



# Visitor and Vehicular Data Collection

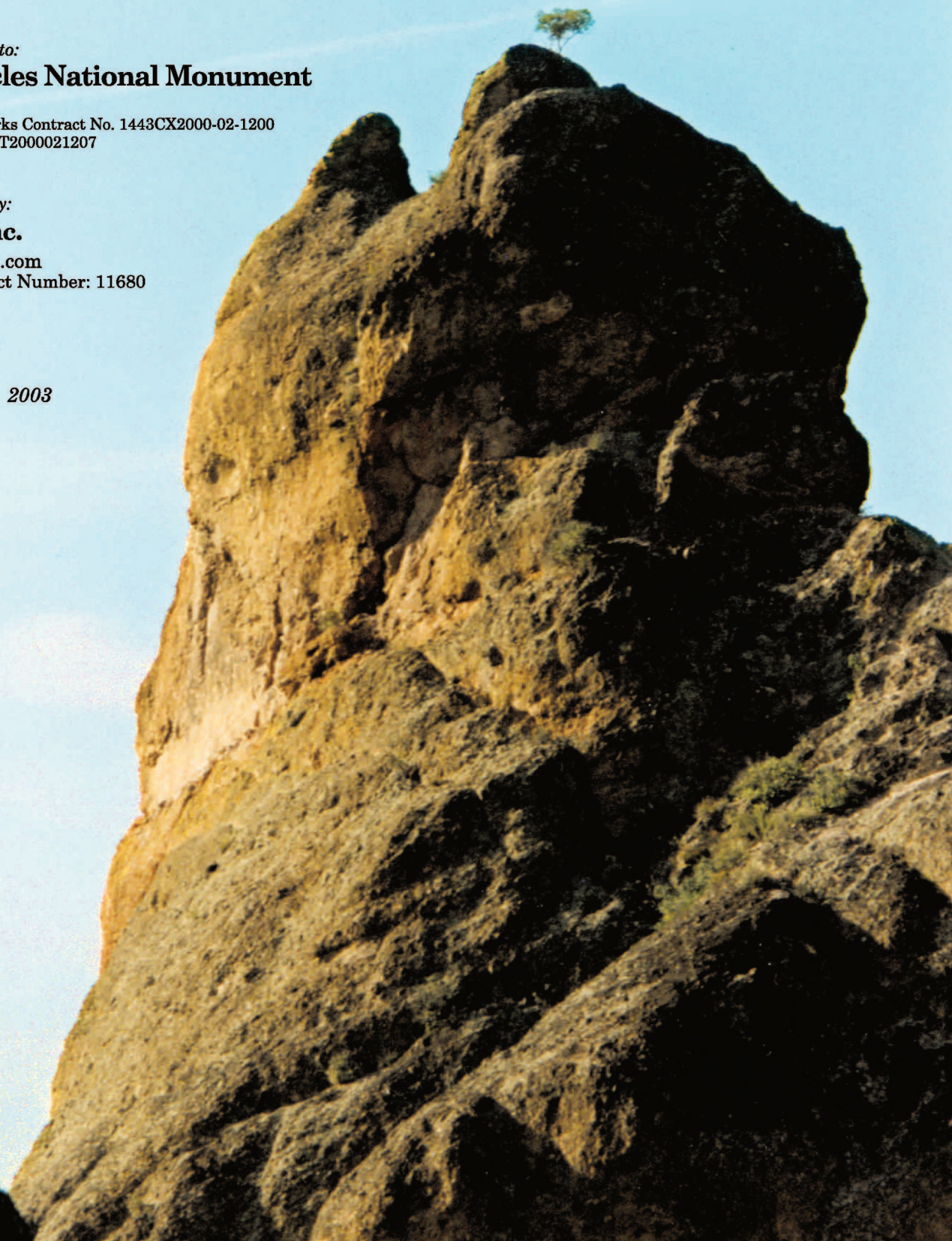
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*Submitted to:*  
**Pinnacles National Monument**

National Parks Contract No. 1443CX2000-02-1200  
Task Order: T2000021207

*Prepared by:*  
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Otak Project Number: 11680

