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SOCIAL RESOURCES

TRANSPORTATION

Affected Environment

A number of transportation studies were undertaken, along with the compilation of transportation data, in preparation for the South Rim visitor transportation plan. The resulting documents provide information about the existing transportation system and its use on the South Rim at Grand Canyon National Park, as described in this section. The “South Rim Transportation Plan Summary of July 2006 Data Collection” provides a detailed summary of data collected at that time (DEA 2006). The data collection period reflects typical conditions during the peak visitor season at the South Rim, from mid-June to mid-August. The information collected relates to vehicular traffic and parking, tour bus parking, shuttle bus ridership, and visitor entries at the South Entrance Station.

Two other documents that provide information related to the South Rim transportation system include the “Analysis of Operation of South Entrance Station at Grand Canyon National Park” (Upchurch 2005) and the “South Rim Visitor Transportation Plan Planning and Design Narrative” (NPS 2007f). However, several aspects of the alternatives were refined subsequent to the completion of the “Planning and Design Narrative” (DEA 2007a, 2007b).

Modes of Access and Traffic Volumes

Modes of Access — How Visitors Arrive at the Grand Canyon

Currently, visitors arrive at the South Rim of the Grand Canyon by private vehicle, on foot or bicycle, by tour bus, or by train (on the Grand Canyon Railway). No regularly scheduled public transit service is provided to the South Rim. According to the NPS Public Use Statistics Office, approximately 4.01 million people visited the South Rim in 2006. Of these,



Currently, visitors arrive at the South Rim of the Grand Canyon by private vehicle or tour bus, the Grand Canyon Railway, or by walking or bicycling.

3.1 million visitors entered through the South Entrance Station, about 78% of whom arrived by private vehicle and 22% by tour bus. An additional 672,000 visitors entered through the East Entrance, 89% of whom arrived by private vehicle and the other 11% by tour bus. The remaining 238,000 visitors entered by means of the Grand Canyon Railway. Taken together, these statistics indicate that on average approximately 75% of visitors to the South Rim travel by private vehicle, 19% by tour bus, and 6% by train (NPS 2006c).

On high visitation days in the peak season a greater number of visitors travel to the South Rim in private vehicles. Based on data collected at the entrance stations in 2005 and 2006, the mix of day visitor transportation modes for the South Rim on the design day is assumed to be 80% by private vehicle, 15% by tour bus, and 5% by train. The percentage of day visitors who are assumed to use a private vehicle for some portion of their travel within the South Rim area on the design day is 80% (NPS 2007f).

Traffic Volumes

Vehicles entering and leaving the park at the South Rim are counted continuously by permanent count stations. Data from these count

stations, as well as data collected at the entrance stations, were used to establish overall trends in traffic entering the study area. Traffic counts were collected in July 2006 to identify how traffic circulates on the South Rim. These counts show the highest volumes of traffic on the South Entrance Road between the South Entrance Station and Center Road, as well as between Desert View Drive and Market Plaza (see Figure 2 for locations). High volumes were also observed on the South Entrance Road between the Market Plaza and Village Loop Drive. This indicates that vehicles are most likely to proceed from the South Entrance Station toward Mather Point and Yavapai Observation Station. An appreciable number of vehicles were observed traveling south on Market Plaza Road, indicating that instead of traveling out of the park on the South Entrance Road through Mather Point, some vehicles choose to take Zuni Way to Market Plaza Road to exit the park through the South Entrance Station.

Traffic circulation on the South Rim is clearly heaviest along the South Entrance Road, which serves many park features, including Mather Point, Yavapai Observation Station, Market Plaza, and Grand Canyon Village National Historic Landmark District, which contains lodges along the canyon rim, food and other visitor services, and popular views

of the canyon. Canyon View Information Plaza is only accessible by tour bus, shuttle bus, bicycle, or on foot from the Mather Point parking area and adjacent roadside parking. The information plaza is not directly accessible by private vehicle (DEA 2006).

Shuttle Bus Service

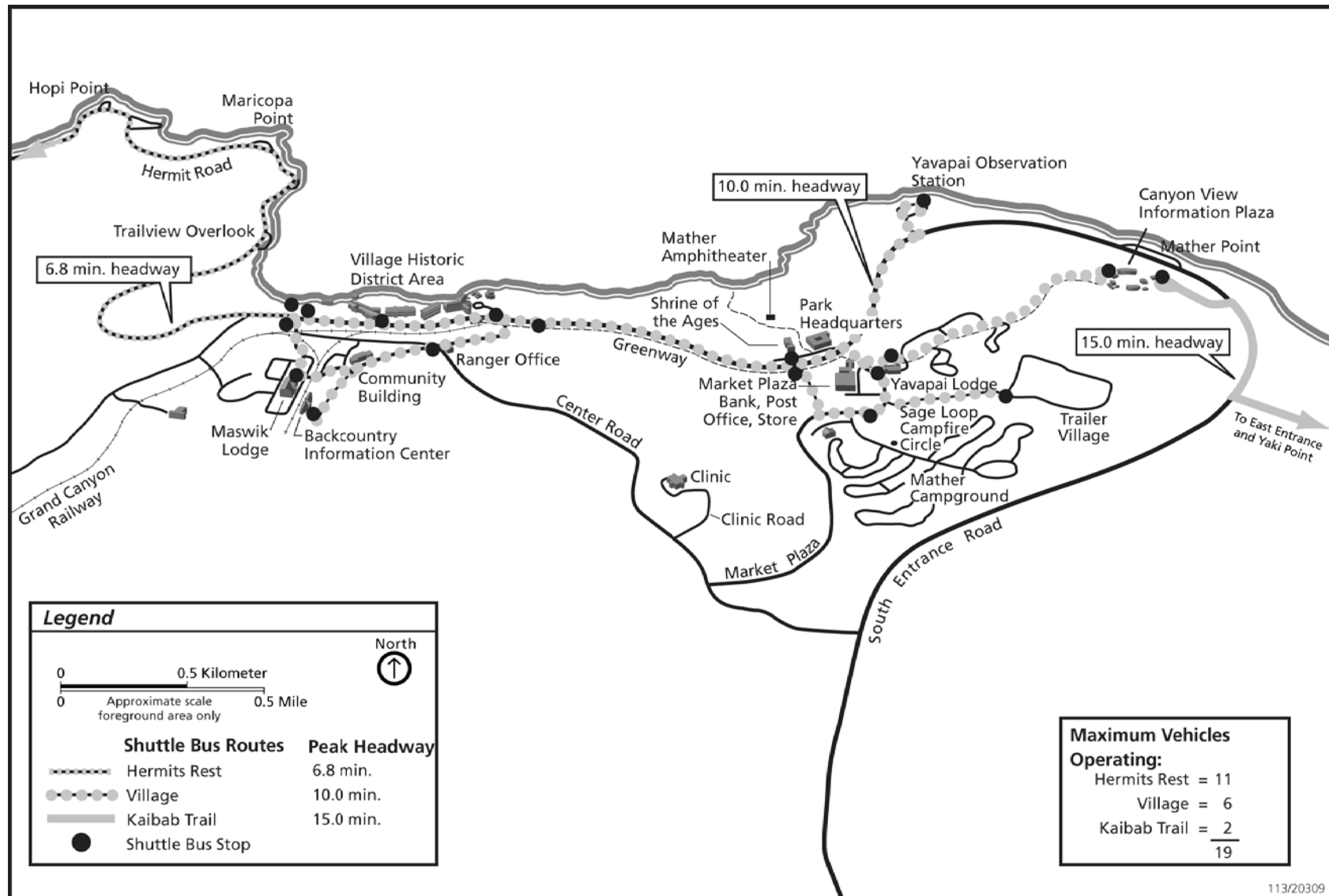
Free South Rim shuttle bus service provides visitor access to and from parking facilities, Canyon View Information Plaza, lodging, and other visitor attractions. Shuttle buses currently operate on three primary routes: Hermits Rest, Village, and Kaibab Trail routes (see Figure 21 and Table 27). A shuttle bus also runs from Canyon View Information Plaza to Mather Point for visitors who are unable or do not wish to walk. In addition, an early morning Hikers Express picks up hikers at the Bright Angel Lodge and the Backcountry Information Center and travels directly to the South Kaibab trailhead. Three daily Hikers Express trips are provided, with hourly departures and times varying by season. The Hermits Rest route provides the only access for most visitors along Hermit Road from March through November, when the road is closed to all visitor traffic except visitors with accessibility permits and backcountry permits. The Hermits Rest route is not in service between December 1 and February 28, when the road is open to private vehicles.

TABLE 27. EXISTING SOUTH RIM SHUTTLE BUS ROUTES: PEAK SERVICE LEVEL CHARACTERISTICS

Route and Stops Served	Route Length	Service Frequency (minutes between departures)	Round-Trip Travel Time	Estimated Peak-Season Daily Bus Miles
Hermits Rest Route: Hermits Rest transfer, Trail Overlook, Maricopa Point, Powell Point, Hopi Point, Mohave Point, The Abyss, Pima Point, Hermits Rest, Mohave Point, Hopi Point, Hermits Rest transfer	16.0 mi.	9.4 minutes	75 minutes	1,283 mi.
Village Route: Canyon View Information Plaza, Market Plaza, Yavapai Observation Station, Shrine of the Ages, Grand Canyon Depot, Bright Angel Lodge, Village route transfer, Maswik Lodge, Backcountry Information Center, Center Road, Village East, Shrine of the Ages, Mather Campground, Trail Village, Market Plaza, Canyon View Information Plaza	8.0 mi.	10 minutes	60 minutes	760 mi.
Kaibab Trail Route: Yaki Point, Pipe Creek Vista, Canyon View Information Plaza, South Kaibab trailhead, Yaki Point	6.0 mi.	15 minutes	30 minutes	380 mi.
Hikers Express: Bright Angel Lodge, Backcountry Information Center, South Kaibab Trailhead	12.0 mi.	60 minutes	60 minutes	36 mi.
Canyon View Information Plaza / Mather Point Accessibility Route	1.0 mi.	15 minutes	15 minutes	44 mi.
Total Estimated Peak-Season Daily Bus Miles for All Shuttle Bus Service				2,503 mi.

SOURCE: NPS 2007f.

FIGURE 21. SOUTH RIM SHUTTLE BUS ROUTES



Service on the Village and Hermits Rest routes is gradually increased during the morning hours. The most frequent service is usually provided between 11 a.m. and 12 p.m. and at sunset on the Hermits Rest route. The Kaibab Trail and Canyon View Information Plaza/Mather Point routes generally operate with the same service frequency (headways or time between arrivals of buses) all day beginning in the early morning hours.

Shuttle bus service levels include two elements — the amount of service on the routes (indicated by headways) and the convenience of travel for visitors using each route. Table 27 illustrates the existing peak service characteristics of the shuttle bus service, including route lengths, peak-season service frequency, total round-trip travel time, and the estimated peak-season daily bus miles traveled. The overall amount of shuttle bus service is indicated by the daily bus miles traveled during the peak season.

The convenience of travel on the shuttle routes is indicated by the extent to which indirect travel is required for trips between key destinations. The Hermits Rest and Kaibab Trail routes provide direct service between key points with little indirect travel. However, the Village route requires a large amount of indirect travel for visitors riding between Canyon View Information Plaza and the historic district. Westbound visitors from Canyon View Information Plaza and Market Plaza must travel east to Yavapai Observation Station and back before heading toward the historic district. Eastbound travelers from the village must travel to Mather Campground and trailer village before traveling to Canyon View Information Plaza.

Parking Conditions

Private Vehicle Parking. Figure 22 depicts parking lots on the South Rim and their capacities. No specific capacity is reported for informal parking areas (including roadside parking near Mather Point, between Mather Point and the Yavapai Observation Station access road, or around the powerhouse).

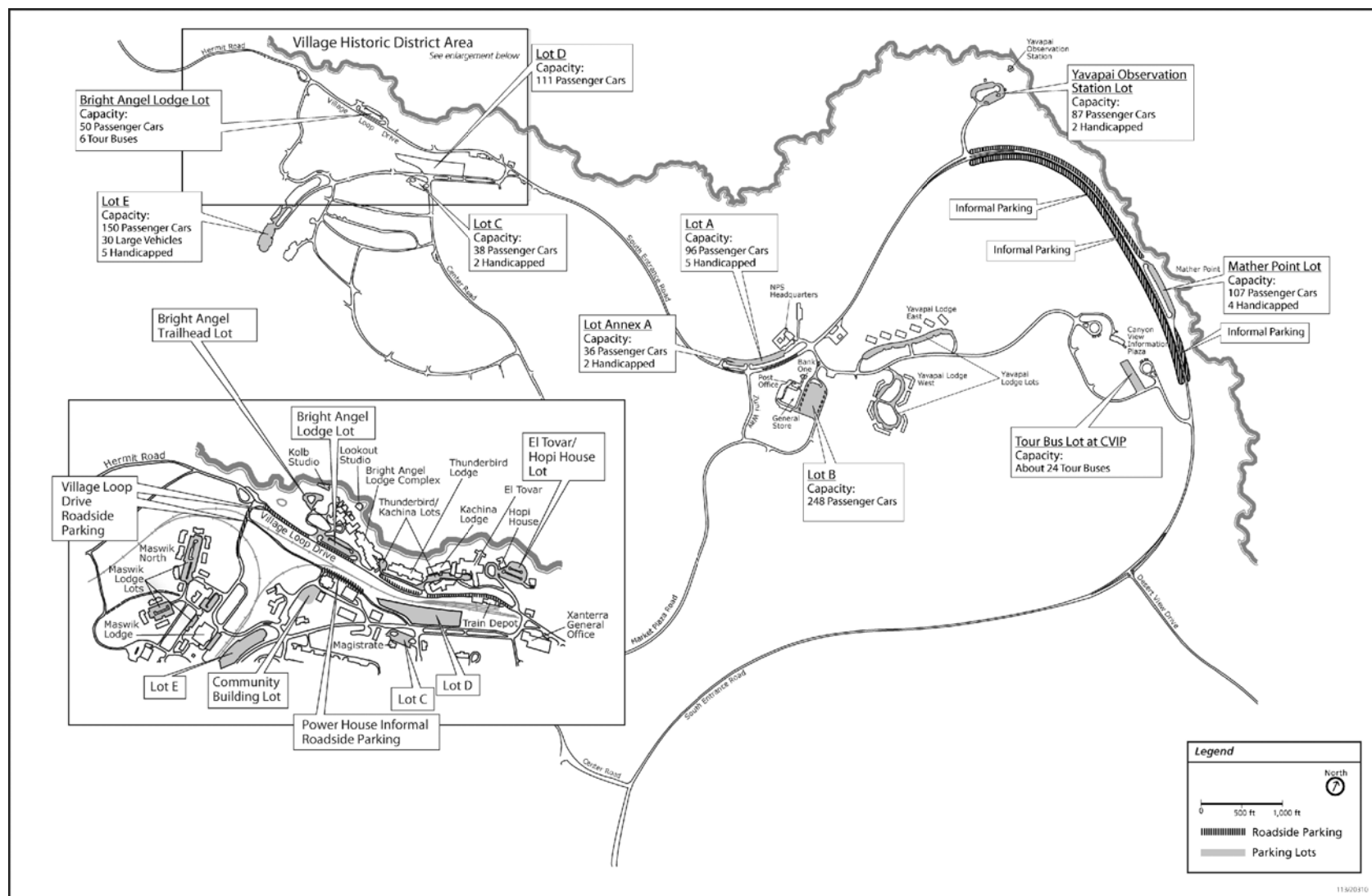


Free South Rim shuttle bus service provides visitor access to and from parking facilities, Canyon View Information Plaza, lodging, and other visitor attractions.

Parking occupancy observations in July 2006 indicate that although parking in the most popular visitor parking lots exceeds capacity, some areas are underutilized. On most days parking is sufficient in endorsed parking areas to accommodate the total number of parked vehicles if all parking spaces were used. Because some lots are poorly utilized, substantial numbers of vehicles park in informal roadside areas near popular visitor destinations, particularly Mather Point. Parking lots that were full or over capacity during the data collection period included those at Bright Angel Lodge, Mather Point, and El Tovar/Hopi House, as well as Village Loop Drive roadside parking. Parking lots that were poorly utilized included lot A (24% maximum occupancy), lot A annex (13% maximum occupancy), lot C (28% maximum occupancy), and lot E (41% maximum occupancy). The most used lots on the day of observation were at Bright Angel Lodge, which was at capacity from 6 a.m. to 8 p.m., and Mather Point, which was at capacity from 12 noon to 7 p.m.

Data collected in 2007 indicated that although parking at Maswik and Yavapai lodges in Grand Canyon Village is intended primarily for overnight guests, substantial numbers of parking spaces are unoccupied during the daylight hours when day visitor parking needs are the greatest. Parking that could be used by day visitors includes 239 spaces at Yavapai Lodge, 150 spaces at Maswik Lodge, and a total of 139 spaces at the rim lodges (Upchurch, pers. comm. 2007).

FIGURE 22. SOUTH RIM PARKING LOCATIONS AND CAPACITIES



The average parking duration at the Canyon View Information Plaza/Mather Point area was approximately 1 hour. The average duration elsewhere on the South Rim was approximately 3 to 4 hours in addition to time spent at Canyon View Information Plaza (DEA 2006). The estimated maximum number of private vehicles for day visitors in Grand Canyon Village on the day of observation was approximately 950–1,050, based on the July 2006 data (NPS 2007f). The number of vehicles entering the South Rim on the parking observation day was close to the average for the peak season. About 6.4% more vehicles entered the South Rim on the design day in 2005. All of the additional vehicles entering the South Rim on the design day are assumed to be day visitors. Table 28 shows the estimated need for day visitor parking on the design day in 2005 compared to the available supply. There is an overall shortfall of 180 parking spaces in Grand Canyon Village and a shortfall of 166 spaces at the Mather Point / Canyon View Information Plaza area (NPS 2007f).

TABLE 28. DAY VISITOR PARKING DEMAND AND SUPPLY

Area	2005 Design Day		
	Parking Demand	Parking Spaces	Shortfall
Total Grand Canyon Village (includes Canyon View Information Plaza / Mather Point)	1,370	1,190	180 (15%)
Canyon View Information Plaza / Mather Point	260	94	166 (177%)

SOURCE: NPS 2007f.

Tour Bus Parking

Tour bus passengers are accommodated at two primary locations on the South Rim (see Figure 22). Canyon View Information Plaza has parking spaces for 24 tour buses, and the Bright Angel Lodge can accommodate short-term loading / unloading of up to 6 buses (DEA 2006). Tour bus parking has also been provided on a trial basis adjacent to the powerhouse (see Village inset in Figure 22).

According to observations made by park staff, tour buses frequently park for extended periods in the short-term passenger loading area at Bright Angel Lodge, resulting in tour bus congestion that can back up to Village Loop Drive. Tour buses have also been seen parking in lots B and E and in scattered informal locations throughout Grand Canyon Village, leading to further congestion. Generally, tour bus operators are able to make individual choices about parking depending on availability. During the July 2006 data collection period, the Bright Angel Lodge tour bus loading/unloading area operated at 100% occupancy. Although the Canyon View Information Plaza tour bus lot provides the majority of tour bus parking, its maximum occupancy was only 25%. This imbalance between the occupancies of the two locations indicates that the current availability of tour bus parking does not provide adequate access to desired park destinations. Anecdotal observations from park staff also indicate that existing tour bus parking is inadequate. Tour bus operators have expressed concern regarding the limited number of existing opportunities for passengers on the South Rim due to restrictions on bus access (DEA 2006).

Environmental Consequences

Methodology and Assumptions

The transportation impacts of the alternatives have been determined for modes of access and resulting traffic volumes, shuttle bus service, and parking (private vehicle and tour bus) conditions. Implementing any of the action alternatives could result in the following:

- changes to the mode of transportation visitors use to arrive at and move within the park (a shift from private vehicles to shuttle buses), as well as the travel routes used to reach the South Rim, with more visitors entering through the East Entrance instead of the South Entrance — These changes would affect the number of private vehicle trips to

and within the park and associated traffic volumes on roads.

- the amount, location, and convenience of parking available to visitors — How visitors arrive and move about the park could alter the demand for parking and subsequently the relationship between parking demand and supply.
- the amount of shuttle bus service and the convenience of the service
- changes to tour bus loading/unloading and parking supplies would result in impacts to tour bus access.

The assumptions used to evaluate transportation impacts when the facilities and services in the plan alternatives are fully implemented include the following:

- The projected volume of traffic entering the South Rim in the design year of 2020 is directly related to visitation projections. Annual visitation to the South Rim would increase by 23% over the life of the plan. Due to spreading out peak visitor demand, peak-season visitation would increase by 20%. Because overnight visitation is assumed to remain unchanged, day visitation is expected to increase by 34% from 2005 to 2020 (see Chapter 1, “Visitation Growth,” page 8).
- The analysis assumes visitation levels and associated transportation demand on the design day. The design day represents visitor use on typically busy days during the summer. Visitor use would exceed the design day on about 10 days in the peak summer season (see Chapter 1, “Design Day,” page 9).
- Based on growth expectations, the *total number of vehicles* projected to enter the South Rim on the 2020 design day is 6,360 (based on a 24-hour day). Absent any management strategies that may be implemented as part of this plan, it is assumed that the proportion of vehicles entering through both the East and South Entrances would be the same as

in 2005. Not all of these vehicles would travel into and through Grand Canyon Village, and not all would be visitor vehicles. Under 2020 design day conditions, approximately 5,300 *private visitor vehicles* would enter the South Rim (80% through the South Entrance and 20% through the East Entrance). The action alternatives could shift entrances from the south to the east.

- Projections of the number of visitor vehicles entering the South Rim and traveling through Grand Canyon Village are based on traffic between the hours of 5 a.m. and 9 p.m., the primary visitor use period.
- Shuttle bus services would be provided between Tusayan and Canyon View Information Plaza for the alternatives that would provide visitor parking in Tusayan. It is assumed that shuttle buses from Tusayan would travel directly to Canyon View Information Plaza, making no stops en route, and then they would return directly to Tusayan. The amount of bus service provided would be sufficient to carry the numbers of visitors expected to use the parking area at Tusayan and to provide convenient service with acceptable waiting times.
- All action alternatives would improve the existing South Rim shuttle bus service, including changes in the routes traveled to reduce indirect travel and improve convenience. All areas currently served by shuttle buses would continue to be served. The amount of service would be sufficient to reduce overcrowding that now occurs on portions of the shuttle bus system and to accommodate increases in shuttle ridership associated with visitation growth.
- Visitor vehicle parking requirements were estimated using data on visitor arrivals at the South and East Entrances and assumptions regarding the percentage of visitors traveling to specific

locations and the length of time visitors would spend at those locations.

Assumptions included:

- About 85% of day visitors and 60% of overnight visitors arriving at Canyon View Information Plaza in private vehicles would choose to stop and take advantage of the visitor services and views at Mather Point.
- The average duration of stay for day visitors would be 1.5 hours at Canyon View Information Plaza (extended from the current 1.0 hour average stay because of the additional visitor services planned).
- Visitors would spend an additional 4.0 hours elsewhere in Grand Canyon Village.
- Parking duration for visitors riding shuttles from parking areas at Tusayan to other points on the South Rim were increased to account for the time visitors would spend riding shuttles between the parking areas and visitor destinations.
- The numbers of commercial tour buses entering the South Rim area under 2005 design conditions was expanded to represent the selected planning horizon year of 2020. Under 2020 design conditions 151 tour buses would enter the South Rim on the design day and would include a mix of large and small buses. This would include tour buses, as well as a small number of buses carrying passengers between Grand Canyon National Park Airport and the South Rim. A maximum of 50% of the buses entering the South Rim would be present in the area and would need parking at any given time.

Impacts on transportation have been assessed using professional judgment to develop both qualitative and quantitative analyses of the effects of actions on transportation.

Transportation information and analysis is

based on information presented in the “Affected Environment” section above.

Modes of Access and Traffic Volumes

Changes in Transportation Modes to the South Rim and Resulting Traffic Volumes.

Changes in the percentage of visitors who would arrive at the South Rim by shuttle bus were estimated for each action alternative. This percentage was compared to the no-action alternative, where 80% of day visitors would travel by private vehicle, 15% by tour bus, and 5% by train. The percentage of visitors arriving by both train and tour bus are assumed to remain unchanged. Under alternatives B and C it is assumed that a portion of the visitors who would otherwise arrive in private vehicles would choose to ride shuttle buses into the park from Tusayan. The associated increase in access to the South Rim by alternative modes and reduction in private vehicle use was estimated based on professional judgment regarding the influence of proposed parking changes and shuttle bus services on visitors’ mode choices for travel to the park.

Some of the action alternatives feature new shuttle bus service that could encourage travelers to the park to switch to alternative modes. For each alternative the percentage of private vehicle trips to the park that could be shifted to shuttle buses was calculated based on the available parking spaces inside the park and at Tusayan and assuming that an active visitor information program and transportation management strategies would inform visitors when parking spaces in the South Rim area were full. Information program and management strategies are assumed to be effective in balancing vehicles entering the park with available parking supply by motivating visitors to ride shuttle buses.

It was assumed that an adaptive management approach would be applied to determining the types of strategies that would be required to achieve effective utilization of the available parking lots. Professional judgment was used to determine the share of visitors who would

change travel modes in this evaluation. The required changes in travel mode to achieve effective utilization of all parking areas would not be affected by shifts in visitor travel routes from the South Entrance to the East Entrance.

Changes in Transportation Modes on the South Rim. Changes in the percentage of visitors who would travel through the South Rim by shuttle bus were also measured for each action alternative. This percentage was compared to the no-action alternative, where 80% of day visitors would use private vehicles for at least a portion of their travel on the South Rim. Related reductions in private vehicle use and traffic volumes on the South Rim were estimated based on professional judgment regarding the influence of proposed parking changes and shuttle bus services on visitors' mode choices for travel within the park. The action alternatives feature expanded and improved South Rim shuttle bus service and new parking at Canyon View Information Plaza that could encourage visitors to switch to alternative modes. For each alternative the percentage of private vehicle trips that could be shifted to shuttle buses was calculated based on the number of parking spaces provided at Canyon View Information Plaza and in other locations throughout the South Rim.

Similar to the above, an active visitor information program and transportation management strategies are assumed that would inform visitors when parking areas were full, allowing visitors to choose alternative parking sites. Further, information programs and management strategies would balance available parking and the number of vehicles traveling through Grand Canyon Village by motivating visitors to park at Canyon View Information Plaza and ride shuttle buses.

Shuttle Bus Service

Changes to shuttle bus service on the South Rim and the convenience of the shuttle bus routes were qualitatively analyzed, including services from Tusayan and within Grand Canyon Village. As service frequency on

individual routes increased and headways or the time between buses decreased, the resulting change in service levels would potentially affect crowding and visitor waiting times between buses. Changes in service frequency were qualitatively evaluated for their potential impact to the convenience and comfort of travel by shuttle bus. Service convenience was determined qualitatively by considering the directness of travel on the routes and the ability of visitors to quickly travel among key destinations on the South Rim.

Parking Conditions

Private Vehicle Parking. Using the results of the "South Rim Visitor Transportation Plan July 2006 Data Collection" study and traffic growth estimates for 2020, parking demand for day visitors was projected for the South Rim area for the 2020 design day. The parking demand was compared with the available capacity to identify the degree to which parking supply would meet or exceed parking demand in each action alternative based on the relationship between parking demand and supply and the location of visitor parking relative to desired visitor destinations.

Tour Bus Loading/Unloading and Parking. Changes in tour bus loading/unloading and parking conditions were qualitatively assessed using criteria such as accessibility to park destinations (the proximity of service to major destinations), supply of loading/unloading and parking areas, and tour bus management actions.

Study Area

The transportation study area includes the roadway system and parking areas used by visitors on the South Rim (from Yaki Point on the east to Hermit Road on the west, and from the canyon rim on the north to the park boundary on the south) and the SR 64 corridor from the South Entrance Station through Tusayan.

