	89	6			
10-11	83	88	95	108	108	116	10	133	142	152	163	174	186	10	95	101	108	116	124	133	9			
11-12	91	97	104	111	119	127	11	146	156	167	179	191	205	11	126	135	144	155	165	177	12			
12-1p	83	88	95	108	108	116	10	199	213	228	244	261	279	15	137	146	157	168	179	192	13			
1-2	83	88	95	108	108	116	10	133	142	152	163	174	186	10	137	146	157	168	179	192	13			
2-3	75	80	85	91	97	104	9	133	142	152	163	174	186	10	137	146	157	168	179	192	13			
3-4	75	80	85	91	97	104	9	106	114	122	130	139	149	8	105	113	120	129	138	148	10			
4-5	66	71	76	81	87	93	8	53	57	61	65	70	74	4	74	79	84	90	97	103	7			
5-6	41	44	47	51	54	58	5	53	57	61	65	70	74	4	32	34	36	39	41	44	3			
6-7	25	27	28	30	32	35	3	53	57	61	65	70	74	4	21	23	24	26	28	30	2			
7-8	17	18	19	20	22	23	2	40	43	46	49	52	56	3	21	23	24	26	28	30	2			
Daily Total																								
1/	828	884	946	1012	1083	1158	100	1328	1420	1520	1627	1740	1862	100	1052	1126	1204	1289	1379	1476				

1/ Daily totals do not include visitors who arrive by tour bus

The May weekend day estimates are presented as a comparison with the average summer weekend day. The daily ridership estimates for the month of May are low when compared to the average summer weekend day. This is so because approximately 15 percent of the visitors during May arrive by bus and are not considered in the ridership estimates.

1. Season of Operation

The major factor in recommendation of the season of operation is the daily visitation to the Monument in the peak season. Traditionally, the "peak season" is inclusive of June, July and August. However, as shown in Table 2, the month of May receives a substantial portion of the total visitation.

For this study, the initial system operation would be for the weekend days in May, June, July and August. By 1984, the system would need to be expanded to include the traditional peak season (June, July and August) as well as weekend days in May.

It is thus recommended that the initial season of operation be for weekend days between May 1 and Labor Day for a total of 40 days. In 1984 the system should be operated daily between June 1 and Labor Day and weekend days in May for a total of 108 days.

2. Hours of Operation

As shown on Table 9, it is recommended that the initial transit service begin at 7 a.m. and operate until 8 p.m. This service would accommodate 93% of the traffic entering the Monument.

D. SYSTEM SUPPORT FACILITIES

The construction of additional support facilities will be required if a transit system is implemented. This section will generally indicate the type of support facility needed which should include a staging area, bus stop amenities and vehicle storage area. Costs for required facilities will be detailed in Chapter 4.

1. Staging Area

The staging area at the shuttle origin would require the construction of a contact station, parking area and access road.

Provided within the contact station would be a fee collection and dispatch area, ranger offices, waiting area and interpretive area, and restrooms. Concessions such as vending machines for drinks and snacks could be provided. The size of the parking area would be such that it could accommodate the peak accumulation as discussed in Chapter 2. It is recommended that approximately 120 permanent parking spaces be provided with an additional 110 spaces on stabilized turf. In each alternative, the access road would be about 1100 L.F. and would include a transit turn-around. Figure 13 illustrates a possible layout for the staging area for Alternatives A, B and C.

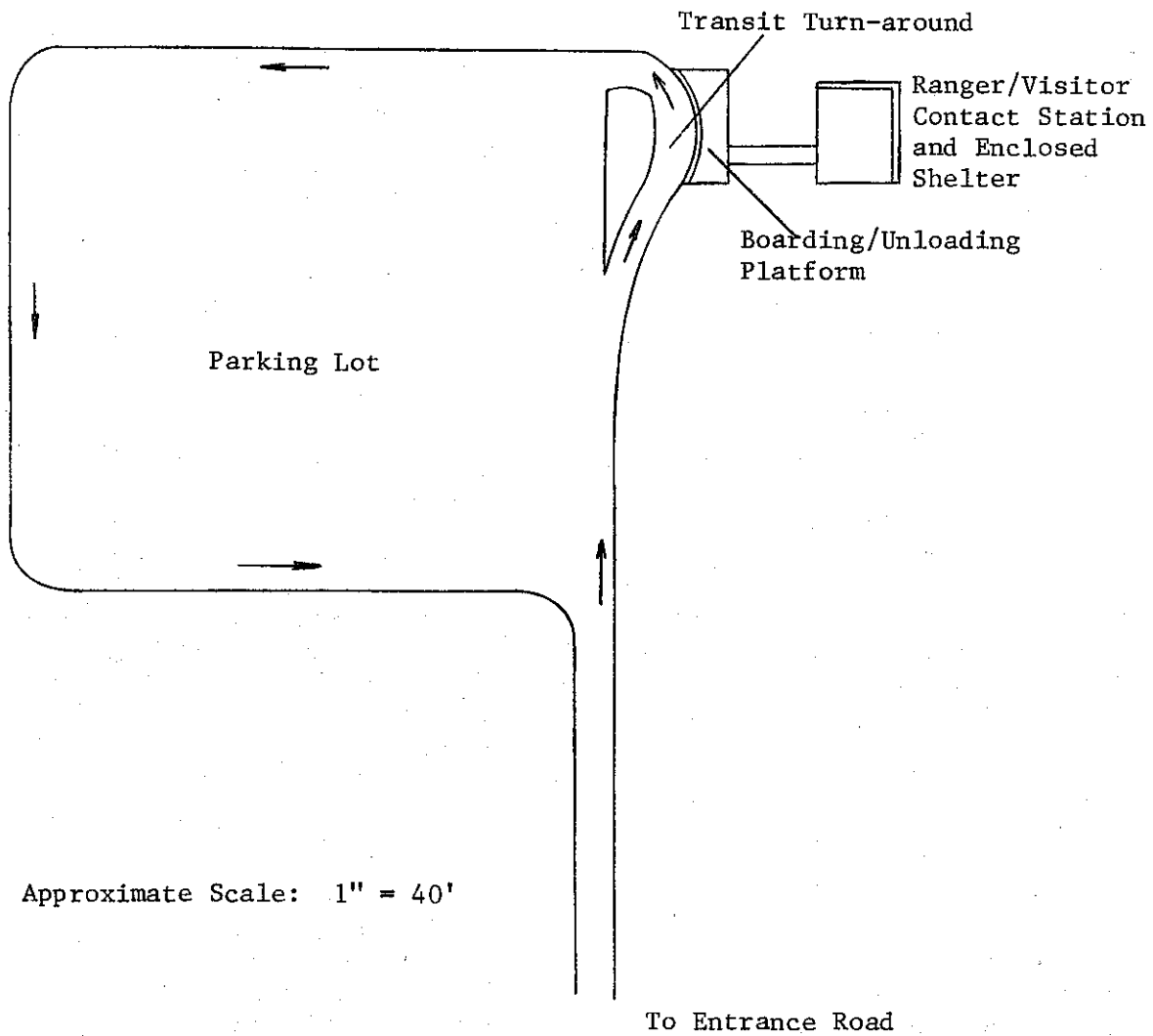
2. Maintenance Facilities

The Development Concept Plan-Proposal/Assessment, Frijoles Mesa Development, proposes to construct a new maintenance facility on Frijoles Mesa. The maintenance facility is to be located north of the Alternative A staging area and is to include road access, parking, security fencing and utility connections. Facilities to be included within the maintenance area are: 12-bay (6 heated) maintenance building with office and locker rooms; a 144 sq. ft. gas and oil storage and dispensing facility, including two 1,000-gallon storage tanks; and, a storage structure (approximately 1,440 sq. ft.).