*December 2003*



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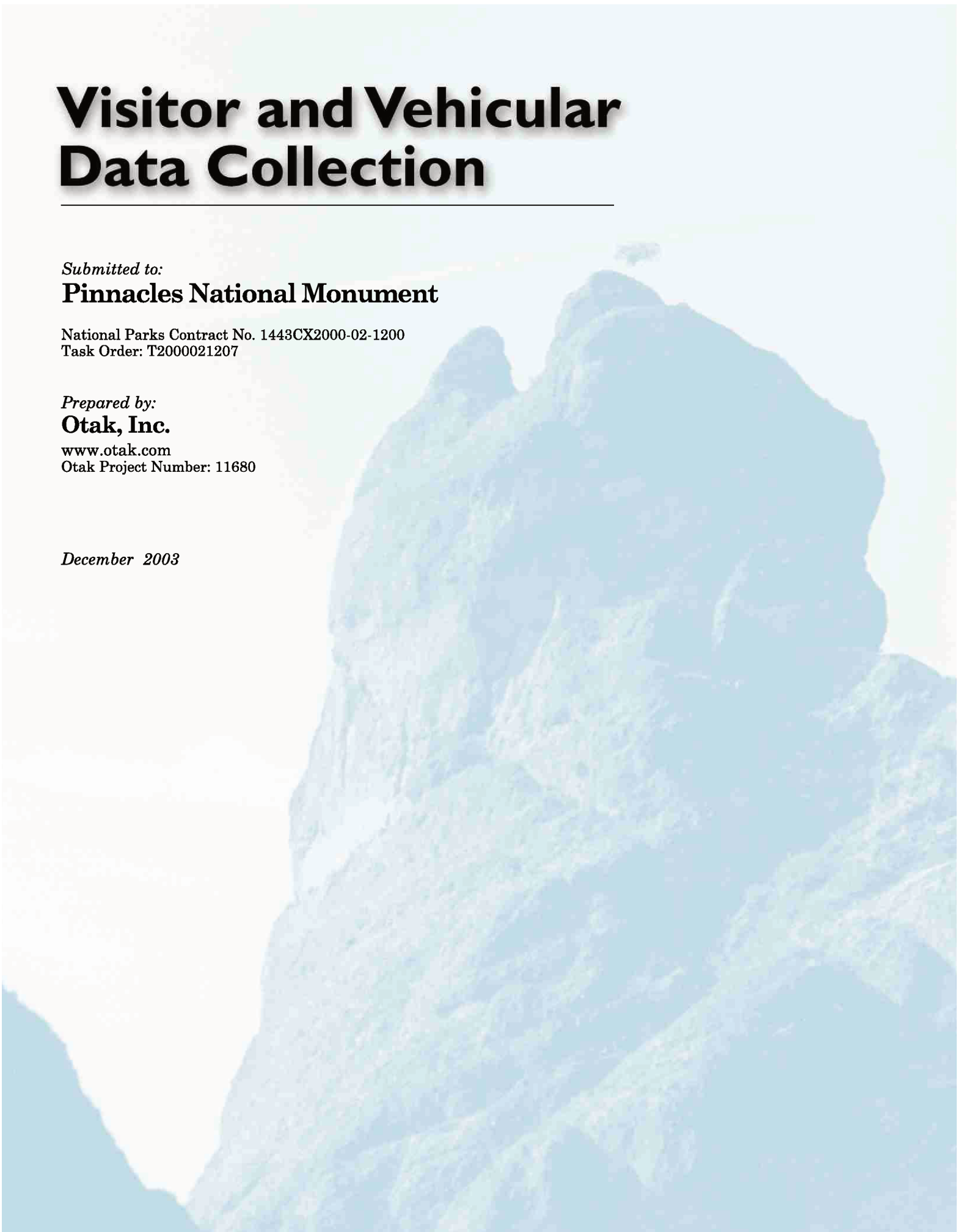
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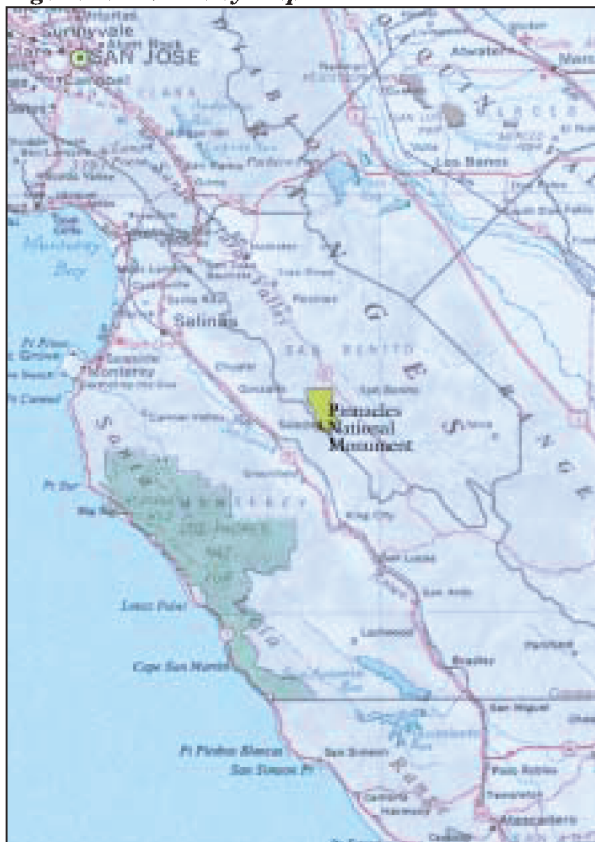
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This report reflects work performed on the Visitor and Vehicular Data Collection project for Pinnacles National Monument. As an existing conditions study, this project will be followed by an Alternative Transportation Study and Plan project which will examine design options for an alternative transportation system.

Figure 1.1 shows the location of Pinnacles National Monument in central California. The monument consists of two districts – east and west. The West District is accessible from U.S. Highway 101 near the town of Soledad. The East District is accessed via State Highway 25, south of the city of Hollister. The two districts flank a mountain ridge that is the location

**Figure 1.1 - Vicinity Map**



***High peaks as seen from the West District of the Monument.***

of the famous pinnacles rock formations. There are no road connections over the ridge – only trails. The primary activities visitors seek in Pinnacles National Monument include hiking, rock climbing, and observing a relatively undisturbed central California ecosystem.