Impact Thresholds

Three different sets of impact thresholds were used in the transportation analysis to allow impacts to be measured across important elements of transportation service quality. A set of thresholds was derived for each of the sub-topics described above — visitor transportation modes and traffic volumes, shuttle bus service, and parking conditions. Thresholds were not defined for changes in tour bus loading and parking. A common duration definition was used; however, the nature of the impact varied by threshold set. Transportation conditions during the peak visitation hours of the design day were used to assess transportation impacts in comparison to the defined thresholds.

Modes of Access and Traffic Volumes

Impact Thresholds:

- *Negligible* — There would be no noticeable change in the modes of travel used by visitors and no noticeable change in the volume of traffic on park roads. A change in traffic volume and mode of travel of less than the existing median day-to-day variation in visitor traffic would occur.
- *Minor* — Changes in the modes of travel used by visitors and the associated change in traffic volumes would be slight but detectable. However, these changes would not appreciably affect traffic flow and would be somewhat higher than the existing typical day-to-day changes in visitor traffic.
- *Moderate* — Changes in traffic volume would be readily apparent to visitors and would result in measurable changes in traffic flow. Traffic volume changes would be similar to the highest existing day-to-day changes in visitor traffic.
- *Major* — Visitors would be highly aware of changes in traffic volumes on roads resulting from changes in travel mode shares of visitors, and the resulting change in traffic flow would be substan-

tial. Changes in traffic volume would be much higher than the highest existing day-to-day changes in traffic volume.

Nature of the Impact:

- *Adverse Impact* — An adverse impact would reduce visitor travel by alternative transportation modes or would lead to increased volumes of traffic and degraded traffic flow.
- *Beneficial Impact* — A beneficial impact would increase the share of visitors traveling by alternative modes or would lead to decreased volumes of traffic and improved traffic flow.

Shuttle Bus Service

Impact Thresholds:

- *Negligible* — There would be no noticeable change in the level or convenience of shuttle bus service as indicated by the frequency of service on shuttle bus routes and the routing of shuttle buses on the South Rim.
- *Minor* — Changes in the level of shuttle bus service would be slight and could be detectable to visitors in the form of shorter or longer waiting times for buses or more or less crowding on buses. There would be no noticeable change in shuttle bus routes.
- *Moderate* — Changes in the level of bus service would be readily apparent to visitors and would result in a very noticeable change in waiting times for buses and/or crowding on buses. Changes in shuttle bus routes would provide a marked change in the convenience of travel by shuttle bus.
- *Major* — Visitors would be highly aware of changes in shuttle bus service. Waiting times would be substantially changed, and crowding on buses would change a great deal. There would be a substantial change in the convenience of travel by shuttle bus.

Nature of the Impact:

- *Adverse Impact* — An adverse impact would reduce the level and convenience of shuttle bus service.
- *Beneficial Impact* — A beneficial impact would increase the level and convenience of shuttle bus service.

Visitor Parking

Impact Thresholds:

- *Negligible* — There would be no noticeable change in the relationship between parking demand and the number or convenience of available parking spaces. Changes in parking supply and demand would not appreciably affect the likelihood that visitors would be able to find parking in designated areas near their desired destinations.
- *Minor* — Changes in the relationship between parking demand and the number and convenience of available parking spaces would be slight but detectable. Changes in parking supply and demand would have a slight impact on the likelihood that visitors would be able to find parking in designated areas near their desired destinations.
- *Moderate* — Changes in the relationship between parking demand and the number and convenience of available parking spaces would be readily apparent to visitors and would result in a very noticeable change in the availability of parking in designated areas serving popular visitor destinations. Substantial changes would occur in the parking supply in some popular visitor use areas.
- *Major* — Visitors would be highly aware of changes in the relationship of parking supply and demand. The likelihood of visitors finding parking in designated areas near their desired destination would change substantially. Substantial changes would occur in the parking supply at all popular visitor use areas.

Nature of the Impact:

- *Adverse Impact* — An adverse impact would reduce the availability and/or convenience of parking or increase the demand, resulting in greater shortfalls of parking.
- *Beneficial Impact* — A beneficial impact would increase the availability and/or convenience of parking or reduce the demand, resulting in lesser shortfalls of parking.

Duration

Short-term Impact. A short-term impact would last as long as construction or less than one year for non-construction activities. Because the implementation of the alternatives would occur in phases, short-term impacts associated with construction or other implementation activities could occur multiple times. Each occurrence of these impacts would be restricted to a single visitation season.

Long-term Impact. A long-term impact would last beyond construction or more than one year for non-construction activities, and it would be permanent in nature.

Alternative A: No Action

Direct / Indirect Impacts

Mode of Access and Traffic Volumes. The current mix of transportation modes would continue through the 2020 planning horizon, with no anticipated changes. In 2020, based on existing visitor travel behavior, 80% of day visitors would travel to the South Rim by private vehicle, 15% by tour bus, and 5% by train. Approximately 80% of visitors would use private vehicles for a portion or all of their travel on the South Rim. Therefore, current transportation modes visitors use to travel to and through the park would remain the same.

Because modes of travel used by visitors would remain constant, changes in traffic volumes would be influenced only by increases in visitation between 2005 and 2020. Annual

visitation is expected to grow 23% between 2005 and 2020, with peak visitation expected to grow by 20% for the same period. Between 5 a.m. and 9 p.m. (the prime visitor hours), about 4,770 vehicles entered the South Rim in 2005, with 5,860 vehicles expected in 2020. The projected daily number of visitor vehicles traveling through Grand Canyon Village between 5 a.m. and 9 p.m. on the design day would grow from 4,020 in 2005 to 4,830 in 2020 (see Table 29). Therefore, the South Rim area would experience an increase in overall traffic from 2005 of about 20%, which would be readily apparent to visitors and would result in long-term, moderate, adverse impacts because of measurable changes in traffic flow. Alternative A would not meet the plan's objective of reducing overall vehicle traffic in the Grand Canyon Village in 2020 by 15%–25% during peak periods.

Shuttle Bus Service. Shuttle bus passenger capacity under alternative A would not change from existing conditions on any route. Some change to the Hermits Rest route would occur due to the planned purchase and use of new vehicles. Because the new vehicles have lower seating capacities than the current vehicles, three additional buses would be required during peak service, resulting in more frequent shuttle bus service on that route. Service would be provided every 6.8 minutes, versus every 9.4 minutes, thus reducing

TABLE 29. ESTIMATES OF TOTAL TRAFFIC ENTERING THE SOUTH RIM AND TRAVELING THROUGH GRAND CANYON VILLAGE IN 2020

Alternative	Visitor Traffic	Total Traffic
Traffic Entering the South Rim (South and East Entrances)		
Base Year — 2005	4,130	4,770
Alternative A — 2020	4,950	5,860
Alternative B — 2020	4,290	5,190
Alternative C — 2020	3,420	4,330
Alternative D — 2020	4,950	5,860
Traffic through Grand Canyon Village		
Base Year — 2005	3,650	4,320
Alternative A — 2020	4,830	5,610
Alternative B — 2020	3,120	3,900
Alternative C — 2020	3,220	4,000
Alternative D — 2020	3,120	3,900

NOTE: All traffic estimates are for the period from 5 a.m. to 9 p.m. on the design day.

TABLE 30. ALTERNATIVE A: SOUTH RIM SHUTTLE BUS ROUTES PEAK SERVICE LEVEL CHARACTERISTICS

Route	Route Length	Service Frequency (minutes between departures)	Round-Trip Travel and Layover Time
Hermit's Rest	16.0 mi.	6.8 min.	75 min.
Village	8.0 mi.	10 min.	60 min.
Kaibab Trail	6.0 mi.	15 min.	30 min.
Hikers Express	12.0 mi.	60 min.	60 min.
Canyon View Information Plaza / Mather Point Accessibility Route	1.0 mi.	15 min.	15 min.

SOURCE: NPS 2007f.

waiting time. All other shuttle bus route lengths, frequencies of service, and travel times would remain the same, as shown in Table 30. Alternative A would not improve the convenience of traveling on the shuttle bus system. Shuttle bus routes would continue to be overcrowded between now and 2020, and conditions would likely worsen with continued visitation increases.

Overall, because of the increase in demand for travel by shuttle bus, no increase in shuttle bus capacities, and only a small reduction in waiting time for users on the Hermits Rest route, a long-term, moderate, adverse impact to shuttle bus level of service would result.

Parking Conditions. No changes to existing parking supplies for private visitor vehicles would occur under alternative A. The current imbalance between parking supply and demand would persist and would worsen, with parking demand continuing to exceed supply as visitation increases. Some parking for Mather Point, Canyon View Information Plaza, and the South Kaibab trailhead would continue to occur on roadsides. Access to Canyon View Information Plaza from the Mather Point parking area is inconvenient and exposes visitors to safety hazards because of having to cross the highway and walk along it (see "Visitor Experience" section below). In 2020 day visitor parking demand would be approximately 20% greater than in 2005, with no change in parking supply. Table 31 shows

TABLE 31. ALTERNATIVE A: DAY VISITOR PARKING DEMAND AND SUPPLY IN 2020

Area	2020 Design Day — Alternative A		
	Parking Demand	Parking Spaces	Shortfall
South Rim Area (includes Canyon View Information Plaza / Mather Point)	1,860	1,190	670 (56%)
Canyon View Information Plaza / Mather Point	319	94	225 (239%)

the relationship between parking demand and supply for the South Rim area and for the Mather Point/Canyon View Information Plaza area. As shown, there would be a substantial shortfall of parking, resulting in local, long-term, moderate, adverse impacts.

Similar to private vehicle parking, no changes to existing tour bus loading/unloading areas, tour bus parking, or access to visitor destinations would occur in this alternative. Tour buses would continue to park at Canyon View Information Plaza, load/unload at Bright Angel Lodge, and park near the powerhouse as well as in undesignated locations based on availability and decisions made by individual bus drivers. An imbalance between the underutilized tour bus parking lot at Canyon View Information Plaza and the overutilized loading/unloading and parking area at Bright Angel Lodge would continue into the future, resulting in long-term, moderate, adverse impacts to tour bus parking conditions. Alternative A would not meet this plan's objective to improve/increase tour bus parking to better accommodate current and future demand.

Cumulative Impacts

Modes of Access and Traffic Volumes. Past, in-progress, and reasonably foreseeable projects (referred to below as other projects) that could affect modes of access and traffic volumes within the South Rim area include the Hermit Road rehabilitation, which would widen and resurface the road, and the South Entrance Road improvements, which would provide two northbound traffic lanes on SR 64 and improve queuing capacity at the South Entrance Station. These actions would im-

prove traffic flow, particularly in the three-month period in the winter when Hermit Road is open to private vehicles. However, these actions would not be expected to change the mode of access or volume of traffic on South Rim roads and would therefore have negligible impacts. Therefore, these impacts when combined with the local, long-term, moderate, adverse impacts of alternative A would result in local, long-term, moderate, adverse cumulative impacts related to modes of access and traffic volumes.

Shuttle Bus Service. Other projects that could affect shuttle bus service on the South Rim include the completed improvements to the Market Plaza shuttle bus stop and the Hermit Road rehabilitation (which would improve the road on which the shuttle bus travels and the bus stops, thus possibly improving operations). Taken together, the additional impacts to shuttle bus service would be long-term, negligible, and beneficial. When combined with the local, long-term, moderate, and adverse impacts of alternative A, cumulative impacts to shuttle bus service would also be local, long-term, moderate, and adverse.

Parking Conditions. Other projects that could affect parking conditions include minor changes to overlooks as part of the Hermit Road rehabilitation. These areas would be open to visitor vehicles only during the winter months and would not change parking supplies on the design day. In addition, upgrades to the Bright Angel trailhead area would include improved organization and design of the existing parking lot, which would result in a slight decrease in the number of parking spaces. Because these actions would slightly reduce parking supply even though parking conditions in the affected areas would be improved, the impacts would be long-term and adverse. However, since only a small share of the overall parking supply would be reduced, the impact would be negligible. When combined with the local, long-term, moderate, and adverse impacts under alternative A, cumulative impacts to parking

conditions would also be local, long-term, moderate, and adverse.

Overall, the impacts associated with past, in-progress, and reasonably foreseeable projects in combination with the local, long-term, moderate, adverse impacts of alternative A would result in local, long-term, moderate, adverse cumulative impacts. Alternative A would contribute substantially to the overall cumulative impacts.

Conclusion

Alternative A would result in local, long-term, moderate, adverse impacts to modes of access and traffic volumes due to a 20% increase in visitor traffic. Local, long-term, moderate, and adverse impacts would occur to shuttle bus service due to increasing demand and no increase in shuttle bus capacity. Local, long-term, moderate, adverse impacts would occur to parking conditions due to increasing parking demand over time with no accompanying increase in parking supply. Overall transportation impacts would be local, long-term, moderate, and adverse. Cumulative transportation impacts would also be local, long-term, moderate, and adverse.

Alternative B: Preferred Alternative

Indirect / Direct Impacts

Modes of Access and Traffic Volumes.

Construction Impacts — Under alternative B parking would be constructed at Canyon View Information Plaza, the South Entrance Road would be realigned in the vicinity of the information plaza, and changes would be undertaken at the South Entrance Station, including an additional service lane. New parking and associated access to SR 64 would also be constructed on national forest system land near Tusayan. Minor construction activities would occur in selected parking areas throughout the South Rim. These activities would cause minor, localized temporary disruptions to traffic flow. A small portion of visitor parking spaces could be unavailable during construction. Mitigation measures would minimize the impacts of

construction activities, including providing new parking areas prior to the removal of existing parking, scheduling construction to avoid unnecessary delays during peak visitation times, alerting visitors about construction activities and alternative routes or parking, and preparing a traffic control plan for construction periods. The noticeable changes to visitors caused by construction would result in local, short-term, minor, adverse impacts. These short-term impacts could occur multiple times, corresponding to the phased implementation of projects.

Operations Impacts — Actions in alternative B would seek to meet the need for improved visitor transportation by providing new parking facilities at Canyon View Information Plaza and on national forest system land adjacent to Tusayan. Actions in alternative B would also seek to encourage a small proportion of visitors who would enter through the South Entrance to enter through the East Entrance.

In 2020, if all parking areas in this alternative were effectively utilized, 19% of day visitors would need to park outside the park and use the shuttle bus service to travel to the Canyon View Information Plaza. This percentage was determined based on the existing arrival times of day visitors throughout the day and the length of time visitors are assumed to spend at the various destinations in Grand Canyon Village. To avoid overloading parking lots in Grand Canyon Village, in addition to the 19% parking at Tusayan, 27% of all day visitors would need to park at Canyon View Information Plaza and use shuttle buses to travel through Grand Canyon Village. The overall mix of transportation modes by which day and overnight visitors travel through Grand Canyon Village (including visitors entering through the East Entrance) would change to approximately 25% on shuttle buses, 54% in private vehicles, 16% on tour bus, and 5% on trains. Consequently, total traffic (including administrative vehicles) traveling through Grand Canyon Village would decline by 31% in 2020 compared to the no-action alternative.

This change in traffic volumes would be readily apparent to visitors.

Assuming that 19% of day visitors would park at Tusayan and travel into the park by means of shuttle buses, private vehicle traffic entering through the South Entrance Station would decrease by 15%. Day visitors driving to the South Rim could park at Canyon View Information Plaza and then use shuttle buses from there to travel to other destinations in Grand Canyon Village. As discussed previously, it is assumed that 27% of the day visitors who drive to the South Rim (not including the 19% assumed to park near Tusayan) would choose to park at Canyon View Information Plaza and ride shuttle buses to other destinations.

The total number of visitor vehicles traveling through Grand Canyon Village between 5 a.m. and 9 p.m. would be 3,120 per day in 2020, compared to 4,020 vehicles per day in 2005 and 4,830 vehicles in 2020 under the no-action alternative (see Table 29 on page 323). A 35% reduction in visitor vehicle traffic and a 31% reduction in total traffic through Grand Canyon Village would occur compared to the no-action alternative in 2020.

Although traffic would continue to circulate in a similar manner to existing conditions, a portion of the South Entrance Road would be removed and realigned to the south and west of Canyon View Information Plaza under alternative B. This realignment would improve traffic flow since pedestrians moving between Mather Point and Canyon View Information Plaza would no longer have to cross the road and because the existing disruptions to traffic from roadside parking would be eliminated.

Some traffic would be diverted onto Village Loop Drive from Maswik Lodge to Center Road due to the closure of the Old Village Bypass Road. Travel conditions on this portion of Village Loop Drive would be monitored to ensure that congestion would not occur.

Lower traffic volumes and, if required, an additional service lane at the South Entrance

Station would also allow increased visitation while maintaining acceptable operations and reasonable visitor waits to enter the park.

Transportation management efforts could improve traffic flow by such programs as encouraging visitors to travel during off-peak periods and providing additional dynamic visitor information about congestion and shuttle bus service en route to the park. Promoting the use of the East Entrance would also decrease traffic flow through the South Entrance Station, thus improving operations at the latter location.

Alternative B would meet this plan's objective of reducing overall vehicle traffic in Grand Canyon Village by reducing visitor traffic by 35% and total traffic (including visitor vehicles, tour buses, and administrative vehicles) by 31% compared to the no-action alternative in 2020.

Overall, changes in the modes of travel used by visitors (specifically the relative decrease in the number of vehicles circulating in Grand Canyon Village compared to alternative A) and the associated difference in traffic volumes would be readily apparent to visitors and would result in measurable changes to traffic flow, with local, long-term, moderate, beneficial impacts.

Shuttle Bus Service. *Construction Impacts* — Construction activities under alternative B would cause temporary, short-term disruptions to shuttle bus operations at isolated locations. These disruptions could cause short delays to shuttle bus service or create a need for minor changes in shuttle bus routes that could affect travel times and result in local, short-term, minor, adverse impacts. These impacts could occur multiple times, depending on phasing of the alternative actions. The impacts would be mitigated by scheduling construction to avoid whenever possible impacts at multiple construction sites on any of the shuttle bus routes.

Operations Impacts — Several changes to the South Rim shuttle bus routes and level of

service would occur in this alternative. In general, changes would increase the amount of service to better accommodate current and future visitor demand, would decrease travel time visitors now experience because of indirect travel, and would improve routes to better serve visitors traveling to destinations east of Canyon View Information Plaza.

- Changes to the Hermits Rest route would include an increase in peak-season frequency, resulting in less crowding and shorter waiting times.
- Changes to the Village route would offer more direct travel routes and more frequent service, reducing travel times, waiting times, and crowding. The Village route would also provide regular service between Mather Point and Canyon View Information Plaza, allowing the special mobility shuttle to be discontinued and affording shuttle bus access to Mather Point from the west.
- The Kaibab Trail route would be extended to provide service to Canyon View Information Plaza, Market Plaza, Mather Campground, and the trailer village.
- The Hikers Express route would be continued.

Adaptive management would guide further increases in shuttle bus service based on visitor demand, as well any future changes to operations or management policies.

In addition to the above improvements to the South Rim shuttle bus service, alternative B is expected to attract 19% of day visitors to park outside the park near Tusayan and take a shuttle bus to Canyon View Information Plaza. Another 27% of visitors would be expected to choose to park at Canyon View Information Plaza and ride shuttle buses to other South Rim destinations.

The Tusayan to Canyon View Information Plaza Route would provide service every 10 to 15 minutes (depending on the type of vehicle). The key operating characteristics of this route,

as well as the routes within the South Rim are shown in Table 32. The two types of vehicles that are being considered for this service (standard buses and high-capacity buses) have different operating characteristics; therefore, both are shown in the table. A pilot shuttle bus service would be implemented to determine interest and demand for shuttle bus travel between Tusayan and Canyon View Information Plaza. This pilot program would primarily serve overnight guests at lodging facilities in Tusayan. Later phases, which would occur in response to evaluation and monitoring through adaptive management, would include regular shuttle bus service between Tusayan and Canyon View Information Plaza and the parking area on national forest system land.

During the initial phase of implementation, improvements to the shuttle bus service would be made with less service on some routes than would be planned for conditions in 2020.

In summary, the elements of alternative B would improve shuttle bus service in ways that would be readily apparent to visitors, including shorter waiting and travel times, less crowding on buses, and a new opportunity to travel into the park from Tusayan on shuttle buses. The level of shuttle bus service would

TABLE 32. ALTERNATIVE B: SOUTH RIM SHUTTLE BUS ROUTES AND CANYON VIEW INFORMATION PLAZA TO TUSAYAN PEAK SERVICE LEVEL CHARACTERISTICS

Route	Route Length	Service Frequency (minutes between departures)	Round-Trip Travel and Layover Time
Hermits Rest	16.0 mi.	6.0 min.	72 min.
Village	6.9 mi.	7.5 min.	52.5 min.
Modified Kaibab Trail	8.8 mi.	12.5 min.	62.5 min.
Hikers Express	12.0 mi.	60 min.	60 min.
Tusayan to Canyon View Information Plaza (standard bus)	14.0 mi.	10 min.	40 min.
Tusayan to Canyon View Information Plaza (high-capacity bus)	14.0 mi.	15 min.	45 min.

SOURCE: NPS 2007f.

be noticeably increased, as indicated by the frequency of service shown in Table 32. For these reasons, operations impacts to the shuttle bus service would be local, long-term, moderate, and beneficial.

Parking Conditions. *Construction Impacts* — Small portions of private vehicle parking would be displaced by construction activities on a temporary and site-specific basis. Impacts would be limited to the immediate areas affected by construction, which would primarily be at Mather Point and lot D. Construction could be phased to minimize impacts on parking, and mitigation measures similar to those described under “Modes of Access and Traffic Volumes” would be employed. Impacts could also be experienced at the periphery of the new parking lots in later phases of construction. Tour bus parking could also be displaced by construction activities on a temporary and site-specific basis. The impacts would occur primarily at Canyon View Information Plaza. Therefore, impacts to parking supply would be local, short-term, minor, and adverse.

Operations Impacts — Several changes to existing private vehicle parking conditions would occur under alternative B. Minor changes would be made to existing parking lots in Grand Canyon Village. Some parking spaces in lot E would be converted from private vehicle parking to tour bus parking, and all of the private vehicle parking in lot D would be converted to Grand Canyon Railway tour bus loading and overnight tour bus parking. Overall, the number of parking spaces for day visitors in existing lots would decrease from 1,190 to 1,040, a reduction of 13%.

Parking at Mather Point would be replaced with parking adjacent to Canyon View Information Plaza. This would make access to Mather Point by vehicle less convenient for the small share of visitors who are now able to find a parking space in the Mather Point parking lot. In addition, vehicles now parked at lot D, including vehicles parked overnight, would

need to use parking lot C, or lot E. Overall, there would be a small impact to parking in existing facilities. Operational strategies would contribute to more effective use of the existing parking supply.

Up to 1,300 new parking spaces would be provided under alternative B — up to 900 at Canyon View Information Plaza and up to 400 on national forest system land near Tusayan. The number of parking spaces would match the parking demand, assuming that at any time 85% of the available spaces would be occupied. This level of occupancy would mean that most visitors would be able to find parking when arriving at each parking area. Visitors would experience a substantial improvement in the availability of parking. Much of the new parking would be near Canyon View Information Plaza, with relatively convenient access to Mather Point and good access to shuttle bus service connecting all major visitor use areas in Grand Canyon Village. About 17% of the day visitor parking would be located outside the park. This portion of the parking supply would be less convenient to most visitor destinations than the parking within the park.

Alternative B would provide expanded tour bus parking at Canyon View Information Plaza and enhanced access to the canyon rim for tour bus passengers. Tour bus use would be added at Yaki Point and on a trial basis at Yavapai Observation Station during the winter months. Bus loading / unloading would continue at Bright Angel Lodge, and additional bus parking would be designated in lot E. Overnight tour bus parking would be provided at lot D, along with loading / unloading facilities for Grand Canyon Railway passengers taking in-park tours operated by the park concessioner. Under alternative B the accessibility of tour buses to park destinations would improve, as would the overall supply of parking areas for tour buses. Alternative B would meet this plan’s objective to improve / increase tour bus parking to better accommodate current and future demand.

When combined, private vehicle and tour bus parking conditions would be greatly improved, resulting in a very noticeable increase in the availability of parking and access for visitors in both private vehicles and buses. Most visitor parking would be close to visitor destinations, and visitors would have a choice of parking near Tusayan, at Canyon View Information Plaza, or elsewhere in Grand Canyon Village. There would be a slight loss of parking serving the popular destinations in the Village Historic District area. As a result of the combined changes in parking supply and demand, as well as the location of the new parking, the impact of alternative B on parking conditions would be local, long-term, moderate, and beneficial.

Cumulative Impacts

Modes of Access and Traffic Volumes.

Other projects that would affect modes of access and traffic volumes along the South Rim during both the short- and long-terms include rehabilitation and improvements to SR 64 in Tusayan and leading to the South Entrance Station, along with the Hermit Road reconstruction. The Hermit Road reconstruction project is expected to be complete before construction would begin on improvements proposed by alternative B. Improvements to SR 64 could occur at the same time as portions of the construction required for alternative B, resulting in short-term, temporary disruptions to traffic flow through the South Entrance and in Tusayan. These disruptions would result in short-term, minor, and adverse impacts to traffic flow. When combined with the impacts of improvements to SR 64, the local, short-term, minor, and adverse impacts of construction of improvements in alternative B would result in local, short-term, minor, and adverse impacts to traffic flow.

The Hermit Road and SR 64 actions would result in long-term improvements to traffic flow, particularly during the three-month period when Hermit Road is open to private vehicles. However, these actions would not be expected to change the mode of access or volume of traffic on South Rim roads. Proposed

improvements to SR 64 in Tusayan would encourage vehicles to slow down and could result in more vehicles choosing to stop in Tusayan en route to the park. In addition, the proposed pedestrian improvements could encourage visitors to remain parked at lodging sites and to walk to other destinations in Tusayan, including shuttle bus stops or the parking facility and shuttle bus boarding area on national forest system land. These improvements to SR 64 in Tusayan would be expected to have long-term, minor, beneficial impacts on mode of access and traffic volumes for trips between Tusayan and the South Rim. When combined with the local, long-term, moderate, beneficial impacts of alternative B, cumulative impacts related to modes of access and traffic volumes would be local, long-term, moderate, and beneficial.

Shuttle Bus Service. Actions related to shuttle bus service on the South Rim would be the same as those described under alternative A. During construction, these projects could cause minor disruptions to bus service, resulting in local, short-term, negligible, and adverse impacts. In combination with the local, short-term, minor, adverse impacts associated with construction under alternative B, cumulative construction impacts would be short-term, minor, and adverse.

In the long term these projects would encourage slight shifts from private vehicle to shuttle bus travel and could lead to slightly reduced traffic volumes. In addition, the planned improvements to SR 64 in Tusayan would enhance the environment for walking in the community, possibly encouraging more people to leave their vehicles parked at lodging sites and use shuttle buses to travel into the park. Improvements to SR 64 approaching the South Entrance Station could reduce waiting time for visitors traveling into the park on shuttle buses. However, the reduced congestion associated with these improvements could also make travel by private vehicle more attractive, resulting in less propensity for visitors to ride shuttle buses into the park. The overall impact of the planned improvements

outside the park would be local, long-term, minor, and beneficial. When combined with the local, long-term, moderate, and beneficial impacts of alternative B, cumulative impacts to shuttle bus service would also be long-term, moderate, and beneficial.

Parking Conditions. There are no current or foreseeable projects within the park that would impact demand or supply of tour bus parking or loading/unloading facilities. Therefore, the impacts related to other past, in-progress, and reasonably foreseeable projects would be the same as those described under alternative A, with small changes in the number and design of parking spaces at Bright Angel trailhead and at overlooks along Hermit Road and small impacts to the parking supply during construction. These other project impacts would be negligible and adverse in both the short and long terms. When combined with the local, short-term, minor, adverse impacts of construction and local, long-term, moderate, beneficial impacts of operations, cumulative impacts would be local, short-term, minor, and adverse due to construction and local, long-term, moderate, and beneficial as a result of increased parking supply at Canyon View Information Plaza and Tusayan.