With the addition of more outdoor storage space for the transit vehicles, the proposed maintenance facility should be adequate to serve as a maintenance facility for the transit operations. Use of the proposed maintenance facility would only be required in the event that the National Park Service owns the vehicles. Therefore, assuming the proposed maintenance area would be used, an additional 1000 sq. ft. of outdoor storage area would be needed. The concessionaire or contractor would have to provide maintenance and storage facilities under a concession or contract arrangement.

FIGURE 13

POSSIBLE TRANSIT TERMINAL STAGING AREA



Chapter 4

CHAPTER 4

Economic Evaluation

A. CAPITAL COSTS

The following elements represent those capital cost items which would be included in each of the transit alternatives.

1. Transit Vehicles

Table 10 illustrates the capital costs involved in purchasing the small heavy-duty transit buses and school buses for each alternative. For small heavy-duty transit buses, capital costs vary from \$384,000 to \$480,000 in 1980. An additional unit would be required in 1983 at a cost of \$76,000. In comparison, capital costs for school buses would vary from \$84,000 to \$105,000 in 1980 with an additional unit required in 1983 at a cost of \$21,000. Alternatives A and C would require four units in 1980 (including spare unit) and Alternative B five units in 1980 (including spare unit).

2. Transit Staging Areas

The capital costs for the transit area for each alternative are shown on Table 11. The facilities needed at each terminal are basically the same for Alternatives A, B and C with the length of the access road being the only difference between the alternatives. Therefore, for comparison purposes, it was assumed that the capital costs for the staging areas in the various alternatives would be equal. This cost has been estimated to be approximately \$389,000.

3. Transit Storage and Maintenance Facility

As discussed in Chapter 3, the proposed maintenance facility on Frijoles Mesa would be utilized as the maintenance and storage facility for the transit system. However, an additional 1000 sq. ft. of outdoor storage area would be approximately \$11,000 (paving and fencing).

B. OPERATING AND MAINTENANCE COSTS

To determine the operating and maintenance costs of the transit operations for the various alternatives, it was necessary to calculate the annual vehicle-miles of travel and annual vehicle-hours of operation. To calculate the annual vehicle-hours of operations and vehicle-mile of travel, the operating characteristics of the alternatives were individually analyzed for weekdays and weekend days for the summer months (including the month of May). The annual vehicle miles of travel for Alternatives A, B and C are shown on Table 12 and the annual vehicle-hours of operation on Table 13. These figures were arrived at by applying the number of vehicles and the daily

TABLE 10

ESTIMATED EQUIPMENT COST FOR TRANSIT ALTERNATIVES
1980-1985 (1979 Dollars)

Small Heavy-Duty Bus

Alternative A & C

	1980	1981	1982	1983	1984	1985
No. of Units	4	-	-	1	-	-
Cost per Unit	\$96000	-	-	\$96000	-	-
Spare Unit	\$96000	-	-	-	-	-
Total Capital Cost	\$384000	-	-	\$96000	-	-

Alternative B

	1980	1981	1982	1983	1984	1985
No. of Units	5	-	-	1	-	-
Cost per Unit	\$96000	-	-	\$96000	-	-
Spare Unit	\$96000	-	-	-	-	-
Total Capital Cost	\$480000	-	-	\$96000	-	-

School Bus

Alternative A & C

	1980	1981	1982	1983	1984	1985
No. of Units	4	-	-	1	-	-
Cost per Unit	\$21000	-	-	\$21000	-	-
Spare Unit	\$21000	-	-	-	-	-
Total Capital Cost	\$84000	-	-	\$21000	-	-

Alternative B

	1980	1981	1982	1983	1984	1985
No. of Units	5	-	-	1	-	-
Cost per Unit	\$21000	-	-	\$21000	-	-
Spare Unit	\$21000	-	-	-	-	-
Total Capital Cost	\$105000	-	-	\$21000	-	-

TABLE 11

COST ESTIMATES*TRANSIT STAGING AREAS

---Access Road	\$ 57,000
To include clearing, site grading, rolling paving and surfacing (approximately 1000 L.F.)	
---Parking Area	\$242,000
To include clearing, site grading, rolling, paving, painting and striping and landscaping (120 permanent spaces plus 110 stabilized turf)	
---Contact Station	\$ 90,000
To include comfort stations, interpretation, shuttle terminal information, concessions (1000 S.F.)	
TOTAL	\$389,000

*The costs for the transit staging areas will be approximately the same for each alternative.

TABLE 13

LABOR REQUIREMENTS FOR TRANSIT ALTERNATIVES
1980-1985
 (Man-hours per season)

	1980	1981	1982	1983	1984	1984
Alt. A Weekday	0	0	0	0	1768	1768
Alt. A Weekend Day	1080	1120	1240	1280	1280	1280
Total Man-hours (Seasonal)	1080	1120	1240	1280	3048	3048
Alt. B Weekday	0	0	0	0	2652	2652
Alt. B Weekend Day	1600	1600	1600	1640	1680	1800
Total Man-hours (Seasonal)	1600	1600	1600	1640	4332	4452

utilization factor to each operating period. It was assumed that the system would operate from 7:00 a.m. to 8:00 p.m. for a total of 13 hours per day. The utilization factor was developed individually on the basis of the distribution of demand throughout the day. These figures were then multiplied by the number of days in each category and summed to yield the annual vehicle-hours of operation and annual vehicle-miles of travel.

The operating and maintenance costs are comprised from a number of different costs which include salaries and benefits for drivers, mechanic and management staff. Also included are costs such as running costs and insurance. The costs associated with the drivers wages comprise the greatest portion of the operating and maintenance costs. The costs to operate and maintain the system differ from year to year and between alternatives and, are summarized in the following section.

C. SYSTEM OPERATION

This section analyzes the basic management options for ownership/management of the system which are available to the National Park Service. For each alternative, a discussion of advantages and disadvantages is presented, along with personnel requirements, salaries and total annualized costs.