Particularly in the East District, transportation has been a key question in park master planning for over 10 years. At the heart of the issue is balancing visitor desire for convenient access to the core of the monument with the mandate to protect sensitive resources from further development disturbance. As early as 1993, the monument utilized a shuttle during the peak season to intercept East District visitors at parking areas outside of the core of the monument. Since that time the shuttle service has been intermittent and the parking supply has been reduced by two events. Major flooding of Chalone Creek in 1998 eliminated a parking area near the historic Pinnacles entrance pillars. In 2002, approximately 60 spaces near the maintenance area were eliminated through a new employee housing and administrative functions project.



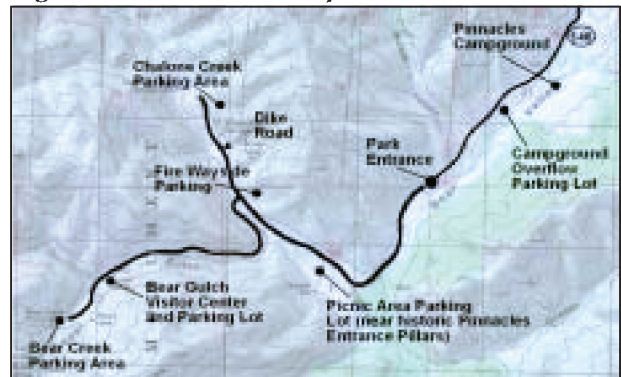
The most recent park planning document to receive National Environmental Policy Act approval was the 1993 East District Development Concept Plan. This document also endorsed a shuttle intercept strategy in order to keep all parking lot expansion at the monument entrance.

This report summarizes the results of a data collection effort that has been split between two periods. These were October 24 to 27, 2002 in the Fall peak period and April 17 to 20, 2003 in the Spring peak period. The monument draws its visitors primarily from the surrounding small cities and the San Francisco Bay Area. High Summer temperatures in the monument have pushed the peak periods to the Fall and Spring. The two primary types of data collection were traffic volume counts at the district entrances and occupancy-duration surveys of all parking lots. Both of the data collection periods extended from a Thursday to a Sunday within which the traffic volumes were collected everyday and the parking lots were surveyed on Saturday and Sunday only. Figures 1.2 and 1.3 are the study areas for the East District and West District, respectively.

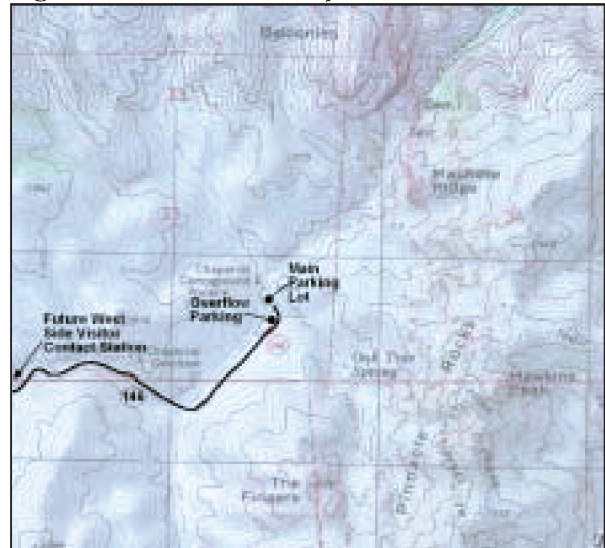
Chapter 2 of this report discusses the general use patterns as reflected by the collected transportation data. Conclusions are drawn on transportation demand in the monument and how parking is a limiting factor.

Chapter 3 of this report provides an evaluation of the demand that presently exists for an alternative transportation system in the East District of the monument. This demand is expressed in terms of potential shuttle ridership as well as needed additional parking capacity.

**Figure 1.2 - East District of the Monument**



**Figure 1.3 - West District of the Monument**





## Introduction

Pinnacles National Monument is a day use facility. A privately owned campground is located near the entrance to the East District but the monument hours are officially limited to 7:30 a.m. to dusk.

A single road serves most of the visitor access needs in the East District. This road is the extension of Highway 146 into the Monument. It terminates near the Bear Gulch Visitor Center. It has two 11-foot-wide lanes and no shoulders. "Dike Road" extends further along Chalone Creek splitting from the primary road where it is redirected up Bear Gulch. The portion of Dike Road that is open to traffic is approximately 0.25 miles long and allows visitors closer access to the two trailheads on Chalone Creek. Since the Chalone Creek parking area was recently eliminated from this area, the only way to continue to allowing parking in the area has been to delineate on-street spaces on the west side of the road, which has two 9.5-foot-wide lanes and no shoulders.

During the Spring data collection period, an informal two shuttle system was

operating in the East District. The seating capacities of each bus were 18 and 7. In addition to all of the parking lots, the larger bus made regular stops at the private campground. In recent years, shuttle buses have been used only on weekends during the Spring peak period.

The West District transportation system simply consists of the access road terminating at a main parking lot, which is immediately adjacent to the trailheads. The access road is maintained by the State of California and is narrow and winding and unstriped. It has several one-lane "choke points."