Overall, the impacts associated with past, in-progress, and reasonably foreseeable projects in combination with the local, short-term, minor, adverse impacts and the local, long-term, moderate, beneficial impacts of alternative B would result in local, short-term, minor, adverse and local, long-term, moderate, beneficial cumulative impacts. Alternative B would contribute substantially to the overall cumulative impacts.

Conclusion

Alternative B would result in construction impacts to traffic flow, shuttle bus service, and parking that would be local, short-term, minor, and adverse and that could occur multiple times. Local, long-term, moderate, beneficial impacts would occur to modes of access and traffic volumes due to shifting a

substantial amount of visitor travel from private vehicles to shuttle buses. Local, long-term, moderate, beneficial impacts would result from increases in shuttle bus service and more efficient routes, and also from a greatly expanded supply of parking in locations reasonably convenient to popular visitor destinations. Overall, alternative B would result in local, long-term, moderate, beneficial transportation impacts. Cumulative transportation impacts would be local, short-term, minor, and adverse and local, long-term, moderate, and beneficial. Alternative B would meet the plan's objectives related to transportation.

Alternative C: Tusayan Parking Emphasis

Direct / Indirect Impacts

Modes of Access and Traffic Volumes.

Construction Impacts — Alternative C would involve construction impacts similar to those described for alternative B. Impacts at Canyon View Information Plaza and the South Entrance Station would be somewhat less than under alternative B, while impacts on national forest system land near Tusayan would be greater. Impacts at the South Entrance would be very limited because no service lanes would be added. Short-term disruptions to traffic flow could occur in specific areas, resulting in very short traffic delays. However, the impacts of these disruptions would be reduced through mitigation measures as described for alternative B. Overall, construction impacts would be local, short-term, minor, and adverse.

Operations Impacts — Alternative C would meet the need for improved visitor transportation by providing new parking facilities, primarily on national forest system land adjacent to Tusayan. Parking intended only for short-term use would also be provided at Canyon View Information Plaza.

In 2020, if all parking areas in the park were effectively utilized, 44% of day visitors who would otherwise drive private vehicles through the South Entrance Station would

need to park outside the park and use shuttle bus service to travel to Canyon View Information Plaza. This percentage was determined based on the arrival patterns of day visitors during the day and the length of time visitors are assumed to spend at the various destinations in Grand Canyon Village.

If 44% of day visitors did not park outside the park and use shuttle buses to travel to and through Grand Canyon Village, then parking areas in the village would become overcrowded. Unlike alternative B, parking would not be provided at Canyon View Information Plaza for visitors who would then use shuttle buses to travel through Grand Canyon Village. Therefore, the mix of transportation modes by which day and overnight visitors travel through Grand Canyon Village would change to approximately 22% on shuttle buses, 58% in private vehicles, 16% on tour buses, and 5% on trains. Traffic volume traveling through Grand Canyon Village (including administrative vehicles) would decline by 29% in 2020 compared to the no-action alternative. This change in traffic volumes would be readily apparent to visitors.

A decrease in private vehicle traffic in Grand Canyon Village would occur under this alternative due to the expectation that 44% of day visitors would park near Tusayan and take shuttle buses into the park. The overall decrease in traffic entering through the South Entrance Station would be at least 34%. Day visitors choosing to drive to the South Rim would be able to stop at Canyon View Information Plaza on a short-term basis to obtain trip planning information, take advantage of visitor services, and view the canyon from Mather Point. But visitors would be directed to continue in their private vehicles and park at one of the lots elsewhere in Grand Canyon Village. Visitors would be discouraged from staying parked at Canyon View Information Plaza and riding shuttles to other destinations.

The total number of visitor vehicles traveling through Grand Canyon Village between 5 a.m. and 9 p.m. would be 3,220 per day in 2020,

compared to 4,020 vehicles per day in 2005 and 4,830 vehicles per day in 2020 under the no-action alternative (see Table 29 on page 323). By 2020 there would be a 33% reduction in visitor vehicle traffic and a 29% reduction in total traffic (including visitor vehicles, tour buses and administrative vehicles) through Grand Canyon Village compared to the no-action alternative.

While traffic circulation would be similar to current conditions, a portion of the South Entrance Road would be removed and realigned to the south and west of Canyon View Information Plaza, similar to alternative B. This realignment would improve traffic flow since pedestrians moving between Mather Point and Canyon View Information Plaza would no longer have to cross the road and existing disruptions to traffic from roadside parking would be eliminated. There would be some interaction between pedestrians and vehicular traffic due to the use of the Mather Point parking lot by people with disabilities.

The substantial reduction in traffic entering the South Entrance Station due to visitors choosing to park in Tusayan and entering through the East Entrance instead of the South Entrance would also allow visitation to increase while maintaining efficient operation of the South Entrance Station and acceptable waits for visitors to enter the park.

Traffic flow changes on Village Loop Drive would be similar to those described under alternative B, and transportation management actions would contribute to improved traffic flow. In summary, alternative C would likely result in lower traffic volumes than under existing conditions, and it would improve traffic flow by reducing existing sources of congestion. Alternative C would meet this plan's objective of reducing overall vehicle traffic in the Grand Canyon Village by reducing visitor traffic by 33% and overall traffic by 29% in 2020.

Overall, changes in the modes of travel used by visitors (specifically the relative decrease in the number of vehicles circulating in Grand

Canyon Village compared to alternative A) and the associated difference in traffic volumes would result in local, long-term, moderate, beneficial impacts because changes would be readily apparent to visitors and would result in measurable changes to traffic flow.

Shuttle Bus Service. *Construction Impacts* — Construction-related impacts to shuttle bus service would be similar to those described under alternative B and would be local, short-term, minor, and adverse.

Operations Impacts — The actions described under alternative B that apply to all action alternatives would also increase the level of service and convenience for shuttle buses operating on the South Rim under alternative C. The key operating characteristics of these routes would be the same as alternative B (see Table 32).

In addition to the improvements to the South Rim shuttle bus service, under alternative C 44% of day visitors would be encouraged to park outside the park near Tusayan and take a shuttle bus to Canyon View Information Plaza. The key operating characteristics of this route for both standard buses and high-capacity buses are shown in Table 33.

Alternative C would improve the shuttle bus level of service in ways that would be highly apparent to visitors, including shorter waiting and riding times, less crowding on buses, and

a new opportunity to use shuttle buses to travel to the park from Tusayan. For these reasons, operations impacts to the shuttle bus service would be local, long-term, moderate, and beneficial.

Parking Conditions. *Construction Impacts* — Construction-related impacts to private vehicle and tour bus parking would be similar to those described for alternative B, with slightly fewer impacts near Canyon View Information Plaza. Overall, construction-related impacts on parking conditions would be short-term, minor, and adverse. These impacts could occur multiple times during the phased implementation of the alternative. Construction schedules would be arranged to minimize parking impacts.

Operations Impacts — Actions common to all action alternatives related to private vehicle parking include converting visitor parking spaces to tour bus parking in lots D and E, with the same impacts as described for alternative B. These actions would result in small changes in the existing parking supply, with the number of parking spaces available for day visitor use declining from 1,190 to 1,040. Operational strategies would contribute to more effective use of the existing parking supply.

Under alternative C up to 1,320 new parking spaces would be provided — up to 920 near Tusayan and up to 400 at Canyon View Information Plaza. The number of parking spaces would match the parking demand, assuming that at any time 85% of the available spaces would be occupied. This level of occupancy would mean that most visitors would be able to find parking when arriving at each parking area. The availability of parking would improve substantially; however, 39% of the available day visitor parking would be outside the park, making it less convenient to visitor destinations in the park. In addition, visitors could find the restriction of parking at Canyon View Information Plaza to be inconvenient. Some visitors might prefer to leave their vehicles parked at Canyon View Information

TABLE 33. ALTERNATIVE C: CANYON VIEW INFORMATION PLAZA TO TUSAYAN PEAK SERVICE LEVEL CHARACTERISTICS

Route	Route Length	Service Frequency (minutes between departures)	Round-Trip Travel and Layover Time
Tusayan to Canyon View Information Plaza (Standard Bus)	14.0 mi.	4.6 min.	46 min.
Tusayan to Canyon View Information Plaza (High-Capacity Bus)	14.0 mi.	7.5 min.	45 min.

SOURCE: NPS 2007f.

Plaza but would be discouraged from doing so. This could be especially true for visitors traveling to the South Kaibab trailhead because they would need to ride a shuttle bus from other parking areas and potentially would need to transfer to the Kaibab Trail route at Canyon View Information Plaza. Balancing parking supply and demand under alternative C would mostly meet this plan's objective to improve private vehicle parking as needed to meet current and future visitor demand, as well as improve the visitor's ability to find parking; however, parking would not be convenient to popular visitor use areas.

The actions common to all action alternatives (as described in alternative B) for tour bus parking include expanding tour bus parking at Canyon View Information Plaza, enhancing access to the canyon rim for tour bus passengers at Yaki Point and on a trial basis at Yavapai Observation Station, providing Grand Canyon Railway tour bus loading and overnight tour bus parking in lot D, and defining additional bus parking in lot E. These actions would improve the accessibility of tour buses to park destinations, as well as increase the supply of loading/unloading and parking areas for tour buses. Alternative C would also provide 40 tour bus parking spaces at Canyon View Information Plaza, although these spaces would be farther from the canyon rim than the spaces provided under alternative B. Alternative C would meet this plan's objective to improve/increase tour bus parking to better accommodate current and future demand.

Overall, private vehicle and tour bus parking conditions would improve from a substantial change in parking availability. Parking supply would be adequate to meet demand, although a substantial portion of the parking would not be conveniently located. Therefore, the operation impacts to parking conditions under alternative C would be local, long-term, minor, and beneficial.

Cumulative Impacts

Modes of Access and Traffic Volumes. The past, present, and reasonably foreseeable

projects affecting mode of access and traffic flow during construction would be similar to those described for alternative B. The short-term, minor, adverse construction-related impacts, when combined with the short-term, minor, adverse construction-related impacts under alternative C would result in local, short-term, minor, and adverse cumulative impacts on traffic flow.

Projects that would affect mode of access and traffic flow would be the same as those for alternative B. The improvements to SR 64 in Tusayan described under alternative B would be expected to influence visitors' decisions regarding travel by shuttle bus from Tusayan to Canyon View Information Plaza. The influence of these improvements on whether visitors would choose to leave their vehicles in Tusayan and use the shuttle bus system would be important enhancements under alternative C, which is designed to divert a large share of visitors from private vehicles to shuttle buses before entering the park. These projects would have a local, long-term, minor, beneficial impact on modes of access and traffic volumes. When combined with the local, long-term, moderate, and beneficial impacts of alternative C, cumulative impacts related to modes of access and traffic volumes would be local, long-term, moderate, and beneficial.

Shuttle Bus Service. Projects that would affect shuttle bus service would be the same as those described for alternative B. These projects would result in short-term, minor, adverse impacts during construction, which when combined with the short-term, minor, and adverse impacts associated with construction of alternative C would result in short-term, minor, and adverse cumulative impacts during construction. The operations impacts could affect shuttle bus service would be long-term, minor, and beneficial. In combination with the long-term, moderate, and beneficial impacts of alternative C, the cumulative impacts on shuttle bus service would be local, long-term, moderate, and beneficial.

Parking Conditions. Projects impacting parking conditions would be the same as those described under alternative A. Construction impacts would result in short-term, minor, adverse impacts. In combination with the short-term, minor, adverse construction impacts from alternative C, the cumulative construction-related impacts to parking conditions would be local, short-term, minor, and adverse. The operations impacts of other projects would be local, long-term, negligible, and adverse with respect to parking supply. When combined with the local, long-term, minor, and beneficial impacts of alternative C, the cumulative impact on parking supply would be local, long-term, minor, and beneficial.

Overall, the impacts associated with past, in-progress, and reasonably foreseeable projects when combined with the local, short-term, minor, adverse impacts and local, long-term, minor to moderate, beneficial impacts under alternative C would result in local, short-term, minor, adverse and local, long-term, moderate, beneficial cumulative impacts. Alternative C would contribute substantially to the overall cumulative impacts.

Conclusion

Alternative C would result in construction impacts related to transportation that would be short-term, minor, and adverse. Local, long-term, moderate, beneficial impacts would occur to modes of access and traffic volumes because a substantial amount of visitor travel would shift from private vehicles to shuttle buses. Local, long-term, moderate, beneficial impacts would occur to shuttle bus service quality as a result of improved service levels and visitor convenience. Alternative C would result in local, long-term minor, beneficial impacts to parking due to the addition of parking, but recognizing that a large portion of parking would be outside the park and less convenient than parking in the park. Overall, alternative C would have local, long-term, moderate, beneficial transportation impacts. Cumulative transportation impacts would be local, short-

term, minor, and adverse, as well as local, long-term, moderate, and beneficial. Alternative C would meet this plan's objectives related to transportation, although the parking provided in this alternative would be less convenient than in the other action alternatives.

Alternative D: Canyon View Information Plaza Parking Emphasis

Direct / Indirect Impacts

Modes of Access and Traffic Volumes.

Construction Impacts — Alternative D would involve construction impacts similar to those for alternative B that would be short-term, minor, and adverse. Construction impacts at Canyon View Information Plaza would be greater than under alternative B, while impacts at the South Entrance Station would be similar to those under alternative B. There would be no construction impacts outside the park under alternative D. These short-term impacts could occur multiple times, corresponding to the phased implementation of the improvements in alternative D. Mitigation measures would be applied to limit the impacts, and the resulting construction impacts would be local, short-term, minor, and adverse.

Operations Impacts — The current mix of transportation modes for visitors entering the South Rim would be maintained in this alternative. It is assumed that 80% of day visitors would continue travel to the South Rim by private vehicle, 15% by tour bus, and 5% by train. Therefore, there would be no change in travel modes used by visitors. There would be a change in the number of visitors entering the park at the South Entrance due to management strategies intended to encourage use of the East Entrance.

Most visitors in private vehicles would be expected to enter the South Rim and travel to Canyon View Information Plaza. Alternative D would generate the highest traffic volumes between the South Entrance and Canyon View Information Plaza of the action alterna-

tives because of more private vehicles entering the park with increased visitation.

At Canyon View Information Plaza these visitors would have the option of parking and using shuttle buses to reach other destinations in Grand Canyon Village or continuing to travel through the village in their private vehicles. It is assumed that 39% of day visitors who drive to the South Rim would choose to park at Canyon View Information Plaza and ride shuttle buses to other destinations. This percentage was determined using methods described for alternative B. If 39% of day visitors did not park at Canyon View Information Plaza and use shuttle buses to travel through the village, parking lots in the village would become overcrowded. Unlike alternatives B and C, no day visitors would be expected to park outside the park and ride shuttles into the park. The share of visitor trips through the village would be expected to be 26% by shuttle bus, 54% by private vehicle, 16% by tour bus, and 5% by train.

The total number of visitor vehicles traveling through Grand Canyon Village between 5 a.m. and 9 p.m. would be 3,120 per day in 2020, compared to 4,020 vehicles per day in 2005 and 4,830 vehicles per day in 2020 under the no-action alternative (see Table 29 on page 323). There would be a 35% reduction in visitor vehicle traffic through Grand Canyon Village compared to the no-action alternative and a 31% decrease in total traffic in 2020.

Although traffic would continue to circulate in a similar manner to existing conditions, a portion of the South Entrance Road would be removed and realigned to the south and west of Canyon View Information Plaza. This road realignment would be the greatest under this alternative. It would improve traffic flow because pedestrians moving between Mather Point and Canyon View Information Plaza would no longer have to cross the road and because the existing disruptions to traffic from roadside parking would be eliminated. Traffic flow changes on Village Loop Drive

would be similar to those described under alternative B.

The addition of a service lane, if required, at the South Entrance Station and a shift in visitors from the South Entrance to the East Entrance would allow increases in visitation to occur while maintaining acceptable operations and reasonable visitor waits to enter the park. Operational and management strategies described for alternative B would also improve traffic flow.

In summary, alternative D would result in a small reduction of traffic entering the South Rim due to visitors choosing to enter the park at the East Entrance, but it would likely result in lower traffic volumes traveling through Grand Canyon Village than under alternative A, and it would improve traffic flow by increasing vehicle capacity at the South Entrance and by reducing existing sources of congestion. Alternative D would meet this plan's objective to reduce visitor vehicle traffic in the village by 35% and total traffic through the village by 31% in 2020.

Overall, there would be no noticeable change in the modes of travel used by visitors to the South Rim, and the volume of South Rim traffic would increase over existing conditions due to increasing visitation. Changes in traffic volumes within the village would be readily apparent to visitors and would result in measurable changes in traffic flow. Thus, the operations impact to mode share and traffic flow would be local, long-term, moderate, and beneficial.

Shuttle Bus Service. *Construction Impacts* —

Impacts to shuttle bus service during construction would be similar to those described for alternative B and would be local, short-term, minor, and adverse. These impacts could occur multiple times, corresponding to the phased implementation of this alternative, and would be mitigated through construction scheduling.

Operations Impacts — The operations impacts of alternative D would be similar to those

described for alternative B, except that alternative D would not provide shuttle bus service between Tusayan and Canyon View Information Plaza. The key operating characteristics of the shuttle bus routes in alternative D are shown in Table 34.

The elements of alternative D would improve the shuttle bus service levels in ways that would be readily apparent to visitors. Waiting time, riding time, and crowding would be reduced. The increase in service indicated by the change in peak headways on routes would be noticeable to visitors. For these reasons operations impacts to the shuttle bus service would be long-term, moderate, and beneficial.

Parking Conditions. *Construction Impacts* — Construction impacts to tour bus parking and private vehicle parking would be similar to alternative B, with no impacts occurring in or near Tusayan. Local, short-term, minor, adverse impacts would occur. These impacts could occur at multiple times, corresponding to the phased implementation of the alternative.

Operations Impacts — The actions common to all action alternatives related to private vehicle parking conditions, including converting visitor parking spaces to tour bus use in lots D and E, would also apply to alternative D, and the impacts from these actions would be the same as those described for alternative B. These actions would result in small changes in the existing parking supply, with the number of parking spaces available for day visitor use declining from 1,190 to 1,040 (as described

under alternative B). Operational strategies would contribute to more effective use of the existing parking supply.

Up to 1,190 new parking spaces would be provided, all near Canyon View Information Plaza. The number of parking spaces would match the parking demand, assuming that at any time 85% of the available spaces would be occupied. This level of occupancy would mean that most visitors would be able to find parking when arriving at each parking area. Visitors would experience a substantial improvement in the availability of parking. All new parking would be located at Canyon View Information Plaza, with convenient access to Mather Point and direct shuttle bus access to all major visitor destinations in Grand Canyon Village, with minimal need for transfers. Because parking supply and demand would be balanced, alternative D would meet this plan's objective to improve private vehicle parking as needed to meet current and future visitor demand, and it would do so by locating parking in a location convenient for most visitors. In addition, improvements would also result in a substantial improvement in the visitor's ability to find parking.

The actions common to all action alternatives for tour bus loading and parking would apply to alternative D — expanded tour bus parking at Canyon View Information Plaza, enhanced access to the canyon rim for tour bus passengers at Yaki Point and on a trial basis at Yavapai Observation Station, Grand Canyon Railway tour bus loading and overnight tour bus parking in lot D, and additional bus parking in lot E. These actions would improve the accessibility of tour buses to park destinations, as well as increase the supply of loading/unloading and parking areas for tour buses. Alternative D would meet this plan's objective to improve/increase tour bus parking to better accommodate current and future demand.

Overall, private vehicle and tour bus parking conditions would improve, resulting in a substantial change in the availability of parking. The parking supply would be adequate to

TABLE 34. ALTERNATIVE D: SOUTH RIM SHUTTLE BUS ROUTES PEAK SERVICE LEVEL CHARACTERISTICS

Route	Route Length	Service Frequency (minutes between departures)	Round-Trip Travel and Layover Time
Hermits Rest	16.0 mi.	6.0 min.	72 min.
Village	6.9 mi.	7.5 min.	52.5 min.
Modified Kaibab Trail	8.8 mi.	12.5 min.	62.5 min.
Hikers Express	12.0 mi.	60 min.	60 min.

SOURCE: NPS 2007f.

serve the demand, and parking would be conveniently located for most visitors. Therefore the operations impacts to parking conditions under alternative C would be local, long-term, moderate, and beneficial.

Cumulative Impacts

Modes of Access and Traffic Volumes. The past, in-progress, and reasonably foreseeable projects impacting mode share and traffic flow would be similar to those described under alternative B. Disruptions associated with construction would result in local, short-term, minor, adverse impacts to traffic flow. When combined with the local, short-term, minor, adverse impacts associated with construction under alternative D, the cumulative impacts to traffic flow would be local, short-term, minor, and adverse.

Improvements to SR 64 in Tusayan would be expected to have local, long-term, minor, beneficial impacts on mode of access and traffic volumes for trips between Tusayan and the South Rim. However, the proposed improvements to pedestrian conditions along SR 64 in Tusayan would not contribute to mode shifts because alternative D does not include shuttle bus service from Tusayan to Canyon View Information Plaza. Therefore the operations impacts of these other projects on mode shares and traffic flow would be local, long-term, negligible, and beneficial. When combined with the local, long-term, moderate, and beneficial impacts of alternative D, cumulative impacts related to modes of access and traffic volumes would be local, long-term, moderate, and beneficial.

Shuttle Bus Service. Projects that would affect shuttle bus service would be the same as those described for alternative B. These projects would result in short-term, minor, adverse impacts during construction. In combination with the short-term, minor, adverse impacts associated with construction projects under alternative D, the cumulative impacts would be local, short-term, minor, and adverse.

Operations impacts to shuttle bus service associated with other projects would be long-term, minor, and beneficial. However, the improvements to SR 64 in Tusayan would not contribute to shuttle bus use in alternative D. In combination with the long-term, moderate, and beneficial impacts of alternative D, the cumulative impacts on shuttle bus service would be local, long-term, moderate, and beneficial.

Parking Conditions. Projects that would impact parking conditions would be the same as those described under alternative B and would have short-term, minor, adverse impacts during construction. These impacts, when combined with the short-term, minor, adverse impacts of alternative D would result in local, short-term, minor, adverse cumulative construction impacts.

These projects would have long-term, negligible, adverse impacts to parking conditions. When combined with the long-term, moderate, beneficial impacts of alternative D, the cumulative operations impacts to parking conditions would be local, long-term, moderate, and beneficial.

Conclusion

Alternative D would result in construction impacts related to transportation that would be short-term, minor, and adverse. Local, long-term, moderate, beneficial impacts would occur to modes of access and traffic volumes. The modes of travel to the park and the traffic volumes entering the South Rim would not change compared to alternative A. Travel by shuttle bus would increase on the South Rim, and traffic volumes would be substantially reduced through Grand Canyon Village. Local, long-term, moderate, beneficial impacts would occur to shuttle bus level of service. Local, long-term, moderate, beneficial impacts would occur to parking conditions due to greatly expanded parking conveniently located for most visitors. Overall, the transportation impacts of alternative D would be local, long-term, moderate, and beneficial. Cumulative transportation impacts would be

local, minor, and adverse in the short term due to construction and local, long-term, moderate, and beneficial due to ongoing operations. Alternative D would meet all of this plan's objectives related to transportation.

VISITOR ACCESS, USE, AND EXPERIENCE

Affected Environment

Grand Canyon National Park is the second most visited national park in the United States, receiving about 4.3 million visitors a year. About two-thirds of park visitors (66%) typically visit the South Rim as part of a longer trip to other nearby destinations, typically (in descending order) Flagstaff and Sedona, Arizona; Las Vegas, Nevada; and Phoenix (Northern Arizona University 2005). Visitors may reach the South Rim by private van service from Williams, Flagstaff, and Tusayan, or by commercial airplane service into the Grand Canyon National Park Airport in Tusayan, where taxi service is available to destinations within the park. However, most visitors experience the canyon from private vehicles; others may come by tour bus or railway. Currently there is no regularly scheduled public transit service to the South Rim.

The majority of park visitors go to the South Rim, which is the most accessible part of the park and is served by two entrances. About 80% of all visitors enter the South Rim through the South Entrance, and the remaining visitors use the East Entrance. Visitors entering through the South Entrance drive 60 to 90 miles from I-40 to the park. The route passes through the towns of Flagstaff or Williams and Valle, high desert and forested terrain with limited signage indicating the distance to Grand Canyon. The surrounding topography gives no suggestion that travelers are approaching the Grand Canyon.

Before arriving at the park, most visitors drive through Tusayan, where they can purchase gas, food, lodging, and use other services. The National Geographic Visitor Center in Tusayan houses the Grand Canyon IMAX

Theater, where visitors can receive general park orientation and see a film about the Grand Canyon and educational displays on geology, explorers, wildlife. The National Geographic Visitor Center and several hotels in Tusayan also provide an opportunity to purchase entry permits at a satellite pay station and obtain information from park staff. In addition, several private scenic air tour operators provide many airplane and helicopter tours from Grand Canyon National Park Airport. Private bus and jeep tours, as well as guided horse rides in Kaibab National Forest, are based out of Tusayan. Some of the tour companies also provide ground-based tours for visitors in the park.

Visitors arriving from the east travel through the community of Cameron and along the Little Colorado River Gorge, which offers a hint of the dramatic canyon views in the park.

Visitors Arriving by Private Vehicle

Visitors leaving Tusayan enter the park through the South Entrance Station. Visitors, administrative staff, employees, service delivery trucks, tour buses, and other vehicles all use this entrance station, which has four northbound lanes for fee collection and one pre-paid lane for visitors who have purchased a pass in advance and for use by entrants who do not pay a fee (employees, residents, etc.)

Before recent improvements, visitors waited in long lines at the South Entrance Station during the peak season, often resulting in frustration and poor experiences. Currently the park uses some transportation management strategies to ease access to the South Rim. These include regularly disseminating information to park visitors, coordinating with the National Geographic Visitor Center and several hotels in Tusayan and Valle to encourage visitors to prepay entry fees, using staff to answer questions for visitors waiting in queues, providing staff to assist visitors with onsite trip planning, and other forms of guidance.

After arriving through the South Entrance, the first opportunity visitors have to view the Grand Canyon is at Mather Point, just before the parking area. In conjunction with Canyon View Information Plaza, the Mather Point overlook is the most frequently visited site in the park. Visitors arriving through the East Entrance can experience several canyon viewing areas along Desert View Drive before reaching Mather Point. Visitor services are also available at Desert View, and the facilities there, as well as the viewpoints along Desert View Drive, are usually uncrowded. Because the area offers the first canyon view for most visitors, 30% of park visitors rated Mather Point / Canyon View Information Plaza as the place most often visited first (University of Idaho 2003). For this reason, during the peak season, the 111-space parking area at Mather Point is constantly full so that visitors wanting to view the canyon have to park along nearby roadsides. Up to 500 vehicles have been observed parking along the road near Mather Point, with parking stretching along the road as far as the Yavapai Observation Station access road, approximately 0.5 mile away (see photo on page **Error! Bookmark not defined.**).

Safety risks also arise where insufficient parking leads to visitors parking along roadsides. When visitors park along the South Entrance Road, there often is not enough room for passenger unloading and the clear and safe passage of other vehicles, posing a risk to pedestrians, parked vehicles, and moving traffic. Similar problems occur at other overlooks along the rim and within the Village Historic District during periods of high visitation. Safety problems also exist where there is either no or poor signage. Inadequate signage leads to visitor confusion and hesitation in making travel decisions.