1. Management Options

a. Option 1 - Owned and Operated by National Park Service

Under this option, the transit system would be owned and operated by the National Park Service. The National Park Service would be responsible for all capital, operation and maintenance costs including maintenance and storage facilities.

b. Option 2 - Owned by National Park Service and Operated by a Concessionaire

This option would provide for the system to be operated and maintained by a private concessionaire. All equipment would be owned by the National Park Service. The concessionaire would be required to: operate, maintain, and repair National Park Service buses; furnish supplies and materials to operate and maintain the buses; operate the buses on routes and schedules as directed by the National Park Service; and, train necessary personnel. The National Park Service would be responsible for investment on equipment and maintenance and storage facilities.

c. Option 3 - System Owned and Operated by a Concessionaire

Under this option the concessionaire would own all the equipment and would operate and maintain the buses. The concessionaire would provide maintenance and storage facilities and would have control over quality of service, although the National Park Service would set standards for quality.

d. Option 4 - Contracted Operation

Under this option, the charter operator would provide a specified number of buses with drivers but would agree to modify the number of buses as required, if given reasonable notice. The operator would own and maintain the equipment and would provide the drivers.

2. Management Options Comparisons

Comparisons have been developed for the four management options and the costs to the National Park Service, Concessionaire and Contractor estimated for each as shown on Tables 14 through 26. The costs are shown on a yearly basis for the years 1980-1985 for each option. Costs associated with each alternative analyzed (A, B and C) using the small heavy-duty transit buses (Tables 14-19) and school buses (Tables 20-26) are also shown.

Two different methods have been used in the comparative analysis of the management options. This is necessary to reflect the differences in financing procedures between the National Park Service and a private concessionaire. For management options (Options #1 and #2) in which the equipment and facilities would be owned by the National Park Service, it was assumed that the capital costs would be paid in a lump sum the first year and that these costs would be straight-line depreciated over the economic life of the item. For a concessionaire the capital costs were annualized through an equivalent uniform annual cost procedure. For management Option #4 (Contracted Operation), it was assumed that payment would be based on a daily rate per unit with driver.

The following assumptions were made for this analysis.

Service Life: Support Facilities - 20 years
Transit Vehicles - 10 years

Salvage Value: Support Facilities - 0%
Transit Vehicles - 10%

a. Option 1 - Owned and Operated by the National Park Service

Tables 14, 17, 20 and 23 indicate the salaries and annualized costs for this option. Tables 14 and 20 indicate costs for Alternatives A and C while Tables 17 and 23 indicate costs for Alternative B.

The advantages in National Park Service operation are that the National Park Service retains full control of the system and its quality of operation. It would provide good flexibility to respond quickly to changes in visitor patterns and would result in reduced annual expenditures. The disadvantages in National Park Service operation are that it would require an increase in Monument staff

to operate the system. The Monument would also be burdened with the day-to-day operation such as hiring and training of drivers, scheduled maintenance and supervision of operations.

b. Option 2 - Owned by National Park Service and Operated by a Concessionaire

Tables 15, 18, 21 and 24 indicate salaries and annualized costs associated with the Management option for Alternatives A and C (Tables 15 and 21) and Alternative B (Tables 18 and 24). This option results in somewhat higher annualized costs but could result in a more effective management operation.

The advantages to this option are that the National Park Service is relieved of the day-to-day operating responsibilities and it allows for professional management of the system. Also, the management and operations contract would be re-negotiated at regular intervals. The major disadvantages to this option are that the total cost of operating and maintaining the system would be somewhat higher than Option 1 and it would be more difficult for the National Park Service to maintain immediate control over transit service.

c. Option 3 - System Owned and Operated by a Concessionaire

Costs to operate under this option are illustrated in Tables 16, 19, 22 and 25. As is illustrated in the tables, annualized costs would be considerably higher than for Options 1 and 2. A major advantage in concessionaire operation, however, is that the National Park Service is relieved of the need to invest in equipment and maintenance facilities and of day-to-day operating responsibilities. The system can be implemented easily with the National Park Service selecting a private operator. The most significant argument against this option is that considerable private capital investment is required. Since, under this option, the operation is removed from direct park management, the quality of service will vary depending on the capabilities and motivations of the contractor.

d. Option 4 - Contracted Operation

This option results in considerably lower annualized costs than the other options considered. The costs to operate under this option are shown in Table 26. This option retains many of the advantages of a concession arrangement, yet provides improved quality control. The operator would own and maintain the equipment and would provide the drivers, but they would be under the direct supervision of the Monument's management and would be subject to their acceptance. This type of operation may yield more favorable overall results where the season will be short and the service required will be limited.

Because of insurance restrictions this service can not be provided by local school districts. However, much of the bus service for the local school districts is provided by local pupil transportation operators. Using their equipment, these operators can provide the service. School buses leased from a local operator would cost approximately \$160 per day/bus.

TABLE 14

ANNUAL COST SUMMARY

TRANSIT MANAGEMENT OPTION #1: OWNED AND OPERATED
BY NATIONAL PARK SERVICE

SMALL HEAVY-DUTY TRANSIT BUSES

ALTERNATIVES A AND C

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs</u>						
Transit Vehicles	384,000	-	-	96,000	-	-
Support Facilities	400,000	-	-	-	-	-
<u>Capital Costs (Depreciated)</u>						
Transit Vehicles		43,200	43,200	43,200	54,000	54,000
Support Facilities		20,000	20,000	20,000	20,000	20,000
<u>Total Annualized Capital Costs</u>	784,000	63,200	63,200	159,200	74,000	74,000
<u>O & M Costs</u>						
Salaries and Benefits						
Manager/Supervisor	2,200	2,200	2,200	2,200	6,000	6,000
Admin. Clerk/Dispatcher	1,500	1,500	1,500	1,500	4,100	4,100
Drivers	7,200	7,400	8,200	8,500	20,200	20,200
Mechanic	2,500	2,500	2,500	2,500	6,800	6,800
<u>Annual Maintenance Costs</u>						
Transit Vehicles	1,500	1,500	1,700	1,800	4,150	4,150
<u>Running Cost</u>	1,100	1,150	1,250	1,300	3,100	3,100
<u>Insurance (Tort Claims)</u>	-	-	-	-	-	-
<u>Total Annual O & M Costs</u>	16,000	16,250	17,350	17,800	45,750	45,750
<u>Total Annual Costs</u>	800,000	79,450	80,550	171,000	119,750	119,750