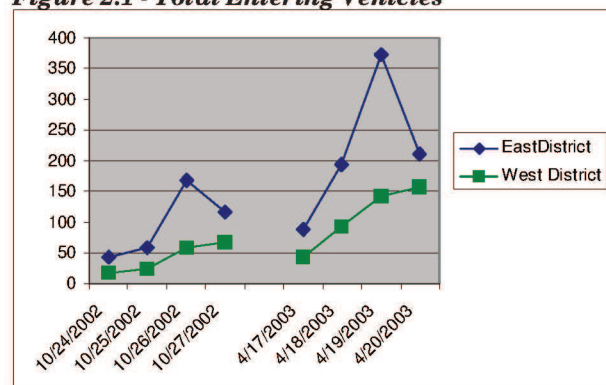
## Traffic Characteristics

The traffic volume counts were performed from 9 a.m. to 6 p.m. on October 24 to 27, 2002 and for the same hours on April 17 – 20, 2003. This captured the majority of monument visitor traffic as the open hours were 7:30 a.m. to 7 p.m. in October and 7:30 a.m. to 8:00 p.m. in April. Figure 2.1 shows the total number of entering vehicles recorded on each day of the volume counts. While the October values are believed to represent typical "Fall peak period" (meaning that visitation



*Bear Gulch Visitor Center*

**Figure 2.1 - Total Entering Vehicles**





**Wildflowers are a popular attraction at Pinnacles National Monument.**

levels are higher in the Fall than in the Summer) conditions, they are still significantly smaller than the recorded Spring traffic. Two common explanations for the increased popularity of the Spring period over the Fall are: 1) the Springtime blooming of various wildflower species, and 2) the Spring break period in school schedules.

The dramatic similarity in the East District – West District patterns and weekday –weekend patterns between the Fall and Spring results is a strong indication that statistically valid days were chosen to collect the data. One minor deviation in the values between seasons is that the East District volumes fell more dramatically from Saturday to Sunday in the Spring compared to Fall. Monument staff have stated that they believe East District visitors to live primarily in the San Francisco Bay Area and the West District visitors to live primarily in the small towns of the Salinas Valley. This pattern could explain the extra fall in East District visitation on April 20, 2003 since, in addition to it being Easter Day, the Bay Area newspapers forecasted an adverse change in the weather for this day.

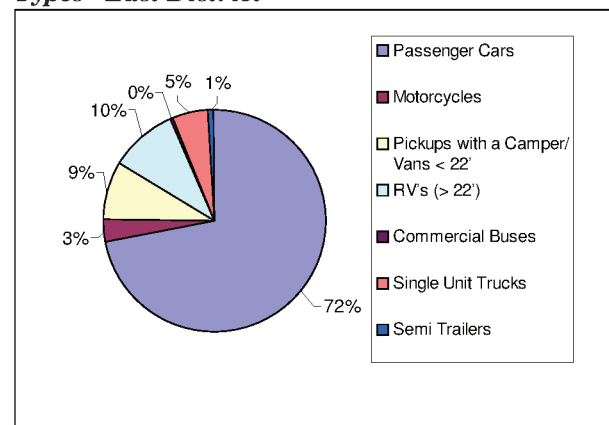
All vehicles recorded in the volume count were assigned to one of the following categories:

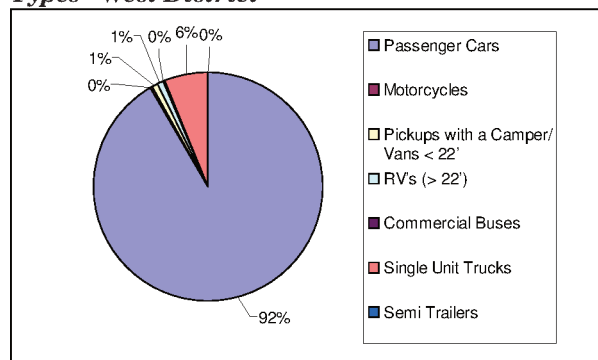
- Passenger Vehicles
- Motorcycles
- Pickups with a Camper or Vans Less Than 22 Feet Long
- Recreational Vehicles (Greater Than 22 Feet Long)
- Commercial Buses
- Single Unit Trucks

This is a standard classification system and its vehicle size distinctions may prove helpful in considering vehicle maneuverability in various areas of the monument. Figures 2.2 and 2.3 are the vehicle type distributions averaged across all volume counts for the East District and West District, respectively. The very low representation of larger vehicle types on the West District very likely reflects the very narrow roadway widths on the access road. In fact, most of the vehicles in the Single Unit Trucks category are National Park Service (NPS) vehicles.

The traffic surveyors also made a note of each vehicle that appeared to be driven by

**Figure 2.2 - Average Distribution of Vehicle Types - East District**

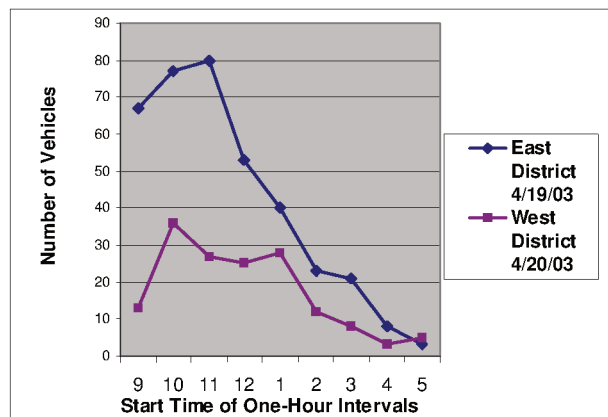


**Figure 2.3 - Average Distribution of Vehicle Types - West District**

an NPS employee. Official vehicles were obvious, and the private vehicles of employees were recorded when a standard parking permit sticker could be seen on the windshield. The only days when the proportion of NPS traffic was significant were weekdays – when overall traffic levels were not critical.