The resulting visitor experience is chaotic and uncomfortable. Drivers are subjected to views of uninterrupted lines of vehicles parked along the road instead of the natural forested terrain with intermittent glimpses of the canyon. During peak times visitors who are



Safety risks are evident where a low supply of parking leads to parking along roadsides, as often is the case at Mather Point.

unwilling to park along the roadside far from the Mather Point viewing area may not experience the intended first view of this overlook. The resultant atmosphere is one of frustration, a sense of crowding, and confusion as pedestrians try to navigate their way to the rim. This detracts from an ideal visitor experience of convenient access to canyon views with limited impacts from vehicles (as articulated in the *General Management Plan*) for first-time visitors to the canyon. Although currently “visitors expect the park to be crowded,” 89% rated the availability and ease of securing parking spaces and parking lots as “somewhat” to “extremely” important (Northern Arizona University 2005).

After viewing the canyon at Mather Point, some visitors choose to walk along the connecting path to the Canyon View Visitors Center, the park’s primary information and visitor facility. Canyon View Information Plaza was constructed to be the location for most visitors to get interpretive and orientation information, and to be introduced to the park’s resources and interpretive themes. Multiple buildings and facilities arranged in a village setting include a visitor center, a bookstore, two shuttle bus shelters, restrooms, service buildings, and shade shelters. Visitors can obtain information about ranger-guided activities, the park shuttle bus system, day hikes along the Rim Trail or into the canyon, bicycling, current weather and park

news, and commercial trips and tours. Park rangers also provide visitor information and assistance.

Canyon View Information Plaza is also a transfer point between the Village and Kaibab Trail shuttle bus routes. Riders arrive at Canyon View Information Plaza first, typically proceed to the Mather Point overlook either by foot or shuttle, and then return to the shuttle stops at plaza. Shuttle buses can be overcrowded during peak visitation, leading to frustration as visitors attempt to find their way through the South Rim. Shuttle bus drivers have expressed concern about overcrowding and the condition of shuttle stops, particularly at the Market Plaza (described below). The shuttle drivers noted that shuttle bus stop signs are mounted too high for some passengers to easily read, leading to confusion (DEA 2006).

Canyon View Information Plaza was intended to be the first stop for visitors after entering the park. However, many visitors never get there because it is not directly accessible by private vehicles; it can only be accessed by shuttle or tour bus, or by walking from the parking area near Mather Point. Many visitors also do not know about the information plaza, miss the path and signs directing them to the site, or simply choose not to walk the distance from the canyon rim to the visitor facility. Therefore, many visitors' only access to information for planning their visits is a brief discussion with a park staff member at the entrance station and the park's printed *Guide*. Many visitors may not have the opportunity to read the *Guide* while driving into the park and may arrive at the canyon rim uncertain about what to do, where to park, or how to travel around Grand Canyon Village.

Visitors who first arrive in private vehicles at South Rim destinations other than Mather Point, such as the Village Historic District, typically are challenged to find parking and visitor amenities (such as restrooms and food), get oriented, and find their desired destinations (such as lodging, trails, or canyon

viewing areas). Although visitors are able to find their way around the park using the existing wayfinding and orientation program, there is still much confusion about where to go and what internal park transportation options are available, according to park staff. Directional signs within the park are inadequate at many locations, most notably at the intersection of Center Road and South Entrance Road, posing a safety hazard. Wayfinding for alternative travel modes (bicycling and walking) is also lacking. Visitors agree that adequate park signage is critical; 91% of visitors rated park road signs as "somewhat" or "extremely" important (Northern Arizona University 2005).

Direct access to canyon views has been and will remain the focus of most park visitors, which Grand Canyon's *General Management Plan* identifies as of utmost importance at the South Rim. Views of the canyon, access to views and trails, and access to interpretation and information are the most important elements of the visitor experience at the South Rim. Canyon overlooks were rated by 87% of park visitors as "extremely important" (Northern Arizona University 2005), and 90% rated their most common activity as "sight-seeing/taking a scenic drive" (90%) (University of Idaho 2003). Some overlooks and viewpoints are extremely popular and become overcrowded at times, which can affect visitor experiences and limit the opportunity for quiet enjoyment and solitude. This is particularly true of Mather Point, which is easily accessible by private vehicles but has limited parking.

Yavapai Observation Station, to the west of Mather Point, is also a popular destination, and the site provides visitors with canyon views, interpretive exhibits, and a bookstore. Yavapai Observation Station is the second most visited place in the park, attracting 62% of park visitors and for 13% of visitors it was their first stop upon entering the park (University of Idaho 2003). Yaki Point is another scenic overlook along Desert View Drive and is accessible only by shuttle bus, walking, or

on concessioner-operated tour buses. No visitor data has been gathered specifically about this location. The eight overlooks along Hermit Road, from Grand Canyon Village to Hermits Rest, are also very popular. During the peak visitation season, these overlooks are accessible only by shuttle bus, tour buses operated by the park concessioner, bicycle, and walking along the Rim Trail. Visitors with disabilities and visitors holding backcountry permits can reach these viewpoints by private vehicle.

After visiting Mather Point and perhaps Canyon View Information Plaza, visitors typically drive to other destinations in Grand Canyon Village. The village is the center of activity and the transportation hub for the South Rim, providing a variety of visitor services. Market Plaza, the business center of the village, includes a general store and deli, bank/ATM, post office, and a cafeteria at Yavapai Lodge. There are several restaurants and gift shops within the village, and there is a snack bar at Hermits Rest. A 2005 visitor study indicated that 37% of visitors surveyed stayed in park lodging or camping facilities, 60% used park restaurants and/or food service, and 70% used shopping outlets (Northern Arizona University 2005). Other visitor services include a community library and garage near the Village East shuttle bus stop, and a library near the park headquarters; health services at the clinic off Center Road; dog boarding services at a kennel off Rowe Well Road; religious services (often held at the Shrine of Ages); and a lost and found.

Visitors can participate in various tours and programs, including guided mule rides, guided motor coach tours operated by a park concessioner, ranger-led hikes, and interpretive ranger programs held at different locations (including key viewpoints, Canyon View Information Plaza, Shrine of the Ages, and Mather Amphitheater). Many visitors (34%) also engage in hiking or backpacking at some point during their trip (University of Idaho 2003). Two trails along the South Rim provide recreational opportunities and access to vista

points without cars. The paved Greenway Trail runs between Canyon View Information Plaza and Grand Canyon Village, and the Rim Trail (paved and unpaved) connects Pipe Creek Vista to Hermits Rest along the rim.

In addition, there are three trailheads in the project area. The South Kaibab trailhead is near Yaki Point and can only be accessed by the Kaibab Trail shuttle bus route or on foot. The Bright Angel trailhead is just west of Kolb Studio and can be accessed by private vehicle, by foot from the Rim Trail, and by shuttle bus from a stop near Bright Angel Lodge. The Hermit trailhead is accessible only by the Hermits Rest shuttle bus route from March to November, by private vehicle in the off-season, or by foot from the Rim Trail (visitors with backcountry permits or accessibility permits can also drive on Hermit Road). These three trails descend into the canyon to the Colorado River. These major trailheads provide access to a large portion of the backcountry and connect to a number of trails that traverse the canyon.

Bicycle use is permitted on all roads open to vehicles in the park, and on some sections of the Greenway Trail. Bicycles are not allowed on the Rim Trail or inner canyon trails. There are many opportunities for recreational walking and hiking, particularly on the Rim Trail and Greenway Trail.

An *Accessibility Guide* is provided for visitors with disabilities. The guide outlines details about Grand Canyon sites and rates their accessibility. Free wheelchairs can be checked out at Canyon View Information Plaza, and the Desert View bookstore has one wheelchair available for loan. An accessibility pass can be obtained at Canyon View Information Plaza, travel desks in lodges, Tusayan Museum, and Kolb Studio to gain access to areas that are otherwise restricted to private vehicles. Fully trained service animals are permitted in all park facilities, on South Rim shuttle buses, and on the rim trails. Restrooms accessible under the Americans with Disabilities Act (ADA) are available at the majority of

sites where restrooms are provided. Five percent of visitors made use of some sort of ADA accessible resource (Northern Arizona University 2005). Most parking lots provide accessible parking. “Kneeling” shuttle buses are available to assist visitors with physical limitations when requested in advance. A shuttle bus service is provided for visitors needing mobility assistance between Canyon View Information Plaza and Mather Point. The park is procuring 20 new fully accessible buses and is providing accessible shuttle bus stops along Hermit Road as part of other near-term projects.

Visitors Arriving by Tour Bus

Visitors arriving on commercial tour buses typically begin their park experience at the South Entrance Station and arrive at the tour bus drop-off and parking area at Canyon View Information Plaza. From here visitors have the choice of either proceeding along a path to the Mather Point viewing area or visiting the information plaza. Few tour bus visitors walk down the Rim Trail to Yavapai Observation Station because they have a set time limit in the area before they must reboard their bus. Existing tour bus access restrictions limit bus passengers to the Canyon View Information Plaza area and areas near Bright Angel Lodge. A private tour bus company provides wheelchair accessible tours by prior arrangement. After leaving the Canyon View area, many tour buses travel to Bright Angel Lodge, where up to six loading / unloading positions are available. From Bright Angel Lodge, tour bus passengers can walk along the canyon rim and take advantage of the visitor services and interpretive information available in the Village Historic District. Visitors typically reboard tour buses at Bright Angel Lodge and leave the park.

Visitors Arriving by Railroad

Grand Canyon Railway operates one to two trains per day from Williams to Grand Canyon Village. Passengers, who may be making a day trip or staying overnight in the park, start the

two-hour train trip from the historic Williams Depot and arrive at the historic Grand Canyon Depot, putting them within walking distance of the rim and other parts of the historic area.

When they arrive, passengers can take guided tours by motor coach, which are coordinated with the train’s arrival and departure schedule. These passengers disembark the train at the depot on the north side of the railroad tracks and board their designated tour bus, which is parked near the depot on the south side of Village Loop Drive. Rail passengers who do not take a guided tour typically cross Village Loop Drive and walk toward the canyon rim. The Village Loop Drive pedestrian crossing at the depot is often heavily congested, especially when rail passengers head to the rim or board tour buses. Passengers making a day trip have about four hours to spend in the village area before having to reboard the train for the return trip.

Environmental Consequences

Methodology and Assumptions

NPS *Management Policies 2006* state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the National Park Service is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks. Because many forms of recreation can take place outside a national park setting, the National Park Service will seek to:

- provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in a particular park unit
- defer to local, state, and other federal agencies, private industry, and non-governmental organizations to meet the broader spectrum of recreational needs and demands that are not dependent on a national park setting

Unless mandated by statute, the National Park Service will not allow visitors to conduct activities that

- would impair park resources or values,
- create an unsafe or unhealthful environment for other visitors or employees,
- are contrary to the purposes for which the park was established, or
- unreasonably interfere with
 - the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park;
 - NPS interpretive, visitor service, administrative, or other activities;
 - NPS concessioner or contractor operations or services;
 - or other existing, appropriate park uses.

Part of the purpose of a park is to offer opportunities for recreation, education, inspiration, and enjoyment. A park's significance lies in the resources that visitors enjoy. According to the park vision statements for the South Rim in the 1995 *General Management Plan*, this transportation plan should support and allow for enhanced visitor experiences and opportunities. (The desired experiences and opportunities are described in Appendix A).

The purpose of this impact analysis is to determine if the alternatives are compatible or in conflict with the purposes of the park, the vision for the South Rim as outlined in the *General Management Plan* and planning documents for Canyon View Information Plaza (see page 10), and the direction provided by *NPS Management Policies 2006*. During the scoping process for this project, visitors identified the following issues as being important:

- visitor experience and quality
- protection of resources

- safe access to sites, views, trails, and resources
- aesthetically appropriate design solutions
- minimal construction delays and construction zone impacts, and respect for visitor time constraints
- avoidance of road closures
- ease of obtaining information and understanding of how to visit the park

Impacts on visitor access, use, and experience may occur as a result of changes to roadway and parking conditions, the South Entrance Station, tour bus operations, shuttle bus services, overlooks, interpretation and recreational opportunities, and other facilities and resources. They also may occur from direct actions that alter the availability of a specific experience or activity. Visitor experiences are also directly affected by actions influencing natural resources, such as air quality, soundscapes, and scenic resources. These impact topics are addressed separately in this document. Enhancement or degradation of these resources would also affect the quality of visitor experiences as described in the impact analysis below.

Impacts on visitor access, use, and experience have been assessed using professional judgment to develop a qualitative analysis of the effects of proposed actions on visitor activities and experiences. The analysis discusses the relationship between proposed changes to the transportation system as discussed under the "Transportation" section and the resulting effects on visitors.

The information used in this analysis is based on a review of several documents, including the *General Management Plan* (NPS 1995b), "South Rim Study" (North Arizona University 2005), "South Rim Visitor Study" (University of Idaho 2003), "Summary of July 2006 Data Collection, South Rim Visitor Transportation Plan" (DEA 2006), and other documents. In addition, input from meetings and workshops with park staff, regional stakeholders, and the

general public, as well as observations made during multiple visits to the park, were all used to inform the analysis.

The assumptions used in evaluating visitor use, experience, and access impacts include those listed below. Individually, these factors affect visitor experiences, but they are also interrelated and affect overall visitor experiences and satisfaction as a whole.

- Private vehicles are the primary mode of travel for most visitors.
- Existing visitor facilities, services, activities and opportunities on the South Rim would continue to exist, even if changes were made in travel modes used for moving about the South Rim, except as changed by the alternatives.
- Anticipated changes in opportunities for visitors to participate in various park activities, from social to solitary, would represent an effect.
- Anticipated changes in the convenience and comfort of travel would represent an effect.
- Anticipated changes in service level (such as reductions in private vehicle access, vehicle congestion, or an increase in services) would represent an effect.

Visitor Access

Visitor access impacts were qualitatively evaluated for the choice and availability of travel modes to and through the park, arrival experience, and ease of access to destinations (wait times, traffic congestion). Impacts on visitor access may occur as a result of proposed changes to roadway and parking conditions, the South Entrance Station, tour bus operations, shuttle bus service, and trails that contribute to the type and quality of visitor movement to and within the South Rim.

Visitor Use and Experience

Impacts on the range of visitor experiences and available recreational opportunities provided by the park may occur as a result of changes to travel options; accessibility to desired destinations (e.g., overlooks, visitor centers, hotels, etc.); ease of orientation and wayfinding in the park; and modifications to physical settings, visitor services, and programs. A qualitative assessment of impacts to visitor experience was completed by analyzing the opportunities for visitors to have a variety of park experiences under each alternative.

The ease of access for visitors to participate in park interpretive and educational programs as proposed under each alternative was also evaluated. This was done by qualitatively assessing proposed changes, including new or enhanced opportunities to use existing interpretive and educational programs and visitor amenities. The analysis of the accessibility of orientation opportunities included a qualitative assessment of proposed changes to existing orientation materials (e.g., pre-trip, en route, and onsite information) and the potential for new or revised orientation opportunities associated with each alternative. Wayfinding refers to the ability of visitors to locate destinations in the study area by all modes of transportation. Factors affecting wayfinding include the design and operation of roadways and pathways, as well as the visibility and legibility of signage. Universal access opportunities that maximize accessibility for all visitors (including those with disabilities) under each alternative were considered.

Visitor Safety

Impacts on safety were qualitatively assessed for risks associated with construction, as well as how improvements would affect the ability of visitors to safely use roads, trails, parking areas, and facilities (e.g., at Canyon View Information Plaza and Mather Point overlook, where pedestrians often interact with vehicles during peak season) in the long term. The National Park Service and its concessioners, contractors, and cooperators seek to provide a

safe and healthful environment for visitors, and the National Park Service works cooperatively with other federal, state, and local agencies, organizations, and individuals to carry out this responsibility (NPS 2006d).

Study Area

The study area for visitor use, experience, and access includes the regional context and the South Rim of Grand Canyon National Park. Included in the study area are the specific improvement locations within the park, adjacent lands in Kaibab National Forest, and regional communities including the gateway community of Tusayan.

Impact Thresholds

The following impact thresholds were defined:

- *Negligible* — There would be no noticeable change in visitor use, in any critical characteristic of visitor experiences fundamental to the park's purpose and significance, or in any defined indicators of visitor satisfaction.
- *Minor* — Changes in how visitors travel to and through the park; ease of access to desired visitor experiences, park resources, and destinations; the availability of educational and interpretive opportunities; and visitor safety would be slight and detectable. However, any one of these changes individually or combined would not appreciably affect the critical characteristics of visitor experiences that are fundamental to the park's purpose and significance. Visitor use and satisfaction would remain stable.
- *Moderate* — A few critical characteristics of how visitors travel to and through the park; ease of access to desired visitor experiences, park resources, and destinations; the availability of educational and interpretive opportunities; and visitor safety would change. These changes would be readily apparent to visitors and would result in

some effects to the critical characteristics of visitor experiences that are fundamental to the park's purpose and significance. Visitor satisfaction and/or the number of opportunities for visitors to participate in an activity would begin to change.

- *Major* — Multiple critical characteristics of how visitors travel to and through the park; ease of access to desired visitor experiences, park resources, and destinations; the availability of educational and interpretive opportunities; and visitor safety would change. Visitors would be highly aware of these changes because the critical characteristics of visitor experiences that are fundamental to the park's purpose and significance would be markedly altered. Visitor satisfaction would markedly change and/or the number of opportunities for visitors to participate in an activity would substantially change.

Nature of the Impact

Adverse Impact. An adverse impact would degrade visitor access and experiences and/or reduce opportunities for recreation and enjoyment of resources.

Beneficial Impact. A beneficial impact would improve visitor access and experiences and provide opportunities for recreation and enjoyment of resources.

Duration

Short-term Impact. A short-term impact would last as long as construction or less than one year for non-construction activities and would affect only one season's use by visitors.

Long-term Impact. A long-term impact would last beyond construction or more than one year for non-construction activities and would be permanent in nature.

Alternative A: No Action

Alternative A assumes that current conditions, including facilities, management strategies, and visitor services would continue. Adopted plans would be implemented and scheduled improvements would be made. However, no improvements would be made to the overall South Rim transportation system. As a result, the ease of access to desired visitor destinations would decrease as park visitation increase in the long term, along with congestion.

Direct / Indirect Impacts

Construction Impacts. There would be no construction-related impacts to visitor access because no construction would occur under this alternative.

Operations Impacts. *Visitors Arriving by Private Vehicle* — Under alternative A there would be no changes to regional visitor access, and the current mix of transportation modes for park access would continue. Most park visitors would continue to access the South Rim by motor vehicle through the South Entrance Station. The same transportation management strategies would continue to be employed.

Park staff would continue to closely monitor operations at the South Entrance and make adjustments as needed to ensure operational efficiency of the entrance station. It is anticipated that these changes would provide some relief to congestion and long lines in the short term, but they would not be adequate to relieve anticipated visitation in the long term given expected increases in visitation. Although these and other transportation management strategies would still be used, congestion at this entrance would likely recur, and wait times would increase. Alternative A would not meet this plan's objective of improving the entrance experience by avoiding long waits at the South Entrance Station for visitors.

Because there would be no changes to existing parking and no additional parking would be provided, visitors would continue to park

wherever they could find spaces, including along roadsides, particularly at Mather Point. Informal parking along roadsides would increase along with visitation, which would further detract from the visitor experience, obstruct visitor views, and pose safety hazards. Visitors who drive to Mather Point and then cross the South Entrance Road to get to Canyon View Information Plaza would continue to be exposed to safety risks because of road congestion and distracted drivers who may be trying to catch a glimpse of rim views instead of focusing on traffic. Alternative A would not meet this plan's objective to reduce safety risks due to continuing conflicts among pedestrians, parked vehicles, and moving traffic near Mather Point. The resulting visitor experience would remain chaotic and uncomfortable, dampened by views of long lines of parked vehicles along the roadside. Visitors would continue to experience frustration, a sense of crowding, and confusion trying to navigate around the rim.

Visitors would still have limited choices of travel modes, and access to Canyon View Information Plaza would remain somewhat difficult. If visitors cannot or do not access the information plaza, they may miss opportunities to learn more about the park's recreational offerings and destinations. They would also miss the benefit of direct interactions with NPS employees. Pedestrian and bicycle access to Canyon View Information Plaza, as well as to shuttle bus stops, would remain limited. No parking facilities would be provided at Canyon View Information Plaza for private vehicles. Accessible parking options would remain unchanged. Alternative A would not support the park's objective of providing a variety of means to access Canyon View Information Plaza to afford all visitors opportunities to receive park orientation soon after their arrival. In addition, alternative A would not meet this plan's objective of improving private vehicle parking as needed to meet current and future visitor demand.

The existing free shuttle bus service would continue. However, shuttle bus routes are

currently overcrowded during the peak season. With increased park visitation over time, these shuttle bus capacity issues would worsen and visitor satisfaction would decrease. Proposed changes to the Hermits Rest route would increase the frequency of service but not the passenger carrying capacity. No other changes related to alternative modes of transportation would occur under alternative A, and overcrowding issues on shuttle routes would not be addressed.

Mather Point and Yavapai Observation Station are the only overlooks in Grand Canyon Village accessible by private vehicles during the peak season. Large numbers of visitors would continue to park alongside the road near these viewpoints, as no additional parking would be provided under alternative A. These sites currently experience an overload of visitors, thus adversely impacting opportunities for quiet enjoyment and solitude. As visitation and congestion increase, adverse impacts at these popular scenic viewpoints would continue. Noise from traffic and the presence of parked vehicles would detract from the solitude and natural setting.

Various visitor services would continue to be provided at the South Rim, including lodging, food service, and shopping. No changes to visitor services and amenities are proposed under this alternative, and the same recreational opportunities would be provided. Long-term impacts to visitors would primarily be related to the ability of visitors to easily access these services. Limitations of the current transportation system, including delays at entrance stations, could result in visitors using fewer services or amenities, particularly at Grand Canyon Village, where there is not enough parking for private visitor vehicles during peak periods.

Changes in the form of increased congestion expected under alternative A would be readily apparent to visitors arriving by personal vehicle and would affect critical characteristics of how they experience the South Rim, most notably due to crowding and lack of

parking at Mather Point. Increased visitation would result in declines to critical characteristics of how visitors drive to and through the park and visitor safety, as well as ease of access to desired visitor experiences, park resources, and destinations. Visitor satisfaction would likely decrease. Therefore, the long-term effect on visitors arriving at the South Rim by private vehicle would be local, moderate, and adverse.

Visitors Arriving by Tour Bus — Under alternative A no change would be made to tour bus parking supply or loading/unloading areas. Designated tour bus parking at Canyon View Information Plaza would continue to accommodate 24 buses. In addition, 6 tour bus loading / unloading positions would be available at Bright Angel Lodge. After unloading passengers, tour bus drivers could park near the powerhouse at undesignated locations in the historic village area. Alternative A would not meet this plan's objective of increasing tour bus parking as needed to meet current and future visitor demand.

Visitors arriving by tour bus would continue to experience congestion and crowding at popular visitor locations, as would visitors arriving by private vehicle, particularly at scenic overlooks. Tour bus visitors would not have to deal with finding adequate parking, as that would be the responsibility of the tour bus operators. Visitors taking tours would also not have to worry about wayfinding, and they would benefit from interpretive information provided by their guides. Continued congestion and crowding would affect tour bus passengers' ease of access to desired visitor experiences, park resources, and destinations, but visitor satisfaction would likely remain stable because of the tour companies would continue to meet all passenger needs for access and interpretive information. Therefore, long-term impacts to visitors arriving to the South Rim by tour bus would be local, minor, and adverse.

Visitors Arriving by Railroad — Visitors arriving by railroad would continue to confront

safety problems because of congestion at the pedestrian crossing at the depot, which would likely worsen as visitation increases in the future. These visitors would not have to deal with finding parking, but they would experience congestion and crowding at popular overlooks. Wayfinding could continue to be difficult for visitors who are walking, particularly in dense crowds. Continued congestion and crowding would affect railroad passengers' ease of access to desired visitor experiences, park resources, and destinations, but visitor satisfaction would likely remain stable. Therefore, long-term impacts to visitors arriving to the South Rim by tour bus would be local, minor, and adverse.

Visitors Arriving by Trail — No changes would be made to the trail system on the South Rim other than those that are already proposed, as discussed under “Cumulative Impacts.”

Cumulative Impacts

There would be no construction under alternative A. As a result, there would be no cumulative impacts from construction activities.

Several past, present, and reasonably foreseeable actions within the project area could affect, or be affected by, changes in visitor experiences that would occur as a result of increasing visitation under this alternative as described below.

- In and near Tusayan improvements to Grand Canyon National Park Airport could lead to increased visitation to the general area. The ability of the community of Tusayan to offer additional visitor services through incorporation, and improvements to the multi-use path and SR 64 corridor, could draw more visitors to the area and enhance the regional visitor experience. These actions would have both adverse and beneficial impacts to the visitor experience in the long term.
- The park's proposed bypass lane and widening of SR 64 on the approach to

the South Entrance Station would result in a long-term, moderate, beneficial impact to visitors arriving in private vehicles.

- Rehabilitating Hermit Road would improve shuttle bus operations and conditions at the viewpoints along the road, thereby slightly improving visitor access and experience. Rehabilitating the historic railroad depot, improving the Market Plaza shuttle stop, and upgrading the East Entrance would be readily noticeable to park visitors and would result in long-term, minor to moderate, beneficial impacts in how various visitors access the South Rim. Improvements to the Bright Angel trailhead parking area would also be a beneficial impact, but would affect only a small, localized area.
- Accessibility would be improved through other actions as well. Some park restrooms do not meet accessibility standards and would be upgraded through a parkwide restroom improvement project. Phase V of the Greenway Trail would include an accessible path from the South Kaibab trailhead to Pipe Creek Vista.
- The development of a village interpretive center would provide in-depth interpretive and educational facilities. The Trail of Time would be improved by adding trail markers and new way-side exhibits along the Rim Trail, benefiting visitors. Improvements to Yavapai Observation Station would also enhance visitors' educational and interpretive experiences. These actions would result in long-term, minor to moderate, beneficial impacts to the overall visitor experience.
- Approximately 9 viewpoints along Hermit Road and 5 viewpoints along Desert View Drive are scheduled for rehabilitation, which would result in long-term, minor to moderate, bene-

ficial impacts to scenic viewing opportunities.

- Recreational opportunities could be affected by actions planned for Kaibab National Forest to restrict off-road travel, close roads, and restrict areas for camping, thus creating recreational opportunities that may appeal to visitors seeking solitude and natural conditions.
- The 36-mile Tusayan bike trail system would provide visitors with additional recreational opportunities in the area. Revisions to the park's *Backcountry Management Plan* could also result in beneficial changes to recreation as it is expected to address visitor use and access into the backcountry.
- Phase III of the Greenway Trail would provide a multi-use trail from the park's south boundary to Canyon View Information Plaza. The trail would be separated from the road, providing additional recreational opportunities and an enhanced level of safety. Phase V would extend the trail from Pipe Creek Vista to the South Kaibab trailhead.
- Services and amenities would be improved with renovations to Bright Angel Lodge and cabins.

Overall, the impacts associated with past, in-progress, and reasonably foreseeable projects would be long-term, negligible to minor, and beneficial, as the actions described above would generally enhance visitor access and experience. When combined with the long-term, minor to moderate, adverse impacts expected under alternative A, cumulative impacts would be local and regional, long-term, minor, and adverse, as the beneficial actions described above would not be sufficient to offset expected increases in visitation and resulting congestion. Alternative A would contribute a small incremental impact to the overall cumulative impacts.

Conclusion

Under alternative A no changes would be made to the park's transportation system. Changes to how visitors travel to and through the park; ease of access to desired visitor experiences, park resources and destinations, and interpretive and recreational opportunities; and visitor safety concerns would be related primarily to increased visitation and congestion. Visitors who arrive by private vehicle would be the most affected, as their experiences would likely continue to be characterized by frustration, crowding, and confusion. As a result, the impact to visitor access, use, and experience would be long-term, local, minor to moderate, and adverse. Long-term cumulative impacts would be local, minor, and adverse. Alternative A would not meet several objectives related to visitor access and experience as defined for this plan.