TABLE 15

ANNUAL COST SUMMARYTRANSIT MANAGEMENT OPTION #2: NPS OWNED, OPERATED
BY CONCESSIONAIRE

SMALL HEAVY-DUTY TRANSIT BUSES

ALTERNATIVES A AND C

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs</u>						
Transit Vehicles	384,000	-	-	96,000	-	-
Support Facilities	400,000	-	-	-	-	-
<u>Capital Costs (Depreciated)</u>						
Transit Vehicles		43,200	43,200	43,200	54,000	54,000
Support Facilities		20,000	20,000	20,000	20,000	20,000
<u>Total NPS Costs</u>	784,000	63,200	63,200	159,200	74,000	74,000
<u>Concessionaire</u>						
O & M Costs						
Salaries and Benefits						
Manager/Supervisor	2,300	2,300	2,300	2,300	6,400	6,400
Admin. Clk./Dispatch.	1,600	1,600	1,600	1,600	4,400	4,400
Drivers	7,600	7,800	8,700	9,000	21,300	21,300
Mechanic	2,200	2,200	2,200	2,200	5,900	5,900
<u>Annual Maintenance Costs</u>						
Transit Vehicles	1,450	1,500	1,700	1,750	4,150	4,150
<u>Running Costs (Fuel, oil, etc.)</u>						
	1,100	1,150	1,250	1,300	3,100	3,100
<u>Insurance</u>						
	2,100	2,100	2,100	2,100	3,500	3,500
<u>G & A Costs (10%)</u>						
	1,850	1,850	1,950	2,050	4,850	4,850
<u>Operating Fee (10% of above)</u>						
	2,000	2,100	2,200	2,200	5,400	5,400
<u>Total Concessionaire Costs</u>	22,200	22,600	24,000	24,500	59,000	59,000
<u>Total Annual Costs</u>	806,200	85,800	87,200	183,700	133,000	133,000

TABLE 16

ANNUAL COST SUMMARY

TRANSIT MANAGEMENT OPTION #3: OWNED AND OPERATED
BY CONCESSIONAIRE

SMALL HEAVY-DUTY TRANSIT BUSES

ALTERNATIVE A

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs (Annualized)</u>						
Transit Vehicles	56,300	56,300	56,300	70,400	70,400	70,400
Support Facilities	47,000	47,000	47,000	47,000	47,000	47,000
<u>Total Capital Costs</u>	103,300	103,300	103,300	117,400	117,400	117,400
<u>O & M Costs</u>						
Salaries and Benefits						
Manager/Supervisor	2,300	2,300	2,300	2,300	6,400	6,400
Admin. Clerk/Disp.	1,600	1,600	1,600	1,600	4,400	4,400
Drivers	7,600	7,800	8,700	9,000	21,300	21,300
Mechanics	2,200	2,200	2,200	2,200	5,900	5,900
<u>Annual Maintenance Costs</u>						
Transit Vehicles	1,450	1,500	1,700	1,750	4,150	4,150
<u>Running Costs</u> (Fuel, oil, etc.)	1,100	1,150	1,250	1,300	3,100	3,100
<u>Insurance</u>	2,100	2,100	2,100	2,100	3,500	3,500
<u>G & A Costs (10% of above)</u>	12,150	12,200	12,300	13,800	16,600	16,600
<u>Operating Fee (10% of above)</u>	13,400	13,450	13,550	15,150	18,250	18,250
<u>Total O & M Costs</u>	43,900	44,300	45,700	49,200	83,600	83,600
<u>Total Concessionaire Costs</u>	147,200	147,600	149,000	166,600	201,000	201,000

TABLE 17

ANNUAL COST SUMMARYTRANSIT MANAGEMENT OPTION #1: OWNED AND OPERATED
BY NATIONAL PARK SERVICE

SMALL HEAVY-DUTY TRANSIT BUSES

ALTERNATIVE B

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs</u>						
Transit Vehicles	480,000	-	-	96,000	-	-
Support Facilities	400,000	-	-	-	-	-
<u>Capital Costs (Depreciated)</u>						
Transit Vehicles	-	54,000	54,000	54,000	64,800	64,800
Support Facilities	-	20,000	20,000	20,000	20,000	20,000
<u>Total Annualized Capital Costs</u>	880,000	74,000	74,000	170,000	84,800	84,800
<u>O & M Costs</u>						
Salaries and Benefits						
Manager/Supervisor	2,200	2,200	2,200	2,200	6,000	6,000
Admin. Clerk/Dispatcher	1,500	1,500	1,500	1,500	4,100	4,100
Drivers	10,600	10,600	10,600	10,900	28,700	29,500
Mechanic	2,500	2,500	2,500	2,500	6,800	6,800
<u>Annual Maintenance Costs</u>						
Transit Vehicles	2,400	2,400	2,400	2,500	6,450	6,700
<u>Running Cost</u>	1,800	1,800	1,800	1,800	4,850	5,000
<u>Insurance (Tort Claims)</u>	-	-	-	-	-	-
<u>Total Annual O & M Costs</u>	21,000	21,000	21,000	21,400	56,900	56,900
<u>Total Annual Costs</u>	901,000	95,000	95,000	191,400	141,700	141,700

TABLE 18

ANNUAL COST SUMMARY

TRANSIT MANAGEMENT OPTION #2: NATIONAL PARK SERVICE OWNED,
OPERATED BY CONCESSIONAIRE

SMALL HEAVY-DUTY TRANSIT BUSES

ALTERNATIVE B

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs</u>						
Transit Vehicles	480,000	-	-	96,000	-	-
Support Facilities	400,000	-	-	-	-	-
<u>Capital Costs (Depreciated)</u>						
Transit Vehicles	-	54,000	54,000	54,000	64,800	64,800
Support Facilities	-	20,000	20,000	20,000	20,000	20,000
Total NPS Costs	880,000	74,000	74,000	170,000	84,800	84,800
<u>Concessionaire</u>						
O & M Costs						
Salaries and Benefits						
Manager/Supervisor	2,300	2,300	2,300	2,300	6,400	6,400
Admin. Clerk/Dispatch.	1,600	1,600	1,600	1,600	4,400	4,400
Drivers	11,200	11,200	11,200	11,500	30,300	31,200
Mechanic	2,200	2,200	2,200	2,200	5,900	5,900
<u>Annual Maintenance Costs</u>						
Transit Vehicles	2,400	2,400	2,400	2,450	6,450	6,700
<u>Running Costs</u>						
(Fuel, oil, etc.)	1,800	1,800	1,800	1,800	4,850	5,000
Insurance	2,800	2,800	2,800	2,800	4,200	4,200
G & A Costs (10%)	2,400	2,400	2,400	2,450	6,300	6,400
<u>Operating Fee</u>						
(10% of above)	2,700	2,700	2,700	2,700	6,900	7,000
Total Concessionaire Costs	29,400	29,400	29,400	29,800	75,700	77,200
Total Annual Costs	909,400	103,400	103,400	199,800	160,500	162,000