The traffic surveyors also attempted to determine the number of occupants in each vehicle. The average value for all days and both sides of the monument is 2.35. It should be emphasized that the surveyors reported a great deal of difficulty in ensuring all occupants were counted. Tinted windows were one factor in this difficulty. Also, recording the East District traffic on April 19 and 20, 2003 required the surveyor to stand outside of the monument at the Overflow lot where vehicle speeds hindered the observation. For these reasons, the 2.35 value may not be accurate and is, most likely, an underestimate.

All traffic volumes were recorded by time of day in 15-minute increments. Figure 2.4 shows the hourly distribution of entering traffic on the critical (highest volume) day for each monument district. The critical day was April 19, 2003 for the East District and April 20, 2003 for the

**Figure 2.4 - Distribution of Entering Traffic on Critical Days**

West District. On both sides the entering traffic reaches a peak in the late morning and steadily falls to zero by about 5:00p.m. However, monument visits are relatively long and peak monument occupancy extends until mid-afternoon as discussed in the Parking Lot Operations section below.

## Parking Lot Operations

The traffic survey included parking lot occupancy – duration surveys for all parking lots identified in Table 2.1 below. The table lists the capacities of each parking lot. The total capacities for the East District is 239 vehicles and for the West District is 136 vehicles. (The locations of each parking lot are indicated on Figures 1.2 and 1.3.)

**Table 2.1 - Parking Lot Capacities**

East District Lots		West District Lots	
Bear Gulch	72	Main	58
Chalone Creek (1)	58	Overflow (2)	78
Dike Road (2)	62		
Fire Wayside (2)	15		
Picnic Area (2)	36		
Campground Overflow (2)	54		

(1) - Surveyed in Fall Only.  
(2) - Surveyed in Spring Only.





**Figure 2.5 - Peak Parking Occupancy, District-Wide**

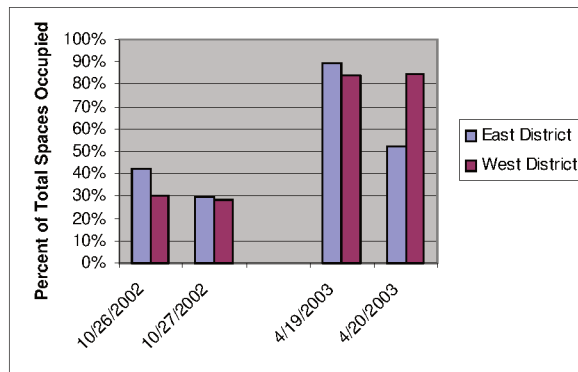
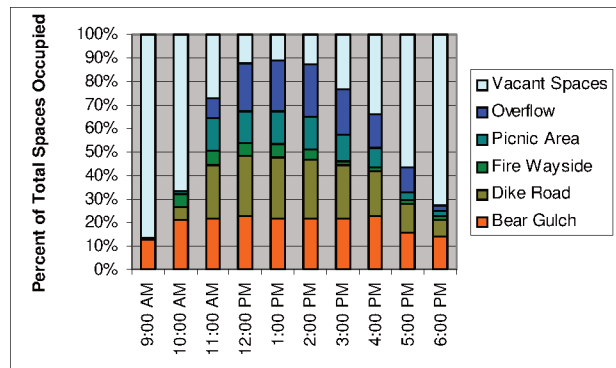


Figure 2.5 shows the peak parking lot occupancy for both sides of the monument on each day of the parking lot occupancy – duration survey. Note that these figures are expressed as total number of vehicles divided by total number of spaces – for the entire district (East District or West District) of the monument. The patterns by day of week and by season mirror those reflected in the entrance volumes discussed above. The disparity in level of visitation between the East District and West District is not apparent because the values are expressed as the percent of occupied spaces. While the West District’s occupancy is high, the raw number of parked cars is small compared to the East District.

Figure 2.6 further examines the April 19, 2003 East District occupancy by showing how its individual lots filled during the course of the day. As illustrated in Figure 1.2 (the East District map), the parking lots are located at various points along the main road. To a large degree, the parking lots filled sequentially starting with those at the core of the monument (Bear Gulch Visitor Center parking lot) and ending with the Overflow lot at the periphery. This could be expected since the primary monument

**Figure 2.6 - Relative Occupancy of Each East District Parking Lot, April 19, 2003**



attractions are probably the hiking trails and the visitor center in the Pinnacles, which are accessed from the core parking lots. However, the fact that some amount of vehicles were observed in periphery parking lots before the core lots had filled indicates that there are attractions outside of the core of the park, notably, trailheads near Dike Road, picnicking, and hiking the Bench Trail.