Alternative B: Preferred Alternative

Alternative B would provide new transportation facilities and services within the park and on national forest system land adjacent to Tusayan. A pilot shuttle bus service would be provided outside the park to transport visitors to the South Rim. Parking at Canyon View Information Plaza would also be developed, and additional shuttles would be provided from Canyon View Information Plaza to other South Rim destinations. In later phases of development, new visitor parking facilities could be provided on national forest system lands, with expanded shuttle bus service into the park.

Direct / Indirect Impacts

Construction Impacts — Several construction activities would occur under alternative B and would be conducted in phases, resulting in a series of short-term impacts to visitor access. Mitigation measures described in Chapter 2 (see page 123) would help reduce impacts to visitors, such as defining construction zones and working within those confines. Developing a construction management plan (see page 111) would also reduce impacts to

visitor safety and traffic circulation during construction phases. Although construction activities would occur at different times and at different locations, the resulting impacts to short-term visitor access would be localized and similar with each phase of work.

Construction activities would include removing and realigning portions of the South Entrance Road near Canyon View Information Plaza and constructing new parking and facilities at the plaza. Private vehicle parking would be displaced by construction activities on a temporary and site-specific basis, limiting impacts to visitor access primarily at Mather Point and lot D in the village. Tour bus parking could also be displaced by construction activities at Canyon View Information Plaza. In addition, modifications would be made at the Mather Point overlook, including the construction of an accessible trail and a canyon viewing area at an existing small, flat rock outcropping east of the primary overlook and adjacent to the Rim Trail. Construction activities would have an adverse effect on visitor access to Mather Point by causing temporary, short-term disruptions to shuttle bus service at isolated locations, resulting in short delays. However, these changes would not appreciably affect critical characteristics of visitor access, and implementation of mitigation measures would help reduce construction-related impacts.

Additional phases would include parking near Tusayan and improvements at the South Entrance Station, if needed. Constructing a parking area on national forest system land near Tusayan would not appreciably change the visitor experience, as no parking or other facilities in the area would be closed or otherwise impacted during construction. Construction of improvements to the South Entrance Station would probably not affect visitors, or the effects would be minimal. Therefore, there would be no noticeable change in any critical characteristic of visitor experience or indicators of visitor satisfaction.

Several mitigation measures, as described in Chapter 2, would help reduce construction-related impacts to visitors and reduce safety risks related to the transport of construction materials and the use of heavy construction equipment. Work would be scheduled to avoid peak visitation times. NPS employees and concessioners would be notified of road closures and delays, and flaggers, signs, or other technology would be used to help visitors navigate around work areas. Any short-term closures of parking areas would be minimized, and replacement parking would be provided in advance of closures. Contractors would provide a weekly schedule, with updates to the National Park Service to assist in the management of visitor use during construction. A traffic control plan would be developed to reduce traffic delays during construction. When possible, the public would be informed of the purpose of the construction, underscoring the long-term benefits that would result from the current, short-term inconvenience. These actions would be applied under all construction phases to minimize adverse impacts. Spreading the short-term impacts over a longer time frame would also help further alleviate impacts to visitors. With mitigation, construction-related impacts to visitor access, use, and experience would be short-term, minor, and adverse.

Operations Impacts. *Visitors Arriving by Private Vehicle* — The majority of visitors arriving by private vehicle would continue to enter through both the South and East Entrances; some visitors would be expected to shift from the South to the East Entrance, slightly affecting regional access.

At the South Entrance Station the same improvements as described under alternative A would be implemented. If needed, a sixth inbound service lane would be constructed to reduce waiting times. This change would alleviate congestion at this entrance and enable visitors to more quickly reach their desired destinations. Under all action alternatives, the National Park Service would

increase offsite sales of park entrance passes, allowing those visitors to use the prepaid lane. In addition, the fee collection process would continue to be refined to reduce transaction times at the entrance station and promote use of the East Entrance.

For visitors arriving through the South Entrance, the first opportunity to view the canyon would still be at Mather Point; however, the arrival sequence would be different and the congested parking lot at Mather Point would be replaced by a new 900-space lot that would be closer to Canyon View Information Plaza and would be accessible from the realigned South Entrance Road. The number of parking spaces would match demand, and most visitors would be able to find parking when they arrived. Parking for persons with disabilities would be available within 200 to 400 feet of the rim and the Canyon View Visitors Center, where visitors would be able to obtain information to plan their visit and learn about the park. New amenities at the information plaza would include a theater, additional interpretive exhibits, and a bicycle rental facility, all of which would enhance opportunities for visitors to enjoy and experience the park.

Under all action alternatives, the East Entrance would be promoted as an alternative entrance to the South Rim. Visitors using this entrance would enjoy views of the Little Colorado River gorge as they traveled west from Cameron. The approach route to the East Entrance climbs the Coconino Plateau, giving visitors a hint of canyon views ahead. Visitor services available at Desert View would likely be less crowded and viewpoints along Desert View Drive would be less congested, offering visitors approaching from this direction a different experience from those arriving through the South Entrance.

Regardless of which entrance station they used, visitors would be able to park in the vicinity of Canyon View Information Plaza and to choose whether to visit the Canyon View Information Plaza facilities first or to

proceed directly to Mather Point for a view of the canyon. Additional pathways would be constructed to connect the parking areas to the plaza and Mather Point. With the new parking lot, pedestrians would no longer have to cross through traffic on the current South Entrance Road at Mather Point. The new parking area would also remove informal roadside parking, which is also a safety concern. Pedestrian crossings of traffic lanes in parking areas would be provided where appropriate, along with pedestrian path lighting. New directional signs would guide visitors to Canyon View Information Plaza, Mather Point, shuttle bus stops, and the Greenway Trail and Rim Trail.

Visitors would access Mather Point by pathway or shuttle bus rather than personal vehicles. In addition to the removal of the parking lot and road, numerous improvements would be made at Mather Point to enhance the visitor experience. These include rehabilitating the overlook to be fully accessible to all visitors, enhancing the Rim Trail with selective vegetation clearing, creating an additional viewing area to the east of the main overlook, and providing amenities such as seating, picnic tables, shelters, and trash receptacles. The intent would be to create a more pedestrian-oriented setting at the Mather Point overlook.

At Mather Point removing the parking area would reduce the visual impacts of vehicles in the foreground. These changes would help provide a more natural, vehicle-free visitor experience in a popular visitor destination.

Parking would be more actively managed, focusing on lots A–E in Grand Canyon Village, and appropriate parking management solutions would be determined for each major activity area (such as Canyon View Information Plaza as well as the village). Most existing parking lots in the village would be retained except for changes to accommodate tour buses. Although the number of parking spaces available for use by day visitors in existing parking lots would be reduced from 1,190 to

1,040, operational strategies would contribute to more effective use of the existing parking supply. In addition, this 13% loss would be offset by the substantial increases in parking at other areas.

Under Alternative B visitors would find it easier to navigate through the South Rim and reach their destinations. Several outreach programs to provide information, enhanced visitor orientation, and trip planning materials would be implemented under all action alternatives. A variety of media would be used to reinforce key visitor messages, such as the availability of park tours and entrances passes for purchase offsite. Greeters at key shuttle bus stops would help with visitor orientation. The “Sign Plan for the South Rim” would be updated to address the need for consistent graphics, static and dynamic sign usage, and pedestrian and bicycle wayfinding programs, all of which would make use of maps, signs, brochures, kiosks, and the Internet. Dynamic visitor information about congestion and shuttle bus service choices would be available while visitors were en route to the park. Park ITS information would also be provided at other key locations, such as Canyon View Information Plaza. Visitors would have better access to trip planning information because of improved access to Canyon View Information Plaza.

A variety of visitor services would continue to be provided on the South Rim. Food items would be available for purchase at Canyon View Information Plaza. This would enable visitors to “park once” at Canyon View without having to drive elsewhere for snack items. Although there would be no changes to the park’s bicycle use policy, a new bicycle rental service would promote this form of travel to South Rim destinations. In addition, bicycle access to new segments of the Greenway Trail, and a newly designated hiking and bicycle route through the Village Historic District would expand opportunities for nonmotorized travel on the South Rim.

New facilities under all action alternatives would conform to accessibility guidelines and standards. New parking at Canyon View Information Plaza would provide direct access to the plaza for visitors requiring mobility assistance. Improved access would also allow more people to check out free wheelchairs and obtain accessibility passes provided there. These actions would improve universal accessibility throughout the park.

Because of improved access, reduced crowding, improved wayfinding, enhanced travel choices, and better conditions at major visitor activity areas, alternative B would result in long-term, primarily local, moderate, beneficial impacts for visitors arriving in private vehicles.

Visitors Arriving by Tour Bus — For visitors arriving by tour bus, the arrival experience at Canyon View Information Plaza would be improved over current conditions. A new commercial tour bus parking lot would be provided on the north or northeast side of the plaza, and a new drop-off would be constructed within 200–400 feet of the rim to provide convenient access to rim views at Mather Point. This would allow more visitors to reach the South Rim by tour bus. A new trail from the tour bus drop-off area to the canyon rim, and a new restroom near this drop-off, would be convenient for tour bus passengers.

All action alternatives also call for expanded opportunities for tour bus access at Yaki Point, and Yavapai Observation Station. Loading and unloading of up to 6 buses at one time at Bright Angel Lodge would remain unchanged. Under alternative B tour bus management improvements would include organizing and delineating existing parking areas, as well as relocating and developing new parking and drop-off areas.

The improvements described above would result in an overall beneficial impact to tour bus visitors, whose experience would be enhanced by positive changes in how they travel through the park. Ease of access to

desired experiences, park resources and destinations, and educational and interpretive opportunities would slightly improve. Therefore, impacts to visitors arriving by tour bus would be long-term, local, minor, and beneficial.

Visitors Arriving by Shuttle Bus — A new shuttle bus service would be established as a pilot program during the peak season to provide access between Tusayan and Canyon View Information Plaza. Depending on the success of this pilot program, a new parking and shuttle bus transfer facility would be constructed at the north end of Tusayan on national forest system land. This would be undertaken under a later phase and in conjunction with expanding shuttle bus service to Canyon View Information Plaza.

Visitors staying overnight in Tusayan could leave their vehicles parked at their lodging facilities or could park at the new shuttle bus staging area near the National Geographic Visitor Center and take a shuttle bus into the park. If the pilot shuttle bus program was effective, the new shuttle bus staging area in Tusayan would include a fee collection and visitor information station, covered shelter, restrooms, and a wayside exhibit area. As described in the “Transportation” section, it is expected that 19% of day visitors would use this parking lot and shuttle bus system to access the South Rim. Frequent shuttle bus service would result in short wait times for visitors choosing to take transit into the park.

Visitors could also receive a park overview and general orientation while riding the shuttle bus from Tusayan to Canyon View Information Plaza, where they would get a more detailed orientation to the park. Passengers could enjoy the Mather Point overlook area, take advantage of the services and amenities at Canyon View Information Plaza, and choose a travel mode for visiting the rest of the South Rim — either by shuttle bus, hiking, or biking. Access to the South Rim shuttle bus system would be convenient, and information would be provided to help visi-

tors understand how to use shuttle buses to reach other destinations. When done visiting the park, shuttle bus passengers would return to Tusayan on shuttle buses from the Canyon View Information Plaza.

Existing shuttle bus routes on the South Rim would offer increased service frequencies and more direct travel (as described in the “Transportation” section), which would reduce crowding, as well as travel and waiting times. Intermodal connections between shuttle connections, parking areas, the Greenway Trail, and other trails would be improved and promoted. Interpretive services could also be provided on the shuttle buses to improve the visitor experience.

The new shuttle bus service from Tusayan to Canyon View Information Plaza would improve how visitors travel to the park. Shuttle bus service changes on the South Rim would improve how visitors travel through the park, increasing ease of access to desired visitor experiences, park resources, and destinations. Traveling on shuttle buses would also improve visitor safety. These changes would be readily apparent to visitors and would increase visitor satisfaction. Visitors using shuttle buses to enter the park might feel less flexibility in their choices for travel within the park, compared to visitors driving into the park. Therefore, long-term impacts would be local, minor, and beneficial.

Visitors Arriving by Railroad — The arrival experience for visitors entering the park by train would be similar to existing conditions because the trains would still arrive at the historic Grand Canyon Depot. However, under alternative B, as well as alternatives C and D, access to tour buses would be improved for railroad passengers. Tour bus loading and unloading for Grand Canyon Railway passengers would occur at a new area directly adjacent to the southernmost tracks. A new platform between the tracks, as well as between the bus loading area and the tracks, would be constructed. This new loading area would reduce visitor crowding and confusion

on the north side of the depot, where a large number of tour buses currently mix with train passengers in a small loading area. Relocating the tour bus passenger loading / unloading activities to the south side of the railroad tracks would also reduce congestion along Village Loop Drive. Rail passengers not riding tour buses would continue to unload at the depot and walk across Village Loop Drive to their destinations. These visitors would enjoy an improved experience because they would not be affected by tour bus noise, exhaust, and boarding passenger crowds.

Improved loading / unloading activities for railroad passengers, along with increased safety in this area, would improve how visitors travel to and through the park. However, these changes would not appreciably affect critical characteristics of the visitor experience, and satisfaction of these visitors would likely remain stable. Therefore, long-term impacts would be local, minor, and beneficial.

Visitors Arriving by Trail — For visitors who choose to enter the park by trail (on foot, horseback, or bicycle), a new trail segment would be constructed from the north end of Tusayan to the park boundary along the east side of SR 64 and would connect with the proposed phase III of the Greenway Trail at the park boundary and the rest of the existing South Rim trail system. This trail would also provide an extension of the Arizona Trail into the park for hikers, cyclists, and equestrians, resulting in a more enjoyable and safe entrance experience than exists today. Trail users traveling north on the new Greenway would be able to continue into the park, then connect to the South Rim trail system. In addition, access to trailheads would be improved, and a new route for trail users would provide access through the Village Historic District. Visitors would be able to park once, either at Canyon View Information Plaza or Tusayan, and hike or bicycle, and take a shuttle back to their vehicles.

Providing a new trail segment into the park would offer a new method of access into and

through the park. For visitors preferring a nonmotorized, more natural method of travel, this provision would be readily apparent and would represent an improvement to a critical characteristic of their experience, resulting in increased satisfaction. Therefore, long-term impacts would be local, moderate, and beneficial.

Cumulative Impacts

As noted in alternative A, several projects that are scheduled or proposed for construction in or adjacent to project areas could have short-term, localized, adverse impacts to visitor access and experience from construction staging and associated activities. Construction-related impacts could create temporary disruptions to traffic flow, which would be slight and detectable or readily apparent to visitors. Therefore, when combined with short-term construction-related impacts under alternative B, the cumulative effects of simultaneous construction activities would be short-term, minor to moderate, and adverse.

The same past, in-progress, and reasonably foreseeable projects described for alternative A would combine with the actions described under alternative B. Unlike alternative A, actions expected under alternative B would result in long-term, beneficial cumulative impacts when combined with these other projects. Specifically, improvements to regional access, such as encouraging visitors to use the East Entrance and implementing shuttle bus service between Tusayan and Canyon View Information Plaza, would combine with other projects that would affect regional access as described for alternative A, resulting in primarily beneficial impacts. Access to other areas on the South Rim would benefit from new parking at Canyon View Information Plaza and more active parking management under alternative B, and would combine with rehabilitation of Hermit Road and improvements to Desert View Drive. Scenic viewing opportunities would be improved from combining the additional viewing area and improvements at Mather Point under alternative B with improvements

to Yavapai Observation Station and other viewpoints along Hermit Road and Desert View Drive. Expanded hiking opportunities under alternative B, in conjunction with changes expected under phases III and V of the Greenway Trail improvements and the proposed pedestrian improvements along SR 64 in Tusayan, would offer long-term, minor, beneficial impacts.

The impacts of alternative B would provide a sizable contribution to the overall beneficial effects described above. The long-term, minor to moderate, beneficial impacts of specific visitor experiences under alternative B, combined with the long-term, minor beneficial impacts of the projects described above, would result in long-term, local and regional, beneficial cumulative impacts that would be moderate due to the sizable influence of the actions proposed under alternative B.

Conclusion

Under alternative B overall construction impacts related to visitor access and visitor experience would be local, short-term, minor, and adverse; cumulative impacts related to construction would be local, short-term, minor to moderate, and adverse. Access to desired visitor destinations would be improved, along with accessibility to educational and interpretive opportunities. Visitors arriving by all modes of access would benefit under this alternative, particularly those arriving in private vehicles and those going to Mather Point. Long-term impacts to visitor access, use, and experience would be local and regional, minor to moderate, and beneficial, depending on the transportation mode. Cumulative impacts related to visitor access, use, and experience would be local and regional, long-term, moderate, and beneficial.

Alternative C: Tusayan Parking Emphasis

Alternative C includes many of the same elements as alternative B, but a greater amount of parking would be located outside the park on national forest system land near Tusayan, with the expectation that more people (44% of day

visitors) would park there and ride a shuttle bus into the park. New parking would still be provided at Canyon View Information Plaza, but only 400 new spaces would be provided, which would be reserved for short-term visitor use.

Direct / Indirect Impacts

Construction Impacts. Under alternative C there would be a greater level of construction near Tusayan and fewer disturbances at Canyon View Information Plaza compared to alternative B. However, the same mitigation measures described for alternative B would also be implemented under this alternative, helping alleviate impacts on visitors. Construction-related impacts under alternative C would be short-term, minor to moderate, and adverse.

Operations Impacts. Visitors Arriving by Private Vehicle — The majority of day use visitors arriving by private vehicles would continue to enter through both the South and East Entrances. The arrival experience would be similar to alternative B for visitors using either entrance station. Under alternative C visitors would be directed toward Canyon View Information Plaza along a realigned South Entrance Road. Direct vehicular access to the Mather Point parking lot would be retained only for use by persons with disabilities and by shuttle buses. Visitors would otherwise be directed to a new parking area south of Canyon View Information Plaza, where 400 parking spaces would be provided, rather than the 900 proposed under alternative B. Only short-term parking would be allowed for visitors going to the information plaza and Mather Point.

The number of parking spaces under alternative C would match demand, and most visitors would be able to find parking when they arrived, although much of the new parking would be located outside the park near Tusayan. Unlike alternative B, where visitors could park long-term at Canyon View Information Plaza, under alternative C visitors would be encouraged to drive to other park-

ing areas on the South Rim and take shuttles, or park near Tusayan. This might be an inconvenience for those visitors who would prefer to leave their vehicles parked at Canyon View Information Plaza and ride the park shuttle bus to other park sites or hike on the extended trail system. Because of limited parking at Canyon View Information Plaza, this lot could become overcrowded if not enough visitors parked near Tusayan and used shuttle buses to enter the park, or if visitors parked at Canyon View Information Plaza for long periods.

Similar to alternative B, visitors arriving at Canyon View Information Plaza could either visit the information plaza first or proceed directly to Mather Point for a view of the canyon. Other improvements and visitor amenities at the plaza would be the same as described for alternative B.

For visitors to Mather Point access from the general parking area would be similar to alternative B. The parking lot at Mather Point would remain, but would only be available for persons with disabilities. As described under alternative B, numerous improvements would be made at Mather Point to enhance the visitor experience and to establish a less crowded, pedestrian-oriented setting with minimal influence from vehicles at the Mather Point overlook.

After visiting both Canyon View Information Plaza and Mather Point, visitors would then drive to other South Rim destinations. For those visitors in private vehicles, the arrival experience would be similar to current conditions. Most existing parking lots in Grand Canyon Village would be retained except for changes to accommodate tour buses.

Similar to alternative B, visitors in private vehicles would experience changes to travel to and through the park. The limited amount of parking provided in the park would make alternative C less convenient for visitors in private vehicles than alternative B. Visitors wanting to leave their cars at Canyon View Information Plaza and travel to other South

Rim destinations might find the travel changes awkward. Decreased vehicular congestion because more visitors would be encouraged to take shuttle buses to the park would result in easier access to desired visitor experiences, park resources, and destinations. Safety would also be improved. These changes would be apparent and would affect critical characteristics of visitor experiences. Long-term impacts would be local, minor, and beneficial.

Visitors Arriving by Tour Bus — For visitors arriving by tour bus, the arrival experience at Canyon View Information Plaza would be slightly improved over current conditions. Similar to alternative B, the existing commercial tour bus parking lot would be expanded, and a drop-off facility would remain in its current location west of the parking area, offering convenient pedestrian access to the plaza. Access to the rim from this drop-off location would be approximately 1,000 feet along an existing path between Canyon View Information Plaza and Mather Point. Similar to existing conditions, tour bus visitors could either go first to Canyon View Information Plaza or to Mather Point.

Visitors arriving by tour bus would experience long-term impacts similar to alternative B, including expanded opportunities along the rim, although less convenient access to Mather Point for tour bus users would result in long-term, local, minor, beneficial impacts.

Visitors Arriving by Shuttle Bus — A new park shuttle bus route from Tusayan to Canyon View Information Plaza would run on a regular basis during the peak season, similar to alternative B. However, under alternative C regular shuttle bus service would be initiated in the first phase of implementation and would operate more frequently than under alternative B.

For visitors entering the park by means of shuttle bus, their arrival experience would begin in Tusayan. Shuttle buses would make pick-ups and drop-offs at the new shuttle staging area and potentially at four to six convenient stops in Tusayan.

The Tusayan shuttle bus staging area would be constructed in the first phase of implementation. In addition to providing parking, the staging area would also include a fee collection and visitor information station, covered shelter, restrooms, and a wayside exhibit area for visitors. The shuttle staging area would have a greater number of parking spaces than proposed under alternative B.

The shuttle bus experience would be similar to that described under alternative B, and visitors would arrive at Canyon View Information Plaza as their first stop in the park. However, under this alternative the goal would be for 44% of day visitors to use the Tusayan parking area and shuttle bus system, which would reduce the potential for future congestion at the entrance station. When finished with their park visit, shuttle bus passengers would return to Tusayan. The shuttle bus service would run through both the peak and shoulder seasons (March through October). Because the success of this alternative would rely on a greater number of visitors parking outside the park and using shuttle buses, service would be provided more frequently than under alternative B.

Visitors arriving by shuttle bus would experience changes to how they travel to and through the park, with improved ease of access to desired visitor experiences, park resources, and destinations. These changes would be readily apparent and would affect critical characteristics of their experiences. Shuttle bus users would likely experience improved visitor satisfaction, and long-term impacts would be local, moderate and beneficial.

Visitors Arriving by Railroad — The arrival experience for visitors entering the park by train would be the same as described in alternative B. Long-term impacts would be local, minor, and beneficial.

Visitors Arriving by Trail — The arrival experience for visitor entering the park by trail would be the same as described for

alternative B. Long-term impacts would be local, moderate and beneficial.

Cumulative Impacts

The additional construction-related actions described for alternative B would also apply to alternative C. However, under alternative C more parking-related construction would occur at Tusayan than under alternative B. The short-term, minor to moderate, adverse construction-related impacts expected under alternative C in combination with the other construction-related actions described under alternative B, would result in local, short-term, minor to moderate, adverse cumulative impacts.

For both visitor access and visitor use and experience, the same long-term cumulative scenario described for alternative B would apply to alternative C. The primary difference under alternative C would be a larger parking area near Tusayan. When combined with the long-term, moderate, beneficial impacts expected under alternative C, cumulative impacts to visitor access, use, and experience would be local and regional, long-term, moderate, and beneficial. The impacts of alternative C would provide a sizable contribution to the overall beneficial impacts described above.

Conclusion

Under alternative C overall construction impacts related to visitor access, use, and experience would be local, short-term, minor to moderate, and adverse; cumulative impacts would be local, short-term, minor to moderate, and adverse. Proposed changes for park access under alternative C would be readily apparent to park visitors and would affect critical characteristics of visitor experiences. Visitor satisfaction would begin to change in many areas, including not only decreased congestion and wait times, but also improved safety and universal access options. Similar to alternative B, visitors arriving by all modes of access would benefit, but to a lesser extent for visitors in private vehicles because of less parking at Canyon View Information Plaza. Long-term impacts to visitor access, use, and

experience would be local and regional, minor to moderate, and beneficial. Long-term cumulative impacts would be local and regional, moderate, and beneficial.

Alternative D: Canyon View Information Plaza Parking Emphasis

Under alternative D all new private vehicle parking would be provided at Canyon View Information Plaza, and shuttle bus service from here would provide access to visitor destinations throughout the South Rim. No shuttle bus service would be provided from Tusayan to the park.

Direct / Indirect Impacts

Construction Impacts. Most construction activities proposed under this alternative would occur at Canyon View Information Plaza and would be conducted in phases. The resulting short-term impacts would be the same as described for alternative B. However, under alternative D there would not be any construction activity outside the park. Construction-related impacts to visitors would be noticeable on park land, but with the incorporation of mitigation measures, they would be short-term, minor to moderate, and adverse for all phases of work.

Operations Impacts. *Visitors Arriving by Private Vehicle* — The majority of day visitors arriving by private vehicles would continue to enter through both the South and East Entrances, and their arrival experience would be similar to that described under alternative B. Because alternative D would not provide shuttle bus service from outside the park, private vehicle traffic at the South Entrance Station would be reduced only to the extent that visitors would choose to switch to the East Entrance. A total of six inbound service lanes would have to be provided at the South Entrance, with the potential to use the bypass lane as an additional service lane, for a total of seven inbound service lanes (two more than now). The addition of more lanes under this alternative would alleviate congestion at the entrance station.

Under Alternative D visitors would be directed toward Canyon View Information Plaza along a realigned South Entrance Road, which would lead directly to an easy-to-find parking area for up to 1,190 vehicles. Parking for persons with disabilities would be available within 200–400 feet of the canyon rim. All new private vehicle parking for day visitors would be provided at Canyon View Information Plaza. This parking would be for both short- and long-term use for visitors going to the information plaza and Mather Point, as well as other South Rim destinations.

Unlike alternatives B and C, all new parking under alternative D would be concentrated within the park, primarily at Canyon View Information Plaza. The number of parking spaces would meet demand and most visitors would be able to find parking upon arrival. Compared to alternative B, the larger parking area would increase the walking distance for some visitors to desired destinations (such as Canyon View Information Plaza facilities and Mather Point). Similar to alternative B, visitors would arrive in the Canyon View Information Plaza area and could either visit the information plaza first or Mather Point. Other improvements and visitor amenities at Canyon View Information Plaza would be the same as described under alternative B.

Approximately 31% of day use visitors would be expected to park at Canyon View Information Plaza and ride shuttle buses. Providing parking here would help the park reach its objective to afford all visitors the opportunity to receive park orientation soon after their arrival in the park, resulting in a readily apparent improvement to available education and interpretive opportunities.

Visitors would access Mather Point on foot or by shuttle bus, similar to alternative B. The Mather Point parking lot and access drive would be removed. Access to Mather Point would be provided by pedestrian paths from Canyon View Information Plaza and from a new South Rim shuttle bus stop at the west end of the existing parking area. Pedestrians

would no longer have to cross traffic on the South Entrance Road to access the overlook. Informal roadside parking in the Mather Point area would be eliminated, thus removing current safety hazards and congestion.

As in alternatives B and C, numerous improvements at Mather Point would enhance visitor experiences, with the intent to create a more pedestrian-oriented setting at the overlook.

After visiting both Canyon View Information Plaza and Mather Point, visitors could either drive to other destinations or take the park shuttle bus system. Visitors would be encouraged to leave their cars at Canyon View Information Plaza and ride the park shuttle bus or use the trail system.