TABLE 18

ANNUAL COST SUMMARY

TRANSIT MANAGEMENT OPTION #2: NATIONAL PARK SERVICE OWNED,
OPERATED BY CONCESSIONAIRE

SMALL HEAVY-DUTY TRANSIT BUSES

ALTERNATIVE B

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs</u>						
Transit Vehicles	480,000	-	-	96,000	-	-
Support Facilities	400,000	-	-	-	-	-
<u>Capital Costs (Depreciated)</u>						
Transit Vehicles	-	54,000	54,000	54,000	64,800	64,800
Support Facilities	-	20,000	20,000	20,000	20,000	20,000
Total NPS Costs	880,000	74,000	74,000	170,000	84,800	84,800
<u>Concessionaire</u>						
O & M Costs						
Salaries and Benefits						
Manager/Supervisor	2,300	2,300	2,300	2,300	6,400	6,400
Admin. Clerk/Dispatch.	1,600	1,600	1,600	1,600	4,400	4,400
Drivers	11,200	11,200	11,200	11,500	30,300	31,200
Mechanic	2,200	2,200	2,200	2,200	5,900	5,900
<u>Annual Maintenance Costs</u>						
Transit Vehicles	2,400	2,400	2,400	2,450	6,450	6,700
<u>Running Costs</u>						
(Fuel, oil, etc.)	1,800	1,800	1,800	1,800	4,850	5,000
Insurance	2,800	2,800	2,800	2,800	4,200	4,200
G & A Costs (10%)	2,400	2,400	2,400	2,450	6,300	6,400
<u>Operating Fee</u>						
(10% of above)	2,700	2,700	2,700	2,700	6,900	7,000
Total Concessionaire Costs	29,400	29,400	29,400	29,800	75,700	77,200
Total Annual Costs	909,400	103,400	103,400	199,800	160,500	162,000

TABLE 19

ANNUAL COST SUMMARYTRANSIT MANAGEMENT OPTION #3: OWNED AND OPERATED
BY CONCESSIONAIRE

SMALL HEAVY-DUTY TRANSIT BUSES

ALTERNATIVE B

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs (Annualized)</u>						
Transit Vehicles	70,300	70,300	70,300	84,400	84,400	84,400
Support Facilities	47,000	47,000	47,000	47,000	47,000	47,000
Total Capital Costs	117,300	117,300	117,300	131,400	131,400	131,400
<u>O & M Costs</u>						
Salaries and Benefits						
Manager/Supervisor	2,300	2,300	2,300	2,300	6,400	6,400
Admin. Clerk/Disp.	1,600	1,600	1,600	1,600	4,400	4,400
Drivers	11,200	11,200	11,200	11,500	30,300	31,200
Mechanics	2,200	2,200	2,200	2,200	5,900	5,900
<u>Annual Maintenance Costs</u>						
Transit Vehicles	2,400	2,400	2,400	2,450	6,450	6,700
<u>Running Costs</u>						
(Fuel, oil, etc.)	1,800	1,800	1,800	1,800	4,850	5,000
Insurance	2,800	2,800	2,800	2,800	4,200	4,200
G & A Costs (10% of above)	14,150	14,150	14,150	15,600	19,400	19,500
Operating Fee	15,550	15,550	15,550	17,150	21,300	21,500
Total O & M Costs	54,000	54,000	54,000	57,400	103,200	104,800
Total Concessionaire Costs	171,300	171,300	171,300	188,800	234,600	236,200

TABLE 20

ANNUAL COST SUMMARY

TRANSIT MANAGEMENT OPTION #1: OWNED AND OPERATED
BY NATIONAL PARK SERVICE

SCHOOL BUSES

ALTERNATIVES A AND C

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs</u>						
Transit Vehicles	84,000	-	-	21,000	-	-
Support Facilities	400,000	-	-	-	-	-
<u>Capital Costs (Depreciated)</u>						
Transit Vehicles	-	9,500	9,500	9,500	11,900	11,900
Support Facilities	-	20,000	20,000	20,000	20,000	20,000
<u>Total Annualized Capital Costs</u>	484,000	29,500	29,500	50,500	31,900	31,900
<u>O & M Costs</u>						
Salaries and Benefits						
Manager/Supervisor	2,200	2,200	2,200	2,200	6,000	6,000
Admin. Clerk/Dispatcher	1,500	1,500	1,500	1,500	4,100	4,100
Drivers	7,200	7,400	8,200	8,500	20,200	20,200
Mechanic	2,500	2,500	2,500	2,500	6,800	6,800
<u>Annual Maintenance Costs</u>						
Transit Vehicles	1,700	1,700	2,000	2,100	5,000	5,000
<u>Running Cost</u>	3,000	3,100	3,400	3,500	8,500	8,500
<u>Insurance</u>	-	-	-	-	-	-
<u>Total Annual O & M Costs</u>	18,100	18,400	19,800	20,300	50,600	50,600
<u>Total Annual Costs</u>	502,100	47,900	49,300	70,800	82,500	82,500

TABLE 21

ANNUAL COST SUMMARY

TRANSIT MANAGEMENT OPTION #2: NATIONAL PARK SERVICE OWNED,
OPERATED BY CONCESSIONAIRE

SCHOOL BUSES

ALTERNATIVES A AND C

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs</u>						
Transit Vehicles	84,000	-	-	21,000	-	-
Support Facilities	400,000	-	-	-	-	-
<u>Capital Costs (Depreciated)</u>						
Transit Vehicles	-	9,500	9,500	9,500	11,900	11,900
Support Facilities	-	20,000	20,000	20,000	20,000	20,000
Total NPS Costs	484,000	29,500	29,500	29,500	31,900	31,900
<u>Concessionaire</u>						
O & M Costs						
Salaries and Benefits						
Manager/Supervisor	2,300	2,300	2,300	2,300	6,400	6,400
Admin. Clerk/Dispatch.	1,600	1,600	1,600	1,600	4,400	4,400
Drivers	7,600	7,800	8,700	9,000	21,300	21,300
Mechanic	2,200	2,200	2,200	2,200	5,900	5,900
<u>Annual Maintenance Costs</u>						
Transit Vehicles	1,700	1,700	2,000	2,100	5,000	5,000
<u>Running Costs</u>						
(Fuel, oil, etc.)	3,000	3,100	3,400	3,500	8,500	8,500
Insurance	2,100	2,100	2,100	2,100	3,500	3,500
G & A Costs (10%)	2,100	2,100	2,200	2,300	5,500	5,500
<u>Operating Fee</u>						
(10% of above)	2,300	2,300	2,500	2,500	6,100	6,100
Total Concessionaire Costs	24,900	25,200	27,200	27,600	66,600	66,600
Total Annual Costs	508,900	54,700	56,500	57,100	98,500	98,500