April 19, 2003 experienced the highest visitation levels of any survey day. In fact, from 12:00 p.m. to 2:30 p.m. all visitors on the East District were stopped at the entrance and only allowed in on a “one-in-one-out” basis. This was managed using two NPS employees. The employee in the fee collection booth stopped



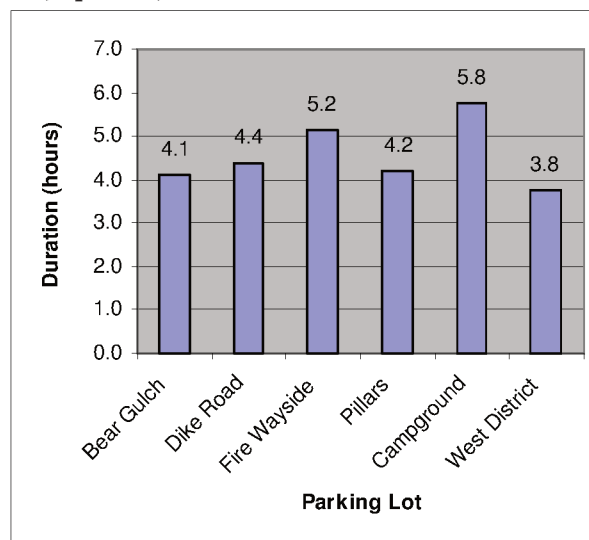
**Bear Gulch Parking Lot had both short-term and long-term parking durations.**



vehicles from entering until other vehicles exited the monument. A second employee circulated between the queued vehicles on foot explaining the one-in-one-out system and providing estimates of wait time. A total of 107 vehicles arrived at the east monument in this period. No data on the average wait time was collected but 14 parties chose to not wait and left the monument. Technically the East District parking lots did not fill – the maximum occupancy was 89%. However, for planning purposes the lots are considered to have filled; the 11% margin is to be expected without a formal real-time information link from each parking lot to the entrance gate staff.

Continuing to examine April 19 as the critical case, Figure 2.7 displays the average duration's for all vehicles that parked in each lot on that day. These average duration's range from 3.8 to 5.8 hours, which is relatively long compared to the duration's at other NPS Parks. This comparison is made because the consultant has performed parking lot duration surveys in a variety of National Parks in the Western United States. This supports the idea the hiking the long trails into the Pinnacles rock formations is the predominant visitor activity. The longer average duration of 5.8 hours at the Overflow lot probably suggests that those visitors did the same activities but spent the extra time getting to the core area. This figure does not include any time the vehicles spent in the queue at the monument entrance.

**Figure 2.7 - Average Duration for Each Parking Lot, April 19, 2003**

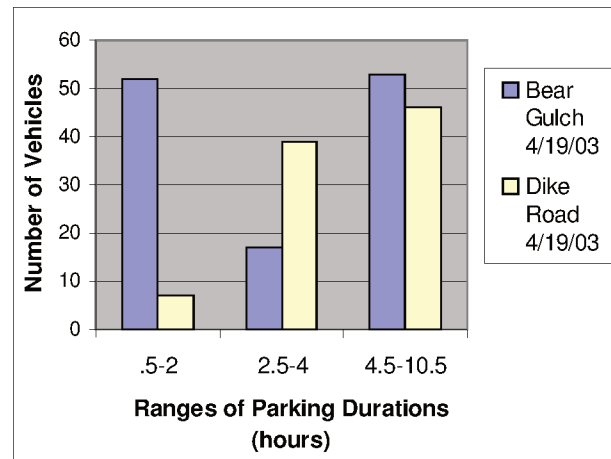


An analysis of the distribution of parking durations for each lot has been performed. With the exception of Bear Gulch, all parking lots have small standard deviation in duration – most visitors parked for a time period that was close to the average duration indicated in Figure 2.7. Figure 2.8 shows the unique pattern of parking durations in Bear Gulch. In this parking lot, there are two distinct parking patterns: 1) short term / 0 to 2 hours, and 2) long term / more than four hours. The Dike Road duration distribution is included in Figure 2.8 for comparison. It represents the normal duration distribution of all parking lots except Bear Gulch. Further analysis was performed on the short term parking at Bear Gulch. By comparing the record of license plate numbers across different parking lots, it was determined that



approximately three-quarters of these visitors leave the monument altogether afterwards. The remaining approximately one-quarter moved to other parking lots. One possible explanation for why vehicles moved to another lot is that the parties decided they were interested in different East District trails and attractions after getting oriented at the Bear Gulch Visitor Center.

**Figure 2.8 - Unique Duration Pattern at Bear Gulch**





This chapter discusses the demand for an alternative transportation system in the East District of the monument. Indications are that there is no such demand in the West District – particularly in light of plans for a replacement visitor contact station relocated to the monument entrance. In addition to increasing total West District parking spaces by approximately 30%, this new facility will break-up parking durations, whereby utilizing the existing parking lots more efficiently. At the time of this writing, the design of the replacement visitor contact station is in the final stages.

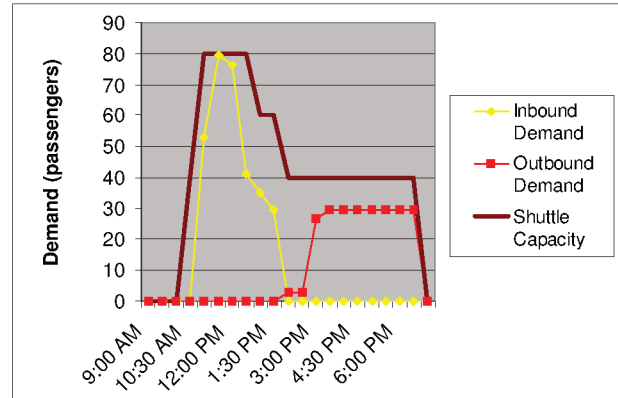
## Alternative Transportation System Demand

Tangible examples of unmet transportation demand in the monument are easy to find. In the Spring peak season of each year, the entire East District parking lot system fills to capacity routinely on weekends.