Like the other action alternatives, visitors who access the park by private vehicles would experience beneficial changes. Ease of access would be improved by being able to park at Canyon View Information Plaza and then either drive or ride shuttle buses to other destinations. Visitor parking would be very convenient, with no visitors expected to park outside the park in or near Tusayan. Improvements to visitor safety would occur as a result of decreased congestion and the elimination of roadside parking. Wayfinding would be the simplest under alternative D because all visitors in private vehicles would be directed to Canyon View Information Plaza. These changes would be readily apparent to visitors entering the South Rim in private vehicles and would result in increased satisfaction. Therefore, long-term impacts would be moderate and beneficial.

Visitors Arriving by Tour Bus — Accessibility of tour buses to park destinations, as well as the amount of loading/unloading and parking areas for tour buses, would improve under this alternative. A new commercial tour bus parking lot, with a passenger drop-off, would be constructed at Canyon View Information Plaza. For most tour bus visitors, their first experience would be to take in a view of the canyon from Mather Point, and then either return to their parked bus or visit Canyon

View Information Plaza. Visitors would access both Mather Point and the information plaza along the existing pathway. No new restrooms would be constructed under this alternative, as the existing facilities are located close to the new passenger drop-off.

Like the other action alternatives, improvements to tour bus operations would make it easier to access desired visitor experiences, park resources, and destinations. Impacts for these visitors would be long-term, local, minor, and beneficial.

Visitors Arriving by Railroad — The arrival experience for visitors entering the park by train would be the same as described under alternative B. Impacts would be long-term, local, minor, and beneficial.

Visitors Arriving by Trail — Improvements to the trail system would be the same as described for alternative B. However, under this alternative if visitors used the Greenway Trail between Tusayan and Canyon View Information Plaza, they would not have the option of taking a shuttle bus back to Tusayan. Impacts would be long-term, local, moderate, and beneficial.

Cumulative Impacts

The same additional construction-related actions described for alternative B would also apply to alternative D. These impacts in combination with the other construction-related actions as described under alternative B, would result in local, short-term, minor to moderate, adverse cumulative impacts.

The same long-term cumulative scenario described for alternative B would also apply to alternative D. The primary difference would be how a larger parking area at Canyon View Information Plaza would combine with other actions proposed within the park. None of the combined benefits resulting from parking in Tusayan would apply.

Taken together, the additional impacts to visitor access would be long-term and primarily beneficial, although possibly to a lesser extent

than under alternative B or C because few regional benefits would be combined. When combined with the long-term, minor to moderate, beneficial impacts expected under alternative D, cumulative impacts related to visitor access would be local, long-term, moderate, and beneficial as well.

Conclusion

Under alternative D overall construction impacts related to visitor access, use, and experience would be local, short-term, minor to moderate, and adverse; cumulative impacts related to construction would be local, short-term, minor to moderate, and adverse. Access to desired visitor experiences and destinations would improve compared to existing conditions. Like alternative B, visitors arriving by all modes of access would benefit under this alternative. Visitors arriving by private vehicle would benefit the most, as this alternative would provide the most private vehicle parking at Canyon View Information Plaza. Long-term impacts to visitor access, use, and experience would be local, minor to moderate, and beneficial. Cumulative impacts related to operations would be local, long-term, moderate, and beneficial.

SOCIOECONOMIC ENVIRONMENT

Affected Environment

The socioeconomic environment adjacent to Grand Canyon National Park that is likely to be most impacted by alternatives being considered for the South Rim visitor transportation plan is Tusayan in Coconino County, Arizona. This gateway community is approximately 1.5 miles south of the South Entrance Station and serves as the primary entrance for visitors accessing the South Rim of the Grand Canyon. This community is highly dependent on, and oriented around, serving national park visitors.

Other communities within Coconino County such as Flagstaff, Williams, Cameron, and Valle, could be considered as distant gateways into the national park. Some information is

presented for Cameron and Coconino County. The transportation plan would have few impacts on Flagstaff and Williams because of their distance from the park and on Valle because of its limited services and few commercial establishments; therefore, socioeconomic information on these individual communities is not presented (see the “Methodology and Assumptions” section below for more detail).

Unless otherwise noted, the information in this section is derived from a socioeconomic report produced for this planning effort by Dornbusch Associates (2007).

Tusayan Economy

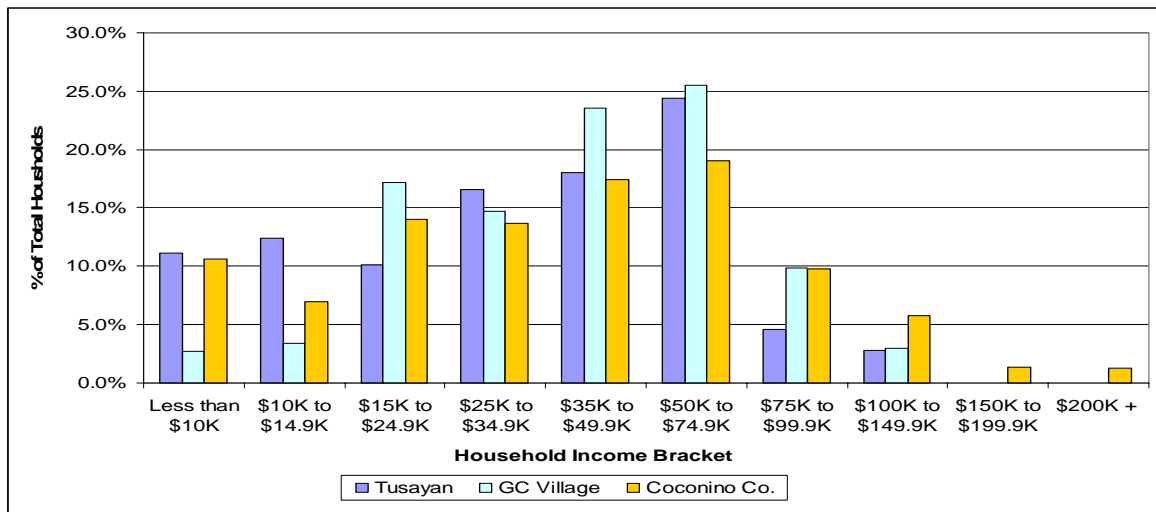
Per Capita Income

The 2000 U.S. Census estimated per capita income in Tusayan to be \$16,637. This was lower than the per capita income in Grand Canyon Village at \$19,923 and Coconino County at \$17,139. Adjusting per capita income figures for inflationary growth from 2000 to 2007, estimated 2007 per capita income would be \$20,244 in Tusayan, \$24,242 in Grand Canyon Village, and \$20,854 in Coconino County. Based on 2000 Census population data and an estimated \$35.0 million of goods and services generated by the economy (economic output) of Tusayan in 2004, average output per person in Tusayan was estimated to be approximately \$63,100 in 2004 or \$69,539 in current 2007 dollars.

Household Income

According to census data, the median household income in Tusayan was estimated to be \$34,917 in 2000 or \$42,486 in 2007 dollars, which is lower than the median household income at Grand Canyon Village at \$42,803 (\$52,082 in 2007 dollars), and in Coconino County, at \$38,256 (\$46,549 in 2007 dollars), as shown in Figure 23. This figure reveals that in 2000 the single largest proportion of households (approximately 24%) earned between \$50,000 and \$74,999 per year, which is equivalent to between \$60,839 and \$91,258 per year in current 2007 dollars. Tusayan has substan-

FIGURE 23. REGIONAL HOUSEHOLD INCOME



SOURCE: 2000 U.S. Census

tially more households with incomes less than \$15,000 (or \$18,252 in 2007 dollars) compared to Grand Canyon Village households. Tusayan also has more households earning \$25,000–\$34,999 (\$30,420–\$42,586 in 2007 dollars) than either Grand Canyon Village and Coconino County, and it has a lower percentage of households earning \$75,000–\$149,999 (\$91,260–\$182,516 in 2007 dollars) compared to Grand Canyon Village and Coconino County. All three regions have the greatest percentage of households earning \$35,000–\$74,999 (\$42,587–\$91,258 in 2007 dollars) annually.

Economic Activity by Sector in Tusayan

The total economic output of Coconino County was estimated to be approximately \$6.3 billion in 2004 or \$6.9 billion in current 2007 dollars (Minnesota IMPLAN Group 2006). Estimated economic output for Tusayan in 2007 was calculated to be \$38.6 million or approximately 0.6% of total Coconino County output. Table 35 summarizes estimated output by sector in Tusayan.

The largest economic sector in Tusayan is the hospitality industry, producing nearly 70% of all its goods and services, followed by transportation, warehousing, and utilities, although this sector is nearly seven times smaller com-

pared to the hospitality sector. The output from agriculture/forestry, education/ health, and public administration is equally distributed at approximately \$1.6 million. Retail produces slightly less, at nearly \$1.4 million.

Tusayan businesses are located along SR 64 and represent nearly all of the commercial enterprises within Tusayan. An inventory identified 7 lodging businesses (hotels, motels, and inns), 14 food and beverage businesses (fast food and restaurants), and 7 retail or other businesses (gift shops, IMAX, tours, gas stations, and others) in this district (Dornbusch Associates 2007).

TABLE 35. ESTIMATED ANNUAL ECONOMIC OUTPUT BY SECTOR IN TUSAYAN (\$2007)

Sector	Output
Arts, entertainment, recreation, accommodation and food services	\$26,644,700
Transportation and warehousing, and utilities	\$3,943,400
Agriculture, forestry, fishing and hunting, and mining	\$1,598,700
Educational, health and social services	\$1,598,700
Public administration	\$1,598,700
Retail trade	\$1,385,500
Finance, insurance, real estate, and rental and leasing	\$852,600
Professional, scientific, management, administrative, and waste management services	\$532,900
Information	\$426,300
Estimated Total Output	\$38,581,500

Cameron Demographic Information

According to 2000 U.S. Census data, Cameron had a population of 978 in 2000 with a median age of around 23 years old. Approximately 94.7% of the population was of Native American descent, reflecting the fact that Cameron lies within the Navajo Nation. The labor force in Cameron in 2000 consisted of 275 persons, of which 236 were employed and 39 were unemployed, indicating an unemployment rate of 14.2%. One explanation for such a small labor force relative to the total population is due to the number of relatively young individuals living in Cameron. Nearly 45% of the population (438 people) are 19 years of age or younger, and 35% (339 people) are 14 years of age or younger (U.S. Census 2000).

Table 36 shows that the top three largest employment sectors were construction, retail trade, and education, health and social services sectors, which combined represent nearly 70% of total employment in Cameron.

In 2000 median household income generated in Cameron was \$24,773 (\$30,143 in 2007 dollars), with 3.3% of total households earning incomes in the top income bracket of

\$75,000 to \$99,999 per year (\$91,260–\$120,460 in 2007 dollars), while 17.1% earning incomes less than \$10,000 per year (\$12,170 in 2007 dollars).

In-Park and Regional Housing

Additional employees that would be required under the various transportation alternatives are expected to reside in a number of locations, including the park, Tusayan, Valle, Williams, and Flagstaff. Although park housing would likely be the first choice for many employees, some employees (possibly between 20 and 35) might need or choose to reside in locations outside the park. As a result, the most relevant level of analysis for housing impacts is Coconino County as a whole.

Number of In-Park and Regional Housing Units. Housing within Grand Canyon National Park consists of approximately 1,200 units (including concessioner partners) that are distributed over five geographic areas. Currently the park has 378 housing units available for NPS employees, as well as 49 mobile homes and 65 trailer pads. These units are located throughout different areas of the park, including the South Rim, North Rim, Desert View, Tuweep, and the inner canyon.

The largest housing area is Grand Canyon Village, with 229 units, including 151 single-family homes, 3 cabins, 60 multi-family homes, 7 dormitories, and trailers and trailer sites. Due to the housing shortage, over 45 housing units have been designated as shared quarters. The park has over 90 single, permanent employees who have to share their residences with other permanent or seasonal employees. In summer 2007 the park had over 50 dual career households occupying single family housing units (Utech, pers. comm. 2007).

The 2000 U.S. Census reveals that Flagstaff had 21,396 housing units and Williams 1,204. The largest number of housing units in Flagstaff and Williams are one-unit, detached housing structures. Approximately 17% of all housing units in Flagstaff were built between

TABLE 36. EMPLOYMENT BY INDUSTRY IN CAMERON (2000)

Industry	Employees	Percentage
Finance, insurance, real estate, and rental and leasing	4	1.7%
Professional, scientific, management, administrative, and waste management services	7	3.0%
Other services (except public administration)	7	3.0%
Agriculture, forestry, fishing and hunting, and mining	14	5.9%
Public administration	17	7.2%
Arts, entertainment, recreation, accommodation and food services	24	10.2%
Educational, health and social services	38	16.1%
Retail trade	53	22.5%
Construction	72	30.5%
Total Employment (2000)	236	100.0%
Estimated Employment (2007)	260	-

SOURCE: U.S. Census 2000.

NOTE: Only industries that were reported as employment figures are included in this table.

1995 and 2000, while roughly 9% of all units in Williams were built over this same period. The average number of housing units built per year between 1980 and 1989 was 20 in Williams and 510 in Flagstaff; this average increased between 1990 and 1999 to 46 units per year in Williams and 651 units in Flagstaff. New housing construction has increased by an average annual rate of approximately 0.1% per year in Williams from 1990 to 2000 and around 2.7% per year in Flagstaff over the same period. Assuming these growth rates have continued since 2000, the number of estimated housing units in Williams in 2007 would be 1,294 and in Flagstaff 25,824 units.

According to the 2000 U.S. Census, Tusayan had a total of 313 housing units. Of these, the largest numbers of housing units are classified as recreational vehicle (RV) units (83 units), with the next largest housing group consisting of structures containing between five and nine units (53 units). Nearly 42% of the housing structures were built between 1995 and 2000, adding approximately 128 housing units to Tusayan. The average number of housing units built per year in Tusayan has trended upward since 1980, from an average of 2.8 houses from 1980 to 1989, to approximately 32 housing units in the year 1999 alone. Despite this average increase in housing construction, occupancy remains high and the housing supply is quite limited. Given the relatively limited supply of land currently available for housing in Tusayan, it is unlikely that there will be any significant increases in the number of housing units in Tusayan.

According to the 2000 Census data, there were 317 housing units in Cameron. Of these, 236 housing units were occupied —195 housing units were occupied by owners, 41 by renters, and 81 were vacant. Median gross rent in 2000 in Cameron was estimated to be \$1,219 per month (or \$1,480 in 2007 dollars).

Average Household Size. In 2000 the average household size for both owner- and renter-occupied housing units in Grand Canyon Village was 2.18 persons and the total number

of households in 2000 was 651.* The average household size in Williams was 2.69 persons and 2.59 persons in Flagstaff, according to the 2000 Census. There were 1,057 households in Williams and 19,306 in Flagstaff in 2000.

According to the 2000 Census, the average household size in Tusayan was 2.38 persons, and there were 222 households. This figure is split between 102 family households and 120 non-family households.** Of the non-family households, approximately 61% (73) represent individuals living alone. Compared to Coconino County, Tusayan has a relatively greater number of non-family households, 54% of total households compared to 33% for the county. This reflects the temporary nature of residence in Tusayan, with single, transient labor representing a large proportion of the labor force.

Occupancy Rates. According to the 2000 Census, of the 791 housing units in Grand Canyon Village, 651 units were occupied and 140 were vacant. The rental vacancy rate within Grand Canyon Village in 2000 was 6.6%.

Of the 1,204 housing units in Williams in 2000, around 1,057 units were occupied and 147 were vacant. The 2000 Census indicated that of 1,057 occupied units, owners occupied 639 units and renters 418 units. The rental vacancy rate in 2000 for Williams was 7.1%. Of the 21,369 units in Flagstaff, 19,306 units were occupied and 2,090 were vacant in 2000. Of the occupied units, owners occupied 9,304 units and renters 10,002 units. The rental

* The U.S. Census defines a household as including “all of the people who occupy a housing unit” with as housing unit defined as “a house, an apartment, a mobile home, a group of rooms, or a single room occupied (or if vacant, intended for occupancy) as separate living quarters.”

** The 2000 U.S. Census defines “family households” as two or more individuals living within the same household who are related by marriage, birth, or adoption, while “non-family households” include individuals living alone or with non-relatives (i.e., roommates only).

vacancy rate in Flagstaff was 5.3% in 2000, lower than both Williams and Grand Canyon Village.

According to Census data, of the 313 housing units in Tusayan, 222 units were occupied and 91 units were vacant. Of the occupied units, owners occupied 24 units (10%), and renters 198 units (90%). The rental housing unit vacancy rate was 13.5% in 2000, and the associated rental occupancy rate was 86.5%. In comparison, Grand Canyon Village and Coconino County had rental vacancy rates around 6.5% or rental occupancy rates of approximately 93.5%.

Average Rent. According to the 2000 Census, the median monthly rental in Grand Canyon Village was \$284 in 2000 (\$346 per month in 2007 dollars), representing only 10.1% of household income for employees residing in the park. In Flagstaff the median monthly rental was \$662 in 2000 (\$814 in 2007 dollars), representing 29.6% of household income. In Williams the median monthly rental was \$466 in 2000 (\$573 in 2007 dollars), representing 25.3% of household income. The relatively lower rent associated with in-park housing may be the result of the National Park Service choosing to regulate rental rates to keep them affordable for employees.

The median monthly rent in Tusayan in 2000 was \$317 (\$386 in 2007 dollars), representing approximately 17.9% of renters' average monthly household income. Median rent in Tusayan is approximately 50% lower than the median rent of Coconino County (\$629 per month in 2000 or \$765 per month in 2007 dollars, which represents 26.8% of average household income for the county). Of the 198 occupied rental units in Tusayan in 2000, approximately 80% of the occupants paid cash rent, while around 20% paid no-cash rent. This may reflect the fact that some workers are provided room and board as part of their employment contract. Based on recent interviews with commercial operators in Tusayan, it appears that most employers, particularly lodging employers, provide

housing units for their employees at somewhat reduced rates. Non-employee private housing in Tusayan is very limited.

Average Housing Prices. The 2000 Census reported that the median price for owner-occupied housing in Flagstaff was \$161,000 and the median price in Williams was \$100,300. Regional housing prices have increased on average much faster than annual inflation. For example, the median home price in Flagstaff was estimated to be \$363,765 in 2006, which implies an average annual increase of 14.6% from 2000 to 2006.

As previously discussed, only 24 housing units in Tusayan were owner occupied in 2000. The Census reported that the median price for owner-occupied mobile homes in Tusayan was \$25,700 in 2000 (\$31,271 in 2007 dollars).

According to the Coconino County Assessors Office, land sales in Tusayan are extremely rare (Wren, pers. comm. 2007). Nearly all land is currently owned by several families and individuals who have owned the land for generations and have either leased the land to commercial operators or operate businesses on the land themselves. One 0.46-acre parcel sold in 2001 for \$250,000, resulting in a residential land value of around \$500,000 per acre in 2000 (\$586,900 in 2007 dollars), assuming equal land quality. A similarly zoned 1.03-acre land parcel in Valle, 23 miles south of Tusayan, sold in 2005 for \$10,000 (\$10,700 in 2007 dollars) (Valle, AZ 2007). This parcel was directly off of SR 64 and was zoned for multi-residential use, with a housing density limit of 10 units per acre, while the parcel in Tusayan was zoned for 20 units per acre. Therefore, even if the parcel in Valle was zoned for a 20 unit maximum, thus potentially doubling its value to \$20,000 (\$21,400 in 2007 dollars), the Tusayan land value would be 27 times greater relative to Valle.

Housing Constraints. According to the 1995 Coconino County *Tusayan Area Plan*, the private land base in central Tusayan consists of approximately 144 acres (Coconino County 1997). Approximately 33 acres are zoned for

varying types of residential uses and approximately 7 acres for “Mobile Home Park” use, for a total of 40 acres of land zoned for housing purposes. This represents the potential supply of housing land in Tusayan; however the effective supply is this total housing acreage minus the amount of developed land where housing units currently exist. Most of the residentially zoned land is currently developed on the west side of SR 64 while the east side is relatively undeveloped.

The primary constraint on development of additional housing units in Tusayan is that nearly all residentially zoned land is owned by private individuals and families who view this land as much too valuable for housing developments. These landowners see a far greater financial return associated with commercially developed land due to the high volume of Grand Canyon visitor traffic and the proven profitability of these commercial enterprises (Dornbusch Associates 2007). Employee housing is viewed as a far less profitable enterprise with potentially greater risks. The *Tusayan Area Plan* verifies these and other constraints on housing development in Tusayan, which “include the limited amount of private land available for development, the absence of a local community water source and limited water availability, and the landowners’ priority for developing commercial uses first.” In addition, the town is surrounded by national forest system lands that greatly

limit outward expansion. Therefore, although residentially zoned land does exist in Tusayan, housing is currently constrained, and it is unlikely that there will be many new housing units for new employees in the near future.

Tusayan Employment

Labor Force. According to the 2000 Census, Tusayan had a labor force of 388 individuals out of a total population of 562 people. The Tusayan workforce fluctuates with seasonal visitation to the Grand Canyon; employment is higher during the summer, lower in the winter. This fluctuation is not captured in the Census statistics because the survey was completed in March 2000, before the peak season. Therefore, the labor force may be underestimated without summer employment levels.

In 2000, 362 persons were employed out of a labor force of 388 and 26 individuals were unemployed, translating into an unemployment rate of 6.7%. The unemployment rate in Tusayan is greater than that observed for Grand Canyon Village, with an unemployment rate of only 2.0%, but roughly the same as that found in Coconino County at 6.9%. Most employees in Tusayan work full time year-round, while a minority of the workforce works part time throughout the year (Dornbusch Associates 2007).

In terms of modes of travel to work, of the 362 employed individuals in Tusayan, roughly 43% drove alone, 2% carpooled, and 55%

TABLE 37. OCCUPATION BY REGION

Occupation	Tusayan		Grand Canyon Village		Coconino County	
	Number	Percentage	Number	Percentage	Number	Percentage
Management, professional, and related occupations	85	23.5%	245	22.8%	19,309	34.8%
Service occupations	136	37.6%	336	31.2%	10,610	19.1%
Sales and office occupations	76	21.0%	282	26.2%	14,240	25.7%
Farming, fishing, and forestry occupations	4	1.1%	5	0.5%	274	0.5%
Construction, extraction, and maintenance occupations	6	1.7%	113	10.5%	5,548	10.0%
Production, transportation, and material moving occupations	55	15.2%	95	8.8%	5,529	10.0%
Total Employment (2000)	362	100%	1,076	100%	55,510	100%
Estimated Total Employment (2007)	400	-	1,186	-	61,184	-

SOURCE: U.S. 2000 Census.

walked to work. The mean travel time to work was 5.4 minutes, indicating that most employees lived near their workplace. The 2007 employment level in Tusayan is estimated at 400 individuals.

Employment by Occupation and Sector.

Table 37 shows that the largest number of employees in Tusayan work in service occupations, which reflects Tusayan's tourism based economy. This percentage is similar to Grand Canyon Village, most likely due to the number of park concessioners who employ workers in service type occupations, including workers in lodging, retail, and food and beverage service sectors. Service occupations are noticeably lower in Coconino County as a whole, representing around 19% of the labor force.

The proportion of workers in management, professional, and related occupations is quite similar in Tusayan and Grand Canyon Village, while the proportion of workers in these types of occupations is somewhat greater for Coconino County as a whole, likely reflecting the inclusion of the more developed and economically diverse cities of Williams and Flagstaff. Construction and maintenance occupations are approximately five times greater in the Grand Canyon Village and

Coconino County compared to Tusayan, where land is limited. Grand Canyon Village has substantially more people employed in maintenance operations than in Tusayan, reflecting a considerably more diverse scale of operations on the South Rim. At around 15%, the proportion of production, transportation, and material-moving occupations was greater in Tusayan relative to either Grand Canyon Village or Coconino County, which likely reflects workers who are employed at Grand Canyon National Park Airport and/or with a helicopter/airplane tour company, such as Papillion Air Tours.

Table 38 shows the importance to the Tusayan economy of the arts, entertainment, recreation, accommodation, and food service sector. It is the largest employment sector (nearly 70% of total employment), followed by transportation, warehousing, and utilities (10% of employment). Agricultural, forestry, educational, health, and public administration sectors are all evenly distributed at around 4% for each category. Retail trade, primarily in the sale of Grand Canyon related souvenirs and including American Indian arts and crafts, employs 3.6% of Tusayan's labor force.

The hospitality industry, represented by the

TABLE 38. REGIONAL EMPLOYMENT BY INDUSTRY

Industry	Tusayan		Grand Canyon Village		Coconino County	
	Number	Percentage	Number	Percentage	Number	Percentage
Arts, entertainment, recreation, accommodation and food services	250	69.1%	642	59.7%	9,035	16.3%
Transportation and warehousing, and utilities	37	10.2%	43	4.0%	2,991	5.4%
Agriculture, forestry, fishing and hunting, and mining	15	4.1%	7	0.7%	957	1.7%
Educational, health and social services	15	4.1%	92	8.6%	14,918	26.9%
Public administration	15	4.1%	77	7.2%	3,754	6.8%
Retail trade	13	3.6%	97	9.0%	7,308	13.2%
Finance, insurance, real estate, and rental and leasing	8	2.2%	5	0.5%	2,167	3.9%
Professional, scientific, management, administrative, and waste management services	5	1.4%	30	2.8%	3,290	5.9%
Information	4	1.1%	4	0.4%	851	1.5%
Construction	0	0.0%	44	4.1%	4,265	7.7%
Manufacturing	0	0.0%	7	0.7%	2,881	5.2%
Wholesale trade	0	0.0%	2	0.2%	910	1.6%
Other Services (except public administration)	0	0.0%	26	2.4%	2,183	3.9%
Total Employees (2000)	362	100%	1,076	100.0%	55,510	100.0%
Estimated Total Employees (2007)	400	-	1,186	-	61,184	-

SOURCE: U.S. 2000 Census

arts, entertainment, recreation, accommodation and food services, is larger in Tusayan than in Grand Canyon Village, where it accounts for around 60% of employment. However, the importance of the hospitality sectors for both Tusayan and Grand Canyon Village can be seen when compared to this sector in Coconino County, where it represents only 16% of the county's labor force, or around three to four times lower than Tusayan and Grand Canyon Village. Approximately 4.1% of employees (about 15 people) in Tusayan are employed by the public sector. According to the U.S. Forest Service, approximately 10 permanent USFS staff plus 5 part time staff work and reside in a 29-unit housing facility just north of Tusayan in the Tusayan Ranger District. The USFS housing compound also houses 7 Federal Aviation Administration staff, 2 county sheriff employees, 1 State Highway Patrol employee, and 3 seasonal NPS employees (Dorsey, pers. comm. 2007). Transportation employment, as previously discussed, is likely greater in Tusayan due to employment associated with air tours and the Grand Canyon National Park Airport. Employment within the retail sector is substantially lower in Tusayan, at 3.6%, compared to retail employment in Grand Canyon Village (9.0%) and Coconino County (13.2%). In most of the remaining sectors, Tusayan employs proportionally fewer workers than Grand Canyon Village and Coconino County.

The largest employers within the park are the National Park Service and Xanterra Parks & Resorts, a concessioner operating food and beverage and lodging concessions within the park. In Tusayan the largest employers are the hotels and motels in town. Other employers, as described above, include the U.S. Forest Service, Federal Aviation Administration, and County Sheriff staff.

Average Wages by Industry. The Arizona Department of Economic Security estimates wages in Arizona by occupation, industry, and location. Since wages are not reported for geographic regions as small as Tusayan, the next best measure of wages prevailing in Tu-

sayan is an examination of Coconino County wages. Table 39 shows Coconino County wage rates for each industry in Tusayan.