TABLE 22

ANNUAL COST SUMMARYTRANSIT MANAGEMENT OPTION #3: OWNED AND OPERATED
BY CONCESSIONAIRE

SCHOOL BUSES

ALTERNATIVES A AND C

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs (Annualized)</u>						
Transit Vehicles	12,300	12,300	12,300	15,400	15,400	15,400
Support Facilities	47,000	47,000	47,000	47,000	47,000	47,000
Total Capital Costs	59,300	59,300	59,300	62,400	62,400	62,400
<u>O & M Costs</u>						
Salaries and Benefits						
Manager/Supervisor	2,300	2,300	2,300	2,300	6,400	6,400
Admin. Clerk/Disp.	1,600	1,600	1,600	1,600	4,400	4,400
Drivers	7,600	7,800	8,700	9,000	21,300	21,300
Mechanics	2,200	2,200	2,200	2,200	5,900	5,900
<u>Annual Maintenance Costs</u>						
Transit Vehicles	1,700	1,700	2,000	2,100	5,000	5,000
<u>Running Costs</u>						
(Fuel, oil, etc.)	3,000	3,100	3,400	3,500	8,500	8,500
Insurance	2,100	2,100	2,100	2,100	3,500	3,500
G & A Costs (10% of above)	8,000	8,000	8,200	8,500	11,700	11,700
Operating Fee (10% of above)	8,800	8,800	9,000	9,400	12,900	12,900
Total O & M Costs	37,300	37,600	39,500	40,700	79,600	79,600
Total Concessionaire Costs	96,600	96,900	98,800	103,100	142,000	142,000

TABLE 23

ANNUAL COST SUMMARY

TRANSIT MANAGEMENT OPTION #1: OWNED AND
OPERATED BY NPS

SCHOOL BUS

ALTERNATIVE B

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs</u>						
Transit Vehicles	105,000	-	-	21,000	-	-
Support Facilities	400,000	-	-	-	-	-
<u>Capital Costs (Depreciated)</u>						
Transit Vehicles	-	11,800	11,800	11,800	14,200	14,200
Support Facilities	-	20,000	20,000	20,000	20,000	20,000
<u>Total Annualized Capital Costs</u>	505,000	31,800	31,800	31,800	34,200	34,200
<u>O & M Costs</u>						
Salaries and Benefits						
Manager/Supervisor	2,200	2,200	2,200	2,200	6,000	6,000
Admin. Clerk/Dispatch.	1,500	1,500	1,500	1,500	4,100	4,100
Drivers	10,600	10,600	10,600	10,900	28,700	29,500
Mechanic	2,500	2,500	2,500	2,500	6,800	6,800
<u>Annual Maintenance Costs</u>						
Transit Vehicles	2,800	2,800	2,800	2,900	7,600	7,800
<u>Running Cost</u>	4,800	4,800	4,800	4,900	13,000	13,400
<u>Insurance</u>	-	-	-	-	-	-
<u>Total Annual O & M Costs</u>	24,400	24,400	24,400	24,900	66,200	67,600
<u>Total Annual Costs</u>	529,400	56,200	56,200	56,700	100,400	101,800

TABLE 24

ANNUAL COST SUMMARY

TRANSIT MANAGEMENT OPTION #2: NATIONAL PARK SERVICE OWNED,
OPERATED BY CONCESSIONAIRE

SCHOOL BUSES

ALTERNATIVE B

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs</u>						
Transit Vehicles	105,000	-	-	21,000	-	-
Support Facilities	400,000	-	-	-	-	-
<u>Capital Costs (Depreciated)</u>						
Transit Vehicles	-	11,800	11,800	11,800	14,200	14,200
Support Facilities	-	20,000	20,000	20,000	20,000	20,000
Total NPS Costs	505,000	31,800	31,800	31,800	34,200	34,200
<u>Concessionaire</u>						
O & M Costs						
Salaries and Benefits						
Manager/Supervisor	2,300	2,300	2,300	2,300	6,400	6,400
Admin. Clerk/Dispatch.	1,600	1,600	1,600	1,600	4,400	4,400
Drivers	11,200	11,200	11,200	11,500	30,300	31,200
Mechanic	2,200	2,200	2,200	2,200	5,900	5,900
<u>Annual Maintenance Costs</u>						
Transit Vehicles	2,800	2,800	2,800	2,900	7,600	7,800
<u>Running Costs</u>						
(Fuel, oil, etc.)	4,800	4,800	4,800	4,900	13,000	13,400
<u>Insurance</u>	2,800	2,800	2,800	2,800	4,200	4,200
<u>G & A Costs (10%)</u>	2,800	2,800	2,800	2,800	7,200	7,300
<u>Operating Fee</u>						
(10% of above)	3,100	3,100	3,100	3,100	7,900	8,100
Total Concessionaire Costs	33,600	33,600	33,600	34,100	86,900	88,700
Total Annual Costs	538,600	65,400	65,400	65,900	121,100	122,900

TABLE 25

ANNUAL COST SUMMARYTRANSIT MANAGEMENT OPTION #3: OWNED AND OPERATED
BY CONCESSIONAIRE

SCHOOL BUSES

ALTERNATIVE B

1979 DOLLARS

	1980	1981	1982	1983	1984	1985
<u>Capital Costs (Annualized)</u>						
Transit Vehicles	15,400	15,400	15,400	18,500	18,500	18,500
Support Facilities	47,000	47,000	47,000	47,000	47,000	47,000
Total Capital Costs	62,400	62,400	62,400	65,500	65,500	65,500
<u>O & M Costs</u>						
Salaries and Benefits						
Manager/Supervisor	2,300	2,300	2,300	2,300	6,400	6,400
Admin. Clerk/Disp.	1,600	1,600	1,600	1,600	4,400	4,400
Drivers	11,200	11,200	11,200	11,500	30,300	31,300
Mechanics	2,200	2,200	2,200	2,200	5,900	5,900
<u>Annual Maintenance Costs</u>						
Transit Vehicles	2,800	2,800	2,800	2,900	7,600	7,800
<u>Running Costs</u>						
(Fuel, oil, etc.)	4,800	4,800	4,800	4,900	13,000	13,400
Insurance	2,800	2,800	2,800	2,800	4,200	4,200
G & A Costs (10% of above)	9,000	9,000	9,000	9,400	13,700	13,900
Operating Fee (10% of above)	9,900	9,900	9,000	10,300	15,100	15,300
Total O & M Costs	46,600	46,600	46,600	47,900	100,600	102,500
Total Annual Costs	109,000	109,000	109,000	113,400	166,100	168,000

TABLE 26

ANNUAL COST SUMMARY

TRANSIT MANAGEMENT OPTION #4: CONTRACTED OPERATION

SCHOOL BUSES*

	1980	1981	1982	1983	1984	1985
Alternatives A & C	19,000	19,000	19,000	26,000	48,000	48,000
Alternative B	26,000	26,000	26,000	32,000	65,000	65,000

*Based on a charge of \$160.00 per day per bus.

NOTE: Does not include cost of staging area (\$389,000).

D. USER FEE SUBSIDY ANALYSIS

Tables 27 and 28 indicate potential cost recovery from various peak season entrance fee surcharge levels (in addition to the existing entrance fee) and their effect on costs for the 1981 and 1985 operational years. Table 27 shows costs for the small heavy-duty transit buses and Table 28 for the school bus.