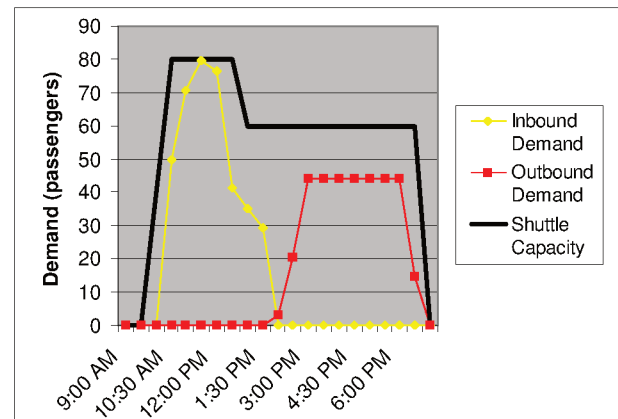
Figures 3.1 and 3.2 depict an estimate of the peak season weekend demand for an alternative transportation system in the East District of the monument. Figure 3.1 reflects a Scenario A in which the Dike Road parking capacity is preserved (through safety improvements or otherwise.) Figure 3.2 reflects a Scenario B in which Dike Road parking capacity is eliminated.

This demand estimate assumes that an alternative transportation system would be structured as an intercept system — all parking lot expansion occurs near the monument entrance and when the core parking areas fill, access is limited to a

**Figure 3.1 - Alternative Transportation System Demand – Scenario A: Dike Road Parking Preserved**



**Figure 3.2 - Alternative Transportation System Demand – Scenario B: Dike Road Parking Eliminated**



shuttle system from the lots at the entrance. The demand estimate is modeled after the transportation patterns that were observed in the monument on April 19, 2003. This was the Saturday of Easter weekend. Basing the demand analysis on data from that single day is warranted for the following reasons:

- Several senior monument staff members expressed stated that, in their judgement, Easter weekend is reliably reflective of general Spring



peak season weekend transportation conditions.

- In Chapter 2, data collected for April 19, 2003 was shown to conform well to general East District – West District patterns and weekday-weekend patterns when compared with the results of an independent traffic count on October 24 – 27, 2002 (Figure 2.1).
- Data retrieved from an automated loop traffic counter for March 1 through May 28, 2003 reveal that there have been several weekends in this Spring season with similar traffic levels to those recorded on April 19, 2003.
- The Campground shuttle was in operation during Easter weekend but did not have a significant impact on the data collection results. The shuttle is currently under used by campers because their proximity to the park allows them to use the available parking spots inside the Monument early in the day. Therefore, most of campers were captured by the transportation data collection. Park staff noted that large groups of campers, such as Boy Scout troops, were more likely to use the shuttle on that particular weekend.

As illustrated in Figures 3.1 and 3.2, there would be two primary components to the daily demand for an East District alternative transportation system – a mid-day inbound travel demand from the entrance parking lot and an afternoon-evening outbound travel demand from the core of the monument.

For the period of 11:00 a.m. to 12:00 p.m., the inbound demand curve in Figure 3.1 is based on the rate that the Overflow parking lot filled on April 19, 2003. Also applied was an assumed average vehicle

occupancy of 2.94 people. The observed average occupancy of 2.35 was increased by 25% for planning purposes. From 12:00 p.m. to 2:30 p.m. on April 19, the Overflow parking lot was filled. This portion of the inbound shuttle demand curve is based on the continued filling of a hypothetical expanded Overflow lot taking into account the rate that vehicles entered and exited the monument in this period. (Visitors leaving the monument in this period vacate parking spots in the core lots.) The inbound demand curve falls to zero after 2:30 because visitors are now leaving the core faster than new visitors are reaching the monument.

The curve for the estimated outbound demand in Figure 3.1 is based on taking the rate that visitors returned to their Overflow vehicles on April 19, 2003 and applying this to the larger peak occupancy in the hypothetical expanded parking lot discussed above. This curve cannot deviate significantly from this estimate since:

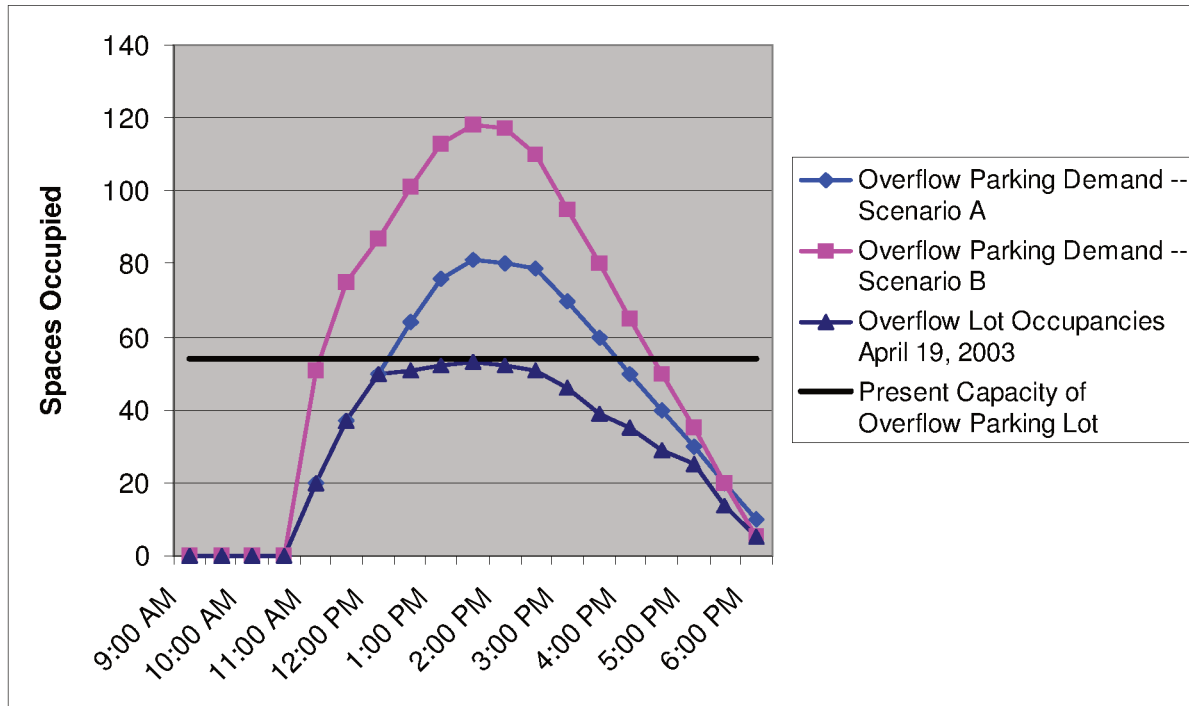
- 1) almost all parking in the monument is for minimum three-hour hikes as discussed in Chapter 2 and,
- 2) all vehicles must vacate the lot by monument closing at 8:00 p.m.

The demand estimates in Figure 3.2 were obtained in the same manner as with Figure 3.1 except that the elimination of 62 Dike Road parking spaces causes the Overflow lot to fill earlier in the day.

An evaluation of transportation demand could be further improved and varified through a daily retrieval of data from an automated loop traffic counter that exists in the roadway of the primary East District road near the historic Pinnacles Entrance Pillars.



**Figure 3.3 - Parking Demand at Monument Entrance**



## Parking Lot Demand

Figure 3.3 depicts the estimated demand for parking at the monument entrance per the analysis described in the Alternative Transportation System section above. This graph also presents Alternative Scenario A – Dike Road parking capacity preserved and Alternative Scenario B – Dike Road parking capacity eliminated. As can be seen in the graph, eliminating Dike Road parking has a greater impact on parking demand than on shuttle demand. The peak parking demand is increased by 50% whereas the shuttle demand is extended over a larger portion of the day. Also provided in the graph for reference are: the current capacity of the parking lot (54 spaces), and observed lot occupancies for April 19, 2003.

## Conceptual Service Plan For An Alternative Transportation System

The design of a transit service plan is not included in this study. However, Figures 3.1 and 3.2 each contain a plotted line that reflects the conceptual level of service that an alternative transportation system could provide. As can be seen on the graphs, both scenarios would involve a peak period service capacity of 80 passengers in a one-half hour segment. This could be provided in a number of arrangements including 20-passenger buses on 7.5-minute headway's or 40-passenger buses on 15-minute headway's. This analysis assumes that a reliable system is put in place to provide real-time information to arriving visitors about whether parking spaces are available in the core lots of the monument. Otherwise, after the Overflow lot has





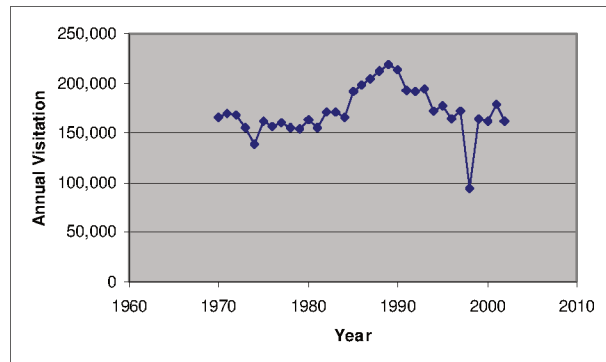


*Typical 20-passenger bus*

opened at the entrance, all visitors will assume they need to park there and use the shuttle when, in fact, some of the core spaces are starting to be vacated by visitors leaving the monument.

The service levels suggested by these graphs are based on monument conditions recorded on April 19, 2003. The April 19, 2003 conditions are believed to represent current peak season weekend traffic patterns for reasons outlined in the Alternative Transportation System Demand section above. It is also believed that the general visitation levels of recent Spring seasons will not change dramatically in the coming years. Figure 3.4 shows that, over the past few decades, the annual visitation levels have been somewhat dynamic, but stable overall. Visitation data collected in this study suggest that the foreseeable demand only warrants the usage of an East District alternative transportation system in the

**Figure 3.4 - Historic Annual Visitation Levels**



Spring peak period (first weekend of March through Memorial Day weekend) and only during weekends.

While the shape of the shuttle service curve in Figures 3.1 and 3.2 is dictated by the Inbound Demand and Outbound Demand Curves, it is recognized that there will also be demand for movement between intermediate points. This includes visitors wishing to start the day at the Bear Gulch Visitor Center and then hike a trail that originates in the Chalone Creek area. Another example is visitors who wish to use the new picnicking facilities near the historic Pinnacles entrance pillars before or after a hike. On the whole, however, these movements constitute a negligible component of demand for planning purposes.