Tusayan's leading industry — recreation and accommodation services — paid the lowest wage rates compared to all other industries, and had the second slowest growth between 2000 and 2005, increasing at an average annual rate of about 1.3%. The 2005 average hourly wage rate in Tusayan was estimated at \$12.02 (\$12.95 in 2007 dollars) compared to an average 2005 wage rate of \$14.67 per hour (or \$15.69 in 2007 dollars) for Coconino County (Dornbusch Associates 2007).

Tusayan Tourism

Hotel Occupancy. Hotel occupancy rates follow a typical pattern that is closely correlated with seasonal visitation to Grand Canyon National Park. The peak visitor season is the summer, the shoulder season are spring and fall, and the off-peak season is winter. Average occupancy is lowest in Tusayan during December, January, and February, ranging from 23% to 34%. Occupancy increases March through May (65% to 75%), while the peak occupancy period is June through August (greater than 80%). Hotel

TABLE 39. COCONINO COUNTY NOMINAL HOURLY WAGE RATES BY INDUSTRY

Sector	2000	2005	Compound Annual Growth Rate
Arts, entertainment, recreation, accommodation and food services	\$9.18	\$9.78	1.3%
Transportation and warehousing, utilities	\$15.35	\$18.28	3.5%
Agriculture, forestry, fishing and hunting, mining	\$12.23	\$14.73	3.8%
Educational, health and social services	\$13.83	\$16.66	3.8%
Public administration	\$17.58	\$19.89	2.5%
Retail trade	\$10.52	\$11.71	2.2%
Finance, insurance, real estate, rental / leasing	\$12.91	\$17.74	6.6%
Professional, scientific, management, administrative, and waste management services	\$12.86	\$18.70	7.8%
Information	\$17.86	\$18.61	0.8%

SOURCE: Arizona Department of Economic Security; U.S. Bureau of Labor Statistics; Dornbusch Associates 2007.

occupancy rates then decline slightly during September and October (Dornbusch Associates 2007).

Average daily room rates are closely correlated with occupancy, as rates tend to increase with demand during summer. In 2006 the average daily room rates during June, July, and August were around \$120 per night, while average rates during December, January, and February were around \$75 per night, a 37.5% decline in room rates from the peak months.

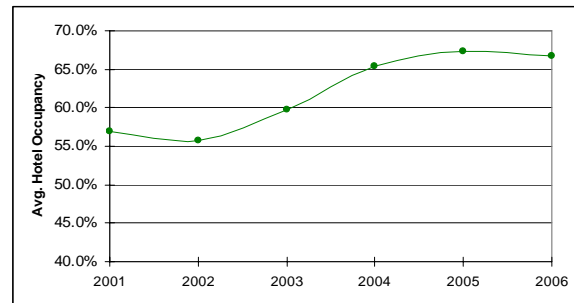
As shown in Figure 24, occupancy rates declined slightly in 2002, likely due to the economic effects of 9/11 on U.S. tourism and the onset of a general recession that year. Occupancy steadily increased from 2002 to 2006 at an average annual rate of 4.6% or a net increase of 11%. In 2006 occupancy was 66.7%, about the same as in 2005 when it was 67.4%.

According to Smith Travel Research, occupancy has expanded in September and October (Smith Travel Research 2007). For example, from 2001 to 2006 September occupancy rates increased from 62.7% to 85.5%, representing an average annual increase of 6.4%. During the same period October occupancy rates increased from 56.2% to 79.0%, an average annual increase of 7.1%. Occupancy rates have steadily increased in October for every year from 2001 to 2006, indicating a consistent trend of more visitors lodging in the fall shoulder season.

Average annual daily room rates in Tusayan rose from approximately \$90 to \$108 from 2001 to 2006 and generally tracked with changes in occupancy over this period. Average room rates declined slightly in 2001, corresponding to the drop in occupancy. From 2002 to 2006 room rates increased at an average annual increase of 5.0%, outpacing average regional inflation during this period of 3.2%, suggesting real growth in lodging demand in Tusayan.

Average Visitor Length of Stay. The average length of stay for overnight visitors at hotels outside the park is approximately 2 days and 2

FIGURE 24. AVERAGE ANNUAL OCCUPANCY IN TUSAYAN, 2001 TO 2005



nights (Michigan State University 2005). This was confirmed by Tusayan hotel managers, who estimated the average length of stay is between 1.5 and 2 nights (Dornbusch Associates 2007). Lodgers made an average of two trips into the park during a typical stay (Michigan State University 2005).

Average Spending per Party Night. The average party size for visitors staying outside the park was approximately 2.8 persons (Michigan State University 2005). Average spending per night was estimated to be \$272, or approximately \$97.14 per party member per night. This study estimated that approximately 15% of expenditures would be inside the park, and the remaining 85% outside the park (see Table 40).

Park Concessioners

Xanterra Parks & Resorts operates all lodging in the park, including El Tovar Hotel; Kachina/Thunderbird Lodges; Bright Angel,

TABLE 40. AVERAGE SPENDING PER PARTY NIGHT BY EXPENDITURE CATEGORY

Expenditure Category	Proportion of Expenditure	Amount Spent per Night
Hotel, Motel, Cabin or B&B	38%	\$103
Restaurants & Bars	19%	\$52
Groceries, take-out food/drinks	4%	\$10
Gas & oil	5%	\$14
Local Transportation	11%	\$30
Admissions & fees	10%	\$26
Souvenirs and other expenses	13%	\$36
Total	100%	\$272

SOURCE: Michigan State University 2005; Dornbusch Associates 2007.

Maswik, and Yavapai lodging complexes; Phantom Ranch; and Trailer Village. Xanterra also operates a number of food and beverage establishments, most of which are at the lodging facilities in Grand Canyon Village, as well as snack bars at Desert View and Hermits Rest. Xanterra also operates a number of general merchandise and retail stores within the park. Most of Xanterra's large-scale concession operations are located at Grand Canyon Village.

Delaware North operates the Canyon Village Marketplace, a general store that provides groceries, camping supplies, and a deli.

Verkamps operates Verkamp's Curios, a large gift and souvenir shop offering a variety of Native American crafts and located adjacent to El Tovar Hotel in Grand Canyon Village.

The Grand Canyon Association is a nonprofit cooperating association that operates a number of bookstores within the park. The association's primary objective is to support park educational and interpretive programs. The association also provides funds to the National Park Service to support ongoing scientific and cultural research.

Paul Revere Transportation provides shuttle bus service within the Park on behalf of the National Park Service.

Environmental Consequences

Methodology and Assumptions

The following sections describe the quantitative analysis that was used to determine economic impacts of the transportation plan, the inputs used for the analysis, and the organization and meaning of the data presented in the analysis by alternative.

IMPLAN Inputs and Outputs

The IMPLAN model was used to estimate impacts to the regional economy based on changes in expenditures in the study region. More specifically, both economic and employment impacts associated with estimated changes in visitor and transportation employ-

ee spending were determined. These expenditures are multiplied throughout the economy, generating demand for other related goods and services, and resulting in an expansion of economic output or overall goods and services in the region. IMPLAN was also used to assess the impacts associated with greater visitor spending within the park associated with increases in average visitor length of stay.

IMPLAN calculates four types of impacts to the economy — direct, indirect, induced, and total or cumulative impacts. Secondary effects are also discussed, which are the sum of indirect and induced effects. Combined effects are the sum of direct and secondary effects. These types of impacts are defined in the "Organization of Impacts" section below.

The level of visitor spending under each alternative was determined and then entered into IMPLAN to generate the impacts to the regional economy. Similarly, impacts related to changes in employment were estimated by inputting the total number of transportation employees required to operate the transportation improvements under each action alternative. IMPLAN then calculated transportation employment impacts to economic output and employment in the local economy. The following sections describe the process by which changes in spending by visitors and transportation employees were input into the model.

Changes in Visitor Spending. Changes in visitor spending are assumed to occur mainly as a result of changes in the average length of stay at lodging in Tusayan. Changes in the length of stay are correlated with the relative ease of access to the South Rim. Greater congestion and wait times both on entering the park and once inside the park would be expected to generally lower the length of stay for some individuals who would be discouraged by the congestion, crowds, and wait times. In addition, the park's reputation for congestion might also be limiting both the number of nights stayed in Tusayan or simply discouraging prospective park visitors from coming at

all. Therefore, the percentage of current Tusayan lodging guests who might increase their length of stay was estimated under each alternative.

These estimates were based on 2006 lodging demand data and interviews with hotel managers and owners in Tusayan, Williams, and Valle. They were asked to provide estimates of the percentage of current guests who might stay one additional night due to transportation improvements associated with each alternative (Smith Travel Research 2007). Tusayan hotel managers could not be specific regarding estimates for each alternative, but they indicated that alternative C, which emphasizes parking in Tusayan, would likely be associated with the largest increases in length of stay, followed by alternative B. However, they estimated that the vast majority of guests (between 85% and 95%) would not alter their length of stay due to the proposed transportation improvements.

Lodging operators in Williams and Valle did not offer specific comments on how the transportation improvements under each alternative would affect visitor stays at their locations. Most hotel managers interviewed in Williams described the positive impact that the Grand Canyon Railway, whose main station is in the center of Williams, had on the hospitality industry in Williams. It appears that a relatively large number of lodging guests in Williams visit the South Rim by using the Grand Canyon Railway, particularly during the peak season. Since railway ridership has generally increased in recent years, and a growing number of visitors staying in Williams are entering the park on the train, transportation improvements under each alternative would have marginal impacts on how long park visitors stayed in Williams because they are basically unaffected by vehicular congestion.

Length of stays would also be governed by other factors, including weather and available recreational activities in the region. Ease of access encompasses avoiding congestion

when entering the park, as well as within the park, and the convenience associated with riding a shuttle rather than driving. Hotel managers in Tusayan indicated that alternative C would likely provide the greatest ease of access for their guests, followed by the alternative B, which would provide a smaller parking area and reduced shuttle bus capacity and frequency. Under alternative D access to the park would still be improved by reducing entry and in-park congestion by widening lanes along the South Entrance Road and at the entrance station and by vastly expanding parking opportunities at Canyon View Information Plaza. Based on estimates provided by hotel managers and owners in Tusayan, increases in length of stay determined for each alternative are shown in Table 41.

The estimated number of additional room-nights was then used to extrapolate increases in visitor spending by spending category in Tusayan. To estimate visitor expenditures associated with increased lodging stays, previous studies were used that profiled visitor expenditures for visitors staying outside the park (Michigan State University 2005). Applying these spending estimates to the additional number of hotel stays provided an approximate level of spending under each alternative. This level of visitor spending was then entered into IMPLAN as an expenditure event and the impacts analyzed.

Potential visitor spending that could occur within the park and therefore impact park concessioners was also considered. It was estimated that 15% of total increased visitor spending arising from longer stays in Tusayan would flow to park retail and food/beverage operations, while 85% of the increased spending would be in Tusayan. The number of

TABLE 41. ESTIMATED CHANGES TO HOTEL LENGTH OF STAY AND OCCUPANCY

	Guests Who Would Stay One More Night	Increase in Occupied Room-Nights
Alternative B	8.0%	4.0%
Alternative C	10.0%	5.0%
Alternative D	6.0%	3.0%

nights that guests stayed in Tusayan would translate into additional park entries, where visitors would likely purchase goods and services from park concessioners. Impacts to concession lodging operations in the park are not expected because lodging is at near 100% occupancy during the summer months.

Spending impacts from potential longer stays within the park were also estimated. Long stays in the park would arise from two primary sources — increases in time spent waiting for and riding shuttle buses and time spent at Canyon View Information Plaza using the additional facilities (theater, food and beverage services, bike rental facility). To estimate visitor spending impacts, the increase in length of stay at Canyon View Information Plaza is most relevant to this impact analysis. It was estimated that average visitor length of stay at Canyon View Information Plaza would increase by 30 minutes. This figure was then applied to average spending per hour estimates for day and overnight park visitors. Estimates of hourly spending by each party were based on visitor spending profiles developed in previous studies and adjusted for this spending on new services at Canyon View Information Plaza. This resulted in an average spending per visitor hour of \$5.50.

Assuming that the new services at Canyon View Information Plaza would operate year-round, longer stays would result in an additional \$1.93 million, with a total spending impact of \$2.85 million. Since the new operations are common to all action alternatives, impacts from longer stays within the park are added to the impacts of each alternative. Table 42 summarizes impacts arising from longer visitor stays within the park.

Visitor spending impacts were also estimated for Cameron, assuming that approximately 2% of South Rim visitation would be rerouted through the East Entrance independent of the action alternatives. Table 43 indicates that a total of 72.3% of all park visitors entered through the South Entrance Station in 2006, either by bus or car. In comparison only

TABLE 42. ANNUAL VISITOR LENGTH OF STAY SPENDING IMPACTS WITHIN THE PARK

	Direct Change	Secondary Change	Total Change	County Change
Number of Employees	27	10	37	0.052%
Labor Income	\$650,023	\$295,578	\$945,601	0.036%
Output	\$1,931,114	\$922,609	\$2,853,723	0.041%
Housing	18	7	25	0.043%

TABLE 43. 2006 VISITATION BY ENTRANCE TO GRAND CANYON NATIONAL PARK (PERSONAL VEHICLES AND BUSES)

	Vehicle Entries	Relative Percentage
South Entrance	3,099,800	72.3%
East Entrance	672,000	15.7%
North Rim Entrance	224,900	5.2%
Tuweep	7,500	0.2%
Total Vehicle Entries	4,004,200	93.4%
Total Entries	4,285,700	100.0%

SOURCE: NPS Public Use Statistics database.

15.7% of all visitors entered through the East Entrance during 2006.

It was assumed that roughly 2% of the visitors entering through the South Entrance (in 2006, 68,200 visitors or approximately 25,260 visitor parties based on an average party size of 2.7) would either lodge in hotels within Cameron or pass through the South Rim but stop in Cameron. Total annual expenditures were estimated for each party type based on visitor spending profiles provided in previous South Rim visitor spending studies (Michigan State University 2005).

Changes in Employment and Housing.

Employee estimates under each alternative include the number of employees associated with expanded South Rim shuttle bus service as well as shuttle bus service from Tusayan under alternatives B and C and additional NPS interpretive ambassador positions. Employees were divided into two broad categories — transportation employees (new employees for transportation operations) and secondary employees (those whose jobs are a result of changes in visitor spending as well as transportation employee spending in the local economy).

Employee spending impacts would largely depend on where these employees would live. Proposed NPS housing projects could provide housing for some transportation employees, but some portion of new employees would be housed in Tusayan, Valle, or possibly Williams or Flagstaff. As previously discussed, the limited availability of housing in Tusayan could present a constraint. Employee spending impacts would occur in a specific location and would correlate to the percentage of employees actually residing in that location. Thus, the total impact associated with transportation and secondary employee spending would likely be divided among the various communities where employees lived. Because all transportation employees would likely reside within Coconino County, the total resulting impact to additional employment and economic output is identified and then compared to existing county employment and economic output levels.

Cameron, about a one-hour drive east of the park, would likely not be a viable alternative for transportation employee housing because of limited services. Williams, a similar distance and travel time to the park, would probably be the preferred residential location for transportation employees because of the greater level of services and amenities compared to Cameron, unless the new employees already live in Cameron. Cameron has a potential workforce that could fill some new jobs created by the transportation improvements.

Period of Analysis. Since congestion occurs primarily during the peak summer months, the effects of traffic improvements would be most relevant during this period. Any changes in length of stay and visitor spending would likely be observed from June through August, when congestion is at its worst. When congestion is lower in the shoulder and off-peak seasons, additional parking and transportation improvements would not influence the length of stay or visitation decisions in any appreciable way, either in the park or gateway communities.

From June through August lodging within the park is at capacity, and many guests typically turn to Tusayan (and other communities) for overflow lodging. However, during off-peak months, in addition to relatively lower congestion levels, park lodging is usually not at capacity, giving visitors the option of staying in the park rather than in Tusayan, which is what most visitors would prefer. Therefore, the number of occupied room-nights and thus spending in the park, Tusayan, and other gateway communities would not be expected to change substantially outside the peak season.

For these reasons, visitor spending impacts are confined to the peak period of park visitation, June through August.

Organization of Impacts

The economic analysis for each alternative identifies both short-term capital expenditures and long-term economic activity. Capital expenditures would result from both capital spending at the county level and the total estimated annual spending by construction employees within Tusayan and the park. Capital expenditures typically include expenditures to acquire or improve property, facilities, and equipment. It is assumed that capital expenditures under each alternative would result in short-term economic impacts outside the Tusayan area. Because no construction equipment or material-producing industries exist in Tusayan, spending on construction materials would occur outside of Tusayan in other areas of Coconino County, where construction-related industries exist.

Where spending impacts would occur would be a function of the location of the firms awarded the construction contracts, the location of their employees, and the location of the preferred material/equipment suppliers and subcontractors. Some capital expenditures would arise in Tusayan from construction worker spending during the workday. Impacts from capital expenditures related to the park, Tusayan, and Coconino County are identified in two tables in the construction-

related analysis. Changes to tourism and housing were not analyzed for capital spending, as these would not change as a result of capital expenditures either in Tusayan or in Coconino County.

The level of economic activity associated with the implementation and operation of transportation improvements in each alternative is also measured and described in the analysis. These impacts result from changes in visitor spending and employment, and they would be long-term because they represent potentially new stabilized or equilibrium levels of regional economic activity. Tusayan is assumed to be the community that would be most affected as it is the gateway community closest to the South Rim and its businesses are oriented around and dependent on serving park visitors.

The expected long-term changes in economic activity under each action alternative are shown in the following tables for each alternative:

- *tourism* — impacts to the tourism sector, specifically occupancy and the average length of stay.
- *employment* — changes in baseline employment, labor income, housing, and economic output associated with the additional economic activity from new transportation operations, including transportation employee expenditures in the region
- *economic goods and services or “output”* — visitor spending impacts associated with greater visitor length of stay in Tusayan, which includes changes to baseline employment, labor income, housing, and economic output associated with additional visitor spending in the region
- *total combined impacts* — impacts to employment, labor income, housing, and economic output associated with transportation improvements for the given action alternative.

Impact estimates are based on the full build-out of the proposed transportation improvements under each action alternative and are reported in 2007 dollars.

In this analysis, impacts are divided into three categories:

- *direct effects* — changes in sales, income, and jobs in those businesses or industries that directly receive the visitor and employee spending.
- *secondary effects* — the sum of indirect effects (changes in sales, income, and jobs from industries that supply goods and services to businesses that sell directly to visitors and employees) and induced effects (changes in economic activity in the region generated by household spending of income earned through the direct or indirect effects of the visitor and employee spending)
- *total effects* — the sum of the direct, indirect, and induced effects and representing the total or combined impact to the economy.

Each long-term impact table reports direct, secondary, and total effects.

Study Area

The area most likely to be affected by the proposed transportation improvements is Tusayan. However, this analysis also considers impacts to other locations in the region, including potential impacts to park concessioners in Grand Canyon Village and Canyon View Information Plaza, the community of Valle (about 20 miles south of Tusayan), Flagstaff, Williams, and Cameron.

Impacts arising from transportation improvements would primarily impact visitors and businesses in Tusayan rather than visitors and businesses in the park for the following reasons:

- Some increases in park visitation associated with the transportation improvements would be expected to occur from expanded day visitation by visitors stay-

ing in Tusayan, the closest gateway community to the South Rim. Tusayan itself is the potential location for a number of transportation improvements, including expanded parking and shuttle bus operations for the National Park Service. Tusayan will be the gateway community that would be most likely impacted by the transportation improvements.

- Parking locations under each alternative would not be expected to impact concessioner lodging operations, as in-park lodging is at 100% capacity during the summer. Even if transportation improvements resulted in efficient access to the park and made staying in Tusayan more attractive, visitor preferences to stay in the park would likely outweigh such access considerations. Thus, in-park concession lodging operations would not be noticeably impacted by transportation improvements, and lodging occupancies would be expected to remain at or near capacity during the peak season.
- Visitors staying within the park already have the option to park near their lodging and use the South Rim shuttle bus service or walk to different points of interest within the park. These visitors do not need to drive into the park each day of their trip and then find parking, as do day visitors. Thus, visitors staying overnight in the park do not experience the same level of daily traffic congestion that day visitors do. Therefore, lodging operators within the park would not expect to see any appreciable changes in guests' length of stay.
- The Michigan State University study (2005) on visitor spending indicated that visitors staying outside the park spent a large percentage of their daily expenditures in gateway communities such as Tusayan. This spending pattern, combined with the likelihood these visitors would be most influenced by

the alternatives (as discussed above), suggests that most spending impacts would involve changes in spending within Tusayan to a greater extent than changes in spending within the park. However, longer visitor stays in the park associated with new services at Canyon View Information Plaza, would primarily impact the park. Therefore, Tusayan is the primary gateway community considered in this analysis, while impacts arising from increases in visitor length of stay within the park are also considered.

However, businesses in the park would be affected by transportation improvements that would result in more visitors, tending to increase in-park visitor spending, primarily at concession food and beverage and retail operations. Thus, potential impacts to concession operations under each alternative were determined by examining the proportion of additional visitor spending within the park. Increases in the average length of stay within the park due to the new bike rental, theater, and food and beverage services at Canyon View Information Plaza would also contribute to spending impacts within the Park.

Impact Thresholds

The following impact thresholds were defined:

- *Negligible* — Effects would be below detectable levels or detectable only through indirect means and with no discernible effect on the character of the social and economic environment.
- *Minor* — Effects would be detectable, but localized in geographic extent or size of population affected and not expected to alter the character of the established social and economic environment.
- *Moderate* — Effects would be readily detectable across a broad geographic area or segment of the community and

could have an appreciable effect on the social and economic environment.

- **Major** — Effects would be readily apparent, affect a large segment of the population, extend across the entire community or region, and would likely have a substantial effect on the social and economic environment.

Nature of the Impact

Adverse Impact. An adverse impact would diminish the established social and economic environment.

Beneficial Impact. A beneficial impacts would improve the established social and economic environment.

Duration

Short-term Impact. Impacts from capital expenditures during project development would cease to occur after the completion of the transportation improvements.

Long-term Impact. Impacts would result in a new stabilized level of economic activity or equilibrium levels associated with transportation improvements.

Alternative A: No Action

Direct / Indirect Impacts:

Table 44 describes the existing conditions in Tusayan and Coconino County. Impacts of the action alternatives are measured, in part, in terms of changes to these baseline indicators.

Tourism. Under the no-action alternative baseline occupancy rates for June through August would continue to reflect 2006 occupancy levels of approximately 86.0%. Occupancy rates in Tusayan would continue to be lowest in the winter months when poor weather reduces visitation to the Grand Canyon and lodging occupancy within the park is relatively low. Occupancy rates in the region would increase during April and May and reach peak occupancy during the summer, similar to current conditions. During

TABLE 44. ALTERNATIVE A: BASELINE ECONOMIC INDICATORS

	Tusayan	Coconino County
Estimated 2007 Total Economic Output	\$38,582,000	\$6,915,770,000
Estimated 2007 Employment	400	71,600
Average Household Size	2.38	2.78
Employees per Household	1.5	1.5
Total Housing Units	313	58,104
Average Current Hotel Occupancy — June–August	86.0%	79.2%
Average Current Length of Stay (days/nights)	2.0	n/a*
Tusayan Labor Income	\$14,537,000	\$2,605,681,000

SOURCES: 2000 U.S. Census; IMPLAN; 2004 Coconino County Data; Smith Travel Research 2007.

* No data were available reporting average length of stay for Coconino County.

summer demand for lodging within the park would continue to far exceed supply and would remain at capacity at nearly 100% occupancy. Therefore, Tusayan would continue to satisfy a relatively large portion of the summer overflow lodging demand in the region, with an average length of stay of two nights for most visitors.

The ongoing lack of visitor parking within the park (as well as congestion at the South Entrance Station during peak visitation periods and as annual visitation grows over time) could result in a negative visitor experience and discourage some visitors from visiting the park or completing their average stay. These factors would most likely result in local, long-term, negligible to minor, adverse impacts to hotel occupancy or the average length of stay.

Employment. Employment would continue to remain fairly stable, averaging approximately 400 employees in Tusayan as in 2007. Employment would be primarily in the hospitality industry and would continue to fluctuate with the tourism seasons, with businesses increasing part-time employment during the spring and summer and then reducing the number of employees during the winter. Factors such as the lack of available parking and congestion at the South Entrance Station

would not affect employment levels, resulting in local, long-term, negligible, adverse impacts to local employment.

Housing. Employers, primarily hotel operators, would continue to provide the majority of housing in Tusayan, where housing growth would remain constrained by the availability of residentially zoned land. In-park housing would also remain constrained by the high occupancy of existing housing units. However, the no-action alternative would not further constrain or influence the availability of housing either in the park or Tusayan, resulting in local, long-term, negligible, adverse impacts.

Economic Output. Total annual economic output in Tusayan is estimated to be approximately \$38.6 million in 2007 dollars, with nearly 70% of the economy composed of arts, entertainment, recreation, accommodation, and food service industries. This dependence of many local Tusayan businesses on recreation and tourism related to park visitation would continue to dominate the local economy into the future. As described under the tourism section above, the lack of available parking, congestion, and other factors associated with the no-action alternative could discourage some visitors from visiting the park. However, these impacts to available goods and services within Tusayan and the county would be minimal and would result in local, long-term, negligible, adverse impacts.

Cumulative Impacts

Projects that could result in cumulative impacts to the social and economic environment are located in Tusayan, the park, or on adjacent lands that have the potential to impact these communities and would include those actions that would influence employment, labor income, economic output, tourism, housing, and visitor spending behavior. Trail projects that would have cumulative impacts under the no-action alternative include the Tusayan bike trail. The construction of the 36-mile Tusayan bike trail would offer visitors simply more recreational options that would

attract additional biking enthusiasts to the area, particularly in Tusayan, and could slightly increase visitation and length of stays in the region. With the trailhead located in Tusayan, any additional visitors would lodge in-town and could increase visitor spending on local businesses, increasing economic output and employment. These increased lengths of stay and visitor spending would result in local, long-term, negligible, beneficial impacts.

Roadway or visitor use access projects that would have cumulative impacts include improvements at the South Entrance Station, East Entrance Station, and Desert View Drive. The lane expansions between Tusayan and the South Entrance Station along SR 64 would generally reduce traffic congestion and wait times for visitors entering the park. If visitation increased through the East Entrance by promoting this park entrance, the improvements at Desert View and associated road rehabilitation might provide the infrastructure necessary to allow greater efficiency in visitor entry during the summer. Assuming that vehicular congestion during the peak season now discourages some level of visitation, these improvements could allow greater total visitation to the South Rim. Increased numbers of visitors and reductions in vehicular congestion and wait time related to the South Entrance Road improvements could increase stays in Tusayan, resulting in increased visitor spending in the park as well as Tusayan. Some level of construction worker expenditures on food and beverages could also result. These factors would result in short- and long-term, minor to moderate, beneficial impacts to economic output, employment, labor income, and tourism within Tusayan and the park.

The increase in the park housing supply resulting from the construction of 64 additional housing units within the park south of the Albright Training Center and the planned construction in the next two years of 40 trailer pad sites (20 of which would be available for park staff and 20 for transit staff) would tend to reduce housing pressure in the surrounding

communities of Tusayan, Valle, Flagstaff, and Williams. Impacts would depend on whether the housing was occupied by park employees currently residing in the park or whether new employees and/or employees currently living elsewhere occupied these units. If occupied by new or outside employees, all or some portion of employee spending would shift from those communities to the park, resulting in local, long-term, minor, beneficial impacts to economic output and employment in the park. If the housing was occupied by existing employees there would likely be no noticeable impacts. Some spending in the park by construction workers for food and beverage items, particularly during lunch periods, would result in local, short-term, minor, beneficial impacts to economic output and employment within the park. Greater levels of spending on construction equipment and supplies would likely occur outside the region but within Coconino County. These impacts would represent local and regional, short-term, negligible, beneficial impacts to output, employment, and labor income within Coconino County.

Other projects that would be expected to influence the economic environment include land conveyance for the Grand Canyon Unified School District, the Canyon Uranium Mine, implementation of the Grand Canyon National Park *Airport Master Plan Update*, and the incorporation of Tusayan. The school land conveyance and the development of school facilities would represent a substantial regional construction project, resulting in local and regional, short-term, minor, beneficial impacts to economic output, employment, and labor income throughout the county and in Tusayan.

The potential operation of the Canyon Uranium Mine 6 miles south of Tusayan and related construction worker spending could result in a long-term, minor to moderate, beneficial impact to economic output, employment, and labor income in Tusayan, depending on the level of operations and yield of the mine and the degree of construction.

Mine operations would also likely increase the demand for housing in Tusayan, Valle, and other regional areas.

Improvements planned for the Grand Canyon National Park Airport would increase current operating capacity. The planned capital improvements would translate into greater construction expenditures that would primarily impact other areas within Coconino County, rather than Tusayan. Some impacts arising from construction worker spending would be expected in Tusayan, particularly spending on food and beverages. Residential housing could expand in Tusayan for state and federal employees under long-range capital improvements. This project would have local and regional, short- and long-term minor beneficial impacts to economic output, employment, labor income, and housing in Tusayan and Coconino County.

Incorporation of Tusayan could result in substantial changes to the socioeconomic landscape. If incorporated, the town would likely need to provide a range of new public services, which might include police/fire protection, road maintenance, planning and zoning, parks and recreation, libraries, magistrate courts, and other services. Capital projects to develop infrastructure to support these facilities could be sizable, depending on the level of services the town chose to implement. Incorporation might also allow the town to rezone land parcels within city limits in ways that best suited community/economic development and planning objectives. This could also result in sizeable changes to current land use patterns and economic activity, including the expansion of commercial and housing possibilities in Tusayan. The demand for new employees to administer and provide new services would also increase. The economic impacts arising from incorporation would occur gradually over an extended period of time. Incorporation would result in local, long-term, moderate, beneficial impacts to economic output, employment, labor income, and housing in Tusayan.

Overall, the impacts of the actions described above, in combination with the impacts of alternative A, would result in local and regional, short-term, negligible adverse cumulative impacts and local and regional, long-term, minor to moderate beneficial cumulative impacts to economic output, employment, labor income, and housing in the study area.

Conclusion

Increased visitation and related vehicle congestion at the South Entrance Station and within Grand Canyon Village could result in some local, long-term, negligible to minor, adverse impacts to tourism by influencing the length of visitor stays. However, employment, housing, and economic output would remain stable and would not be adversely affected by lack of parking or other factors under this alternative. Total cumulative impacts would be local, short-term, negligible, and adverse and local and regional, long-term, minor to moderate, and beneficial.

Alternative B: Preferred Alternative

Direct / Indirect Impacts

Construction Impacts. *Tourism* — Local and regional, short-term, negligible, beneficial impacts to hotel occupancy in Tusayan or Coconino County would occur as a result of construction. Some additional demand for lodging in Tusayan could occur if construction workers stayed in Tusayan during the construction period. Construction would likely occur during the warmer spring, summer, and fall months. Lodging demand for construction workers could increase occupancy and room rates slightly during the slower shoulder spring and fall seasons if construction took place during these periods. However, given the high hotel occupancy and peak room rates during the summer months, it appears unlikely that much of this additional

lodging demand could be satisfied; therefore, it is unlikely that room rates or occupancy would be impacted. In addition, the duration of any increase in lodging demand arising from construction worker stays would be short and limited to the period of construction. To the extent that occupancy increased, this would represent a beneficial impact to local economy. Capital spending would occur primarily in construction-related industries, and the majority of construction workers would be expected commute from locations outside of Tusayan.

Employment — Table 45 shows estimated impacts at the county level resulting from project capital expenditures. Annual project capital expenditures of approximately \$12.92 million would create approximately 150 jobs plus 75 secondary jobs, for a total of 225 new jobs, or an increase of 0.314% over baseline county employment. However, these jobs would likely represent employment in part-time positions in construction-related industries and would disappear once the projects were completed. The 150 construction employees would be expected to earn \$6.38 million, while the 75 secondary employees would earn \$2.37 million, for a total increase in labor income of \$8.75 million. This would represent an increase to Coconino County labor income of 0.336% at full build-out.

Table 45 depicts potential construction worker employment impacts in Tusayan and the park. Assuming that 30% of total estimated construction-related capital costs were paid to labor and that 80% of these costs were paid to construction labor, the average number of construction workers employed annually in the region would be 53 workers. The direct employment impact to Tusayan of these 53 workers would depend on the percentage of these positions that were available to and

TABLE 45. ALTERNATIVE B: ANNUAL CONSTRUCTION IMPACTS — COCONINO COUNTY

	Direct Change	Secondary Change	Total Change	County Percentage Change
Employees	150	75	225	0.314%
Labor Income	\$6,379,900	\$2,372,400	\$8,752,250	0.336%
Output	\$12,919,500	\$7,033,900	\$19,953,400	0.289%

actually filled by members of the Tusayan labor force. Construction worker spending in Tusayan and within the park on food and beverage items might result in some secondary employment impacts because this spending would generate additional employment. However, this secondary employment would be temporary and would end with the completion of the capital improvements. Therefore, alternative B would result in short-term, minor, beneficial impacts to both Tusayan and Coconino County employment.

Housing — No impacts to housing within Tusayan or Coconino County would occur from capital expenditures, as most construction employees would likely reside outside Tusayan, perhaps in Flagstaff or Williams. In addition, no long-term changes in the demand for housing in Tusayan or other locations would result from capital expenditures because they are short-term in nature.

Economic Output — Table 45 indicates that the total estimated average annual capital expenditures of \$12.92 million would generate a \$7.03 million annual increase in additional economic output in the county. These combined outputs would result in a total annual increase of \$19.95 million for Coconino County, or an increase of 0.289% over baseline county output.

The economic impact to the Tusayan region, including the park, would occur because of spending by construction workers on food and beverage items, either at concession operations within the park or in Tusayan. Based on expenditure data in the most recent 2005 U.S. Bureau of Labor Statistics *Consumer Expenditure Survey*, which estimated that construction workers on average spend approximately 5.7% of their annual income on “food away from home,” and based on an average annual construction worker salary of \$41,780 and 260 work days per year, it was estimated that construction workers might spend approximately \$9 per work day on food

and beverage items in Tusayan and the park. As shown in Table 46, this translates into a total annual direct spending of approximately \$126,140. However, this is only an approximation and could vary considerably depending on individual worker spending patterns.

Capital expenditures and construction worker spending at the county level and within Tusayan would result in local and regional, short-term, minor, beneficial impacts to the local economy. These benefits would accrue as transportation improvements were constructed and would cease at full build-out.

Operations Impacts. Tourism — As shown in Table 47, the average length of stay would increase by approximately 0.08 night (from 2.00 to 2.08 nights), an increase of approximately 4%. This longer stay would result from an 8% increase in the current number of lodgers in Tusayan staying one additional night because of improved visitor flow patterns in the park under alternative B. As a result, hotel occupancy would rise from 86.0% to 89.4% in Tusayan and from 79.2% to 79.5% in Coconino County from June through August. While this increase would only occur three months a year, it would result in local and regional, long-term, minor, beneficial impacts.

TABLE 46. ALTERNATIVE B: ANNUAL CONSTRUCTION IMPACTS — TUSAYAN AND THE PARK

Construction Impact	Cost
Estimated annual per worker spending in Tusayan and the park	\$2,380
Total estimated annual worker spending in Tusayan and the park	\$126,140
Total estimated worker spending in Tusayan and the park during the project	\$378,420

TABLE 47. ALTERNATIVE B: CHANGES IN LENGTH OF STAY AND STABILIZED OCCUPANCY

	Absolute Change	Percentage Change
Tusayan: Average Length of Stay	0.08 night increase	4.00%
Tusayan: Occupancy	3.4 percentage point increase	4.00%
Coconino County: Occupancy	0.3 percentage point increase	0.42%

Employment — Table 48 shows that an estimated 21 full-time equivalent transportation employees would be required annually for transportation-related improvements under alternative B. These employees would earn a total of approximately \$844,600 in annual wages. An additional 7 jobs would be generated by the additional economic activity, with a combined total of \$208,700 in labor income annually. A total of 28 new employees would be associated with alternative B and would result in a total change in employment of approximately 0.039% for the county and 6.9% for Tusayan. Table 48 indicates that the associated change in labor income would be 0.04% for the county and 7.2% for Tusayan. As previously discussed, the spending impact of transportation employees would largely depend on where they chose to reside, as well as the phasing of the project.

As shown in Table 49, increased visitor spending would generate jobs for a total of 21 new employees in Tusayan who would earn a combined annual income of approximately \$569,000. This new employment would repre-

sent an increase over current employment levels of 5.3% in Tusayan and 0.03% in the county. However, some increased visitor spending would occur in the park at concession food and beverage and retail operations, thereby reducing new employment in Tusayan generated by greater visitor spending. If 15% of the increased visitor spending occurred in the park, this would transfer approximately 3 of the 21 additional employees from Tusayan, representing approximately \$85,400 in combined annual income (park figures are not displayed in tables). The remaining 18 employees would be in Tusayan.

Approximately 49 additional jobs would be generated under alternative B, as shown in Table 50. Of these, approximately 21 employees would be new transportation workers. The remaining 28 jobs would result from the additional economic activity caused by the new transportation operations (7 employees) and increased visitor spending (21 employees). If all employment impacts were in Tusayan, the total increase in employees at full

TABLE 48. ALTERNATIVE B: ANNUAL OPERATIONS IMPACTS

	Direct Change	Secondary Change	Total Change	Tusayan Percentage Change	County Percentage Change
Employees	21	7	28	6.9%	0.039%
Labor Income	\$844,600	\$208,700	\$1,053,300	7.2%	0.040%
Output	\$1,143,000	\$622,900	\$1,765,700	4.6%	0.026%
Housing	14	5	19	6.1%	0.033%

TABLE 49. ALTERNATIVE B: ANNUAL VISITOR SPENDING IMPACTS

	Direct Change	Secondary Change	Total Change	Tusayan Percentage Change	County Percentage Change
Employees	16	5	21	5.3%	0.030%
Labor Income	\$406,080	\$162,900	\$569,000	3.9%	0.022%
Output	\$967,900	\$501,100	\$1,469,000	3.8%	0.021%
Housing	11	3	14	4.5%	0.024%

TABLE 50. ALTERNATIVE B: ANNUAL COMBINED SPENDING IMPACTS

	Direct Change	Secondary Change	Total Change	Tusayan Percentage Change	County Percentage Change
Employees	37	12	49	12.2%	0.068%
Labor Income	\$1,250,700	\$371,700	\$1,622,400	11.2%	0.062%
Output	\$2,110,900	\$1,124,000	\$3,234,900	8.4%	0.047%
Housing	25	8	33	10.6%	0.057%

build-out would represent a 12.2% increase. The impact to Coconino County, however, would be far less, with only a 0.068% increase. New employment would generate an estimated \$1.62 million in labor income, an increase of 11.2% in Tusayan and 0.062% in Coconino County.

Approximately 37 jobs, generating \$945,600 in labor income, would be created from longer visitor stays within the park and associated spending on new services at Canyon View Information Plaza. Of these, an estimated 27 jobs, generating approximately \$650,020 in labor income, would be associated with direct spending at Canyon View Information Plaza, and an additional 10 positions generating \$295,580 in labor income would be created as a result of secondary economic activity.

Therefore, a total of 86 jobs would be created under alternative B, generating a total combined labor income of \$2.57 million. These positions would represent increases to employment in Coconino County of 0.120% and to labor income of 0.099%.

Impacts related to employment would be regional, long-term, negligible, and beneficial for Coconino County since greater employment and income would translate into an expansion of economic opportunity and well being for individuals in the region. Employment impacts in the park and Tusayan would be considered local, long-term, minor to moderate, and beneficial at full build-out. Because the project would be phased, these benefits would not occur all at once or might not be fully achieved if some improvements, such as parking, were not constructed.

Housing — More jobs would result in more demand for housing in the region. Table 50 shows that approximately 33 new housing units would be required to house the additional 49 employees required under alternative B. In addition, approximately 25 housing units would be required for 37 new employee positions generated by longer stays and spending on new services at Canyon View Information Plaza. Therefore, a combined

total of approximately 58 new housing units would be required for new employees, representing an increase over current housing levels of 18.5% in Tusayan, 4.8% in the park, 4.5% in Williams, 0.2% in Flagstaff, and 0.1% in Coconino County. Some of this demand could be met if the National Park Service provided an additional 40 trailer pads (including hook-ups) and made some of them available to new employees. However some portion of the new employees would likely need to find housing outside the park.

Increased demand for housing would potentially raise the value of land zoned for residential uses in the area and increase rental rates. Given the lack of an existing rental housing market in the region, this increase in land values and rental rates could provide landowners or developers with a greater incentive to build rental housing units in the region. The development of rental housing would result in a beneficial impact on the socioeconomic environment in Tusayan or other gateway communities, including Valle, Williams, and Flagstaff. However, if rental rates were driven up by increased demand, and new employees had to find housing outside the park or Tusayan, this could increase commuting costs, an adverse impact to renters. To the extent that this affected workforce retention, employers could be adversely affected. Overall, the impact to housing would be regional, long-term, minor, and adverse, given the magnitude and geographic dispersion of the increase in housing demand.

Economic Output — As shown in Table 48, \$1.14 million would represent the total value of services provided by all new transportation employees. Of this, \$844,600 would represent the income paid to transportation staff. The secondary impact, resulting primarily from transportation employee spending, would be \$622,900 in additional economic output. Therefore, the new economic output under alternative B would be approximately \$1.76 million, an increase over baseline economic

output levels of approximately 4.6% in Tusayan and 0.026% in Coconino County.

Table 49 shows that an estimated increase in visitor spending of \$967,900 would generate \$501,100 in additional economic output in the region, for a total increase in output of \$1.47 million. This would represent increases of 3.8% in Tusayan and 0.021% in Coconino County. The combination of both transportation operations and visitor spending (Table 50) would result in an increase in total economic output of approximately \$3.23 million (\$1.76 from operations impacts plus \$1.47 million from visitor spending impacts) under alternative B. This total represents an 8.4% increase over baseline Tusayan output or a 0.047% increase over county output. As a result, long-term, minor beneficial impacts would occur to regional economic output.

Parking at Canyon View Information Plaza, in combination with other transportation improvements under alternative B, could encourage more park visitors. Therefore, visitor spending patterns could increase within the park and result in greater concession sales. However, because park lodging is near 100% occupancy during the summer, providing parking at Canyon View Information Plaza would not impact concessioner lodging revenues. A large percentage of visitors who park at the information plaza would be day visitors staying overnight outside the park. Therefore, expanded parking at Canyon View would result in greater spending on concession food and beverage and retail items. Visitors who stay outside the park typically spend around 85% of their daily expenditures where they stay, so only a small increase in the sale of concession food and beverage and retail items might occur in the park. If 15% of the total visitor spending impact of \$1.47 million shifted to park concession food, beverage, and retail purchases, this would result in an increase of \$220,400 in economic output in the park. The total increase in economic output in Tusayan, or 85% of the total \$1.47 million increase associated with

visitor spending, would be approximately \$1.25 million.

Transfers of spending from one location to another within the park might occur under alternative B, for example, from Grand Canyon Village to Canyon View Information Plaza, including expenditures on existing or new services such as bike rentals, theater, and food and beverage operations. However, since visitors would still be allowed to drive or take the South Rim shuttle bus to concession locations throughout Grand Canyon Village and because greater visitation and spending occur within the park during the peak season, the net spending impact would not appreciably reduce sales at concession operations located away from Canyon View Information Plaza.

Longer stays in the park by day and overnight visitors, specifically with more time being spent at Canyon View Information Plaza, would increase economic output by approximately \$2.85 million annually. Of this amount, an estimated \$1.93 million would be direct spending on goods and services at Canyon View Information Plaza, which would generate an additional \$922,600 in economic output. Most of this impact in the park would represent a local, long-term, minor, beneficial impact to economic output.

The total combined impact to economic output from transportation improvements under alternative B, plus longer visitor stays at Canyon View Information Plaza, would increase \$6.09 million, an increase in Coconino County output of 0.088%.

Assuming that approximately 25,260 visitor parties were redirected to the East Entrance Station through Cameron, the 66 hotel rooms in Cameron could provide 16,060 occupied room-nights, assuming an occupancy rate similar to that in Tusayan. Assuming occupied room nights increased by 10% in Cameron, reflecting the increase in visitation through the East Entrance, this would result in 1,606 additional room nights in Cameron. Average spending per party per night was assumed to

be approximately \$223, based on past spending estimates in gateway communities outside the park and then adjusted slightly downward to account for the lack of commercial establishments and services in Cameron compared to more typical gateway communities. In addition to lodging, this figure also includes average spending on restaurants, groceries, souvenirs and gifts, gas, park entry passes, and other items. This level of spending would result in an increase in annual visitor spending in Cameron of approximately \$358,100.

Assuming that 24,455 parties not lodging in Cameron passed through the East Entrance Station each year, it was estimated that 30% of these parties might stop in Cameron and purchase goods and services (Northern Arizona University 2005). The Cameron Trading Post is a popular regional attraction for purchasing authentic Navajo, Zuni, and Hopi jewelry and other gifts, and it would be the most likely attraction for most visitors to the South Rim. The 2005 study found that 15% of visitors surveyed had visited or planned to visit the Cameron Trading Post (Northern Arizona University 2005). It is estimated that an additional 15% of visitor parties might also choose to stop at other locations in Cameron such as gas stations.

Average daily spending in gateway communities for all visitors, excluding visitors lodging in Cameron, was estimated to be \$24 per day (including camping fees, restaurants, groceries, souvenirs and gifts, gas, park entry passes, and other items). This average spending per party (non-lodging parties) for 30% of the 24,455 parties could result in a roughly \$176,000 increase in direct spending and economic output in Cameron.

The combined spending impacts arising from increases in lodging demand and from other purchases in Cameron would total approximately \$534,200 if approximately 2% of South Entrance visitation was redirected through Cameron. Local, long-term economic benefits to Cameron would be beneficial and minor.

Cumulative Impacts

Under alternative B the economic output, employment, labor income, and tourism impacts associated with recently completed, in progress, or reasonably foreseeable projects would be the same as described for alternative A. Phase III of the Greenway Trail and Tusayan bike trails would result in local, short-term, negligible, beneficial impacts. Desert View and road improvements, The potential 104 unit expansion of employee housing in the park, land conveyance for the Grand Canyon Unified School District, and improvements at Grand Canyon National Park Airport would result in regional, short-term, minor, beneficial impacts. South Entrance Road (including South Entrance Station) improvements, a potential Canyon Uranium Mine, and incorporation of Tusayan would result in minor to moderate beneficial impacts. As noted in alternative A, most impacts from capital expenditures would represent both short- and long-term improvements to the economy.

These impacts in combination with the minor, beneficial impacts of alternative B would result in local and regional, short- and long-term, minor to moderate, beneficial cumulative impacts to economic output, employment, labor income, and housing within the park, Tusayan, and Coconino County. The contribution of alternative B to overall cumulative impacts would vary depending on the projects implemented. Generally, the contribution would be moderate to large, except if the uranium mine was implemented or Tusayan was incorporated. In this case, the contribution of alternative B would be small.

Conclusion

For Tusayan and Coconino County, capital expenditures and construction activities would result in local and regional, short-term, negligible, beneficial impacts to tourism, no impacts to housing, and local and regional, short-term, minor, beneficial impacts for employment and economic output. Operation of the transportation system would result in

local and regional, long-term, beneficial impacts that would be minor for tourism and economic output, and minor to moderate for employment; while impacts to housing would be regional, long-term, minor, and adverse. Providing new services at Canyon View Information Plaza would result in local, long-term, minor, beneficial impacts to employment and economic output for the park, but regional, long-term, minor, adverse impacts to housing. Local, long-term impacts to Cameron could be beneficial and minor. Cumulative impacts would be local, minor to moderate, and beneficial in both the short and long terms.

Alternative C: Tusayan Parking Emphasis

Direct / Indirect Impacts

Construction Impacts. *Tourism* — Construction projects would result in local and regional, short-term, negligible, beneficial impacts to hotel occupancy in Tusayan and Coconino County. Some additional demand for lodging in Tusayan could occur if construction workers stayed there during their jobs. Construction would likely occur during spring, summer, and fall. Construction worker lodging demand could potentially increase occupancy and room rates slightly during the slower shoulder spring and fall seasons if construction took place during these periods. However, given the high hotel occupancy and peak room rates during the summer months, it appears unlikely that much of this additional lodging demand could be satisfied; therefore, it is unlikely that room rates or occupancy would be impacted. In addition, the duration of any increased lodging demand due to construction would be limited to the construction period. To the extent that room occupancy increased, this would be a beneficial impact to the local economy.

Capital spending would occur primarily in

construction-related industries and the majority of construction workers would be expected commute from locations outside of Tusayan.

Employment — As shown in Table 51, approximately 154 jobs that would generate a combined total income of \$6.53 million annually would be created as a result of direct project capital expenditures under alternative C. An additional 78 secondary jobs, generating a total of \$2.47 million in annual labor income, would also be generated, for a total of 232 new jobs, or an increase of 0.324% over baseline county employment. The total increase in labor income would be \$9 million, an increase to Coconino County labor income of 0.345%.

Potential impacts related to construction worker employment in Tusayan and the park are shown in Table 52. An estimated 50 workers would be employed annually under alternative C. Impacts to Tusayan employment would depend on the number of construction jobs filled by the Tusayan labor force and the effects of construction worker spending on secondary employment. Short-term impacts related to employment associated with capital expenditures would be local, minor, and beneficial.

Housing — As described for alternative B, no impacts to housing within Tusayan or Coconino County would occur as a result of short-term capital expenditures for construction.

Economic Output — Table 51 shows that the total estimated average annual capital expenditures of \$13.27 million under alternative C would generate a \$7.31 million increase in additional economic output at the county level. The total increase in economic output at the county level would be \$20.58 million or an increase of 0.298%. Table 52 shows that con-

TABLE 51. ALTERNATIVE C: ANNUAL CONSTRUCTION IMPACTS — COCONINO COUNTY

	Direct Change	Secondary Change	Total Change	County Percentage Change
Employees	154	78	232	0.324%
Labor Income	\$6,534,600	\$2,467,900	\$9,002,500	0.345%
Output	\$13,266,600	\$7,312,700	\$20,579,300	0.298%

TABLE 52. ALTERNATIVE C: ANNUAL CONSTRUCTION IMPACTS — TUSAYAN AND THE PARK

Construction Impact	Cost
Estimated annual per worker spending in Tusayan and the park	\$2,380
Total estimated annual worker spending in Tusayan and the park	\$119,000
Total estimated worker spending in Tusayan and the park during the project	\$357,000

struction worker spending would result in a total annual spending impact on the food and beverage sector in the Tusayan region of approximately \$119,000 per year. This spending would be distributed between the Tusayan and park concessioner food and beverage operations, depending on the work site location as discussed in alternative B. These impacts would represent local, short-term, minor, beneficial impacts to economic output in the county and in Tusayan and would cease upon completion of full build-out.

Operations Impacts. Tourism — As a result of expanded parking in Tusayan and the operation of the shuttle bus system from Tusayan to Canyon View Information Plaza, the average length of stay is estimated to increase by 0.1% (from 2.00 nights to approximately 2.10 nights), an increase of approximately 5% in the average length of stay (see Table 53). It is estimated that 10% of current lodging guests would stay one additional night as a result of improved visitor flow patterns under alternative C. As a result, hotel occupancy rates in Tusayan would increase from 86.0% to 90.3% from June through August. The increase in summer occupancy in Tusayan would result in an increase in Coconino County hotel occupancy rates from

TABLE 53. ALTERNATIVE C: CHANGES IN LENGTH OF STAY AND STABILIZED OCCUPANCY

	Absolute Change	Percentage Change
Tusayan: Average Length of Stay	0.10 night increase	5.00%
Tusayan: Occupancy	4.3 percentage point increase	5.00%
Coconino County: Occupancy	0.4 percentage point increase	0.53%

79.2% to 79.6% for the same months. This increased occupancy rate would represent a local, long-term, minor, beneficial impact to Tusayan lodging operators because of higher room revenues.

Employment — Approximately 29 transportation employees would be required under alternative C, as shown in Table 54. These transportation employees would earn around \$1.17 million in annual wages. Secondary impacts, including transportation employee spending, would generate an additional 9 job positions with \$288,300 in annual wages. In total, 38 new jobs would represent a 9.6% increase in Tusayan employment and 0.053% in Coconino County. These new jobs would create \$1.45 million in additional labor income, an increase of 0.056% over baseline county labor income.

An increase in visitor spending would generate a total of 26 new jobs with a combined annual income of approximately \$711,300 (see Table 55). This would be an increase over current employment levels of 6.6% in Tusayan and only 0.037% in Coconino County. As explained for alternative B, some of the increased visitor spending would occur at park concession food and retail operations, and approximately 4 of the 26 new employees would be in the park and would earn a total combined income of approximately \$106,700 annually (park figures are not displayed in the table). The remaining 22 employees would be located in Tusayan.

Table 56 reveals that a total of approximately 64 additional jobs would be generated under alternative C — 29 jobs generated by transportation operations, and 35 jobs generated by transportation employee spending in the region and increased visitor spending. The total employment impact to Coconino County would represent an increase of 16.2% over Tusayan and 0.090% over county employment levels. Labor income associated with the expansion of employment would represent a total increase of approximately \$2.16 million or an increase of approximately 0.083%

TABLE 54. ALTERNATIVE C: ANNUAL OPERATIONS IMPACTS

	Direct Change	Secondary Change	Total Change	Tusayan Percentage Change	County Percentage Change
Employees	29	9	38	9.6%	0.053%
Labor Income	\$1,166,400	\$288,300	\$1,454,600	10.0%	0.056%
Output	\$1,578,200	\$860,200	\$2,438,400	6.3%	0.035%
Housing	19	6	25	8.0%	0.043%

TABLE 55. ALTERNATIVE C: ANNUAL VISITOR SPENDING IMPACTS

	Direct Change	Secondary Change	Total Change	Tusayan Percentage Change	County Percentage Change
Employees	20	6	26	6.6%	0.037%
Labor Income	\$507,600	\$203,700	\$711,300	4.9%	0.027%
Output	\$1,209,900	\$626,400	\$1,836,200	4.8%	0.027%
Housing	13	4	17	5.4%	0.029%

TABLE 56. ALTERNATIVE C: ANNUAL COMBINED SPENDING IMPACTS

	Direct Change	Secondary Change	Total Change	Tusayan Percentage Change	County Percentage Change
Employees	49	15	64	16.2%	0.090%
Labor Income	\$1,673,900	\$492,000	\$2,165,900	14.9%	0.083%
Output	\$2,788,000	\$1,486,600	\$4,274,600	11.1%	0.062%
Housing	32	10	42	13.4%	0.072%

increase over Coconino County labor income levels.

Employment impacts associated with longer visitor stays in the park and associated spending at Canyon View Information Plaza would be the same as under alternative B, with an additional 37 jobs created, generating \$945,600 in labor income. Combining the employment impacts associated with the transportation improvements under alternative C with those resulting from longer park stays would result in a total increase of 101 jobs, generating a combined labor income of \$3.11 million. These positions would represent increases to employment of 0.141% and labor income of 0.119% in Coconino County.

Similar to alternative B, the impact to Coconino County would be regional, long-term, negligible, and beneficial. At full build-out employment impacts to the park and Tusayan would be local, long-term, minor to moderate, and beneficial.

Housing — Growth in employment would result in the need for an additional 42 housing units, an increase of approximately 13.4% in existing housing units in Tusayan or 0.072% in the county (see Table 56). The impacts arising from longer