Depending on the management option and type of bus considered, the surcharge to recover full cost can vary significantly. For example, when considering the small heavy-duty bus, the surcharge to recover full cost varies from \$.75 (Option 1) to \$1.50 (Option 3) in 1985 for Alternatives A and C. This compares with \$.35 (Option 4) to \$1.00 (Option 3) in 1981 when considering the school bus. As illustrated in the tables, the surcharge fees would be higher in 1981 because the system would operate only on weekend days thus resulting in less riders.

TABLE 27a

POTENTIAL COST RECOVERY
FROM VARIOUS PARK USER FEE CHARGES

SMALL HEAVY-DUTY TRANSIT BUS

1981

	Management Option	1981 User Fee (Per User)	Income	Cost of 1981 System	Balance	Percent of Total Costs Recovered
ALTERNATIVES A AND C	#1	\$1.00	\$ 53,000	\$ 79,450	-\$ 26,450	67%
		\$1.50	\$ 79,600	\$ 79,450	+\$ 150	100%
		\$2.00	\$106,100	\$ 79,450	+\$ 26,650	134%
		\$2.50	-	-	-	-
		\$3.00	-	-	-	-
	#2	\$1.00	\$ 53,000	\$ 85,800	-\$ 32,800	62%
		\$1.50	\$ 79,600	\$ 85,800	-\$ 6,200	93%
		\$2.00	\$106,100	\$ 85,800	+\$ 20,300	124%
		\$2.50	-	-	-	-
		\$3.00	-	-	-	-
	#3	\$1.00	\$ 53,000	\$147,600	-\$ 94,600	36%
		\$1.50	\$ 79,600	\$147,600	-\$ 68,000	54%
		\$2.00	\$106,100	\$147,600	-\$ 41,500	72%
		\$2.50	\$132,600	\$147,600	-\$ 15,000	90%
		\$3.00	\$159,100	\$147,600	+\$ 11,500	108%

	Management Option	1981 User Fee (Per User)	Income	Cost of 1981 System	Balance	Percent of Total Costs Recovered
ALTERNATIVE B	#1	\$1.00	\$ 53,000	\$ 95,000	-\$ 42,000	56%
		\$1.50	\$ 79,600	\$ 95,000	-\$ 15,400	84%
		\$2.00	\$106,100	\$ 95,000	+\$ 11,100	112%
		\$2.50	-	-	-	-
		\$3.00	-	-	-	-
	#2	\$1.00	\$ 53,000	\$103,400	-\$ 50,400	51%
		\$1.50	\$ 79,600	\$103,400	-\$ 23,800	77%
		\$2.00	\$106,100	\$103,400	+\$ 2,700	103%
		\$2.50	\$132,600	\$103,400	+\$ 29,200	128%
		\$3.00	-	-	-	-
	#3	\$1.00	\$ 53,000	\$171,300	-\$118,300	31%
		\$1.50	\$ 79,600	\$171,300	-\$ 91,700	46%
		\$2.00	\$106,100	\$171,300	-\$ 65,200	62%
		\$2.50	\$132,600	\$171,300	-\$ 38,700	77%
		\$3.00	\$159,100	\$171,300	-\$ 12,200	93%

TABLE 27b

POTENTIAL COST RECOVERY
FROM VARIOUS PARK USER FEE CHARGES

SMALL HEAVY-DUTY TRANSIT BUS
1985

	Management Option	1985 User Fee (Per User)	Income	Cost of 1985 System	Balance	Percent of Total Costs Recovered
ALTERNATIVES A AND C	#1	\$.50	\$ 75,000	\$119,750	-\$ 44,750	65%
		\$.75	\$125,500	\$119,750	+\$ 5,750	105%
		\$1.00	\$150,000	\$119,750	+\$ 30,250	125%
		\$1.25	-	-	-	-
		\$1.50	-	-	-	-
	#2	\$.50	\$ 75,000	\$133,000	-\$ 58,000	56%
		\$.75	\$125,000	\$133,000	-\$ 8,000	94%
		\$1.00	\$150,000	\$133,000	+\$ 17,000	113%
		\$1.25	-	-	-	-
		\$1.50	-	-	-	-
	#3	\$.50	\$ 75,000	\$201,000	-\$126,000	37%
		\$.75	\$125,000	\$201,000	-\$ 76,000	62%
		\$1.00	\$150,000	\$201,000	-\$ 51,000	75%
		\$1.25	\$187,500	\$201,000	-\$ 13,500	93%
		\$1.50	\$225,000	\$201,000	+\$ 24,000	112%

	Management Option	1985 User Fee (Per User)	Income	Cost of 1985 System	Balance	Percent of Total Costs Recovered
ALTERNATIVE B	#1	\$.50	\$ 75,000	\$141,700	-\$ 66,700	53%
		\$.75	\$125,500	\$141,700	-\$ 16,200	89%
		\$1.00	\$150,000	\$141,700	-\$ 8,300	106%
		\$1.25	\$187,500	\$141,700	+\$ 45,800	132%
		\$1.50	\$225,000	\$141,700	\$ 83,300	159%
	#2	\$.50	\$ 75,000	\$162,000	-\$ 87,000	46%
		\$.75	\$125,000	\$162,000	-\$ 37,000	77%
		\$1.00	\$150,000	\$162,000	-\$ 12,000	93%
		\$1.25	\$187,500	\$162,000	+\$ 25,500	116%
		\$1.50	\$225,000	\$162,000	+\$ 63,000	139%
	#3	\$.50	\$ 75,000	\$236,200	-\$161,200	32%
		\$.75	\$125,000	\$236,200	-\$111,200	53%
		\$1.00	\$150,000	\$236,200	-\$ 86,200	64%
		\$1.25	\$187,500	\$236,200	-\$ 48,700	79%
		\$1.50	\$225,000	\$236,200	-\$ 11,200	95%

TABLE 28a

POTENTIAL COST RECOVERY
FROM VARIOUS PARK USER FEE CHARGES

SCHOOL BUS
1981

	Management Option	1981 User Fee (Per User)	Income	Cost of 1981 System	Balance	Percent of Total Costs Recovered
ALTERNATIVES A & C	#1	\$.50	\$ 26,500	\$ 47,900	-\$21,400	55%
		\$.75	\$ 39,750	\$ 47,900	-\$ 8,150	83%
		\$1.00	\$ 53,000	\$ 47,900	+\$ 5,100	111%
	#2	\$.75	\$ 39,750	\$ 54,700	-\$14,950	73%
		\$1.00	\$ 53,000	\$ 54,700	-\$ 1,700	97%
		\$1.25	\$ 66,250	\$ 54,700	+\$11,550	121%
	#3	\$1.50	\$ 79,500	\$ 96,900	-\$17,400	82%
		\$1.75	\$ 92,750	\$ 96,900	-\$ 4,150	96%
		\$2.00	\$106,000	\$ 96,900	+\$ 9,100	109%
	#4	\$.25	\$ 13,250	\$ 19,000	-\$ 5,750	70%
		\$.35	\$ 18,550	\$ 19,000	-0-	100%
		\$.50	\$ 26,500	\$ 19,000	+\$ 7,500	140%

	Management Option	1981 User Fee (Per User)	Income	Cost of 1981 System	Balance	Percent of Total Costs Recovered
ALTERNATIVE B	#1	\$.75	\$ 39,750	\$ 56,200	-\$16,450	71%
		\$1.00	\$ 53,000	\$ 56,200	-\$32,000	94%
		\$1.25	\$ 66,250	\$ 56,200	+\$10,050	118%
	#2	\$1.00	\$ 53,000	\$ 65,400	-\$12,400	81%
		\$1.25	\$ 66,250	\$ 65,400	+\$ 850	101%
		\$1.50	\$ 79,500	\$ 65,400	+\$14,100	122%
	#3	\$1.50	\$ 79,500	\$109,000	-\$29,500	73%
		\$1.75	\$ 92,750	\$109,000	-\$16,250	85%
		\$2.00	\$106,000	\$109,000	-\$ 3,000	97%
	#4	\$.25	\$ 13,200	\$ 26,000	-\$12,800	51%
		\$.50	\$ 26,500	\$ 26,000	-0-	100%

TABLE 28b

POTENTIAL COST RECOVERY
FROM VARIOUS PARK USER FEE CHARGES

SCHOOL BUS
1985

	Management Option	1985 User Fee (Per User)	Income	Cost of 1985 System	Balance	Percent of Total Costs Recovered
ALTERNATIVES A & C	#1	\$.25	\$ 37,500	\$ 82,500	-\$45,000	45%
		\$.50	\$ 75,000	\$ 82,500	-\$ 7,500	91%
		\$.75	\$112,500	\$ 82,500	+\$30,000	137%
	#2	\$.50	\$ 75,000	\$ 98,500	-\$23,500	76%
		\$.75	\$112,500	\$ 98,500	+\$14,000	114%
		\$1.00	\$150,000	\$ 98,500	+\$51,500	152%
	#3	\$.50	\$ 75,000	\$142,000	-\$67,000	53%
		\$.75	\$112,500	\$142,000	-\$29,500	79%
		\$1.00	\$150,000	\$142,000	+\$ 8,000	106%
	#4	\$.25	\$ 37,500	\$ 48,000	-\$10,500	78%
		\$.35	\$ 52,500	\$ 48,000	+\$ 4,500	104%
		\$.50	\$ 75,000	\$ 48,000	+\$27,000	156%

	Management Option	1985 User Fee (Per User)	Income	Cost of 1985 System	Balance	Percent of Total Costs Recovered
ALTERNATIVE B	#1	\$.25	\$ 37,500	\$101,800	-\$64,300	37%
		\$.50	\$ 75,000	\$101,800	-\$26,800	74%
		\$.75	\$112,000	\$101,800	+\$10,200	110%
	#2	\$.50	\$ 75,000	\$122,900	-\$47,900	61%
		\$.75	\$112,500	\$122,900	-\$10,400	92%
		\$1.00	\$150,000	\$122,900	+\$27,100	122%
	#3	\$.75	\$112,500	\$168,000	-\$55,500	67%
		\$1.00	\$150,000	\$168,000	-\$18,000	89%
		\$1.25	\$187,500	\$168,000	+\$19,500	112%
	#4	\$.25	\$ 37,500	\$ 65,000	-\$27,500	58%
		\$.50	\$ 75,000	\$ 65,000	+\$10,000	115%

Appendix

TABLE A1

Historical Record

Monthly Monument Visitation

	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1969	1777	1195	4035	8277	19245	22180	22834	23328	11746	10988	5156	2652	133413
1970	3018	3918	7752	9413	24342	30451	39272	39474	19156	12804	6966	4649	201215
1971	2719	4654	9545	17732	30428	39041	36303	35103	11844	12937	6576	2584	209466
1972	4837	5792	13242	21631	36093	34710	35811	29713	12796	11147	3261	4010	213043
1973	1999	2575	4901	11873	20835	36945	27523	30540	14538	12477	4075	2854	171135
1974	2014	2276	9701	12591	18856	22216	25088	25592	12218	10999	4381	2286	148218
1975	693	803	4234	10636	34821	42242	57024	58834	16488	13360	6056	3288	248479
1976	6509	4472	9034	13738	35370	71333	60434	43711	15099	11965	6417	5143	283225
1977	3822	4365	7170	12326	19950	11848	16088	19785	13782	13666	7197	6432	13643
1978	6538	4060	13158	11858	17477	18824	25011	22545	10330	13727	6540	3781	153849

TABLE A2

Hourly Percentage
Vehicles Entering, Leaving and Parking Accumulation
Average % of Vehicles for Weekend Day
Peak Season

Time	% On	% Off	Cumm %
12-1a			
1-2			
2-3			
3-4			
4-5			
5-6	1	0	1
6-7	1	1	1
7-8	3	1	3
8-9	4	2	5
9-10	7	2	10
10-11	10	5	15
11-12	11	5	21
12-1p	15	6	30
1-2	10	10	30
2-3	10	15	25
3-4	8	12	21
4-5	4	13	12
5-6	4	11	4
6-7	4	7	2
7-8	3	4	1
8-9	2	3	0
9-10	1	1	0
10-11	1	1	0
11-12	1	1	0
TOTALS	100%	100%	

TABLE A3

Hourly Percentage
Vehicles Entering, Leaving and Parking Accumulation
Average % of Vehicles for Weekday
Peak Season

Time	% On	% Off	Cumm %
12-1a			
1-2			
2-3			
3-4			
4-5			
5-6	1	0	1
6-7	1	0	2
7-8	5	2	5
8-9	5	3	7
9-10	7	3	11
10-11	10	4	17
11-12	11	6	22
12-1p	10	8	24
1-2	10	10	24
2-3	9	10	23
3-4	9	12	20
4-5	8	12	16
5-6	5	14	7
6-7	3	6	4
7-8	2	4	2
8-9	2	3	1
9-10	1	2	0
10-11	1	1	0
11-12	0	0	0
TOTALS	100%	100%	

TABLE A4

Hourly Percentage - Vehicles Entering
Average % of Vehicles for Weekday and Weekend Day
Off Season

Time	% Weekday	% Weekend Day
12-1a	0	0
1-2	0	0
2-3	0	0
3-4	0	0
4-5	0	0
5-6	0	0
6-7	1	1
7-8	4	2
8-9	5	3
9-10	7	6
10-11	8	9
11-12 noon	9	12
12-1	10	13
1-2	11	13
2-3	11	13
3-4	10	10
4-5	10	7
5-6	5	3
6-7	3	2
7-8	2	2
8-9	1	1
9-10	1	1
10-11	1	1
11-12	1	1
TOTALS	100%	100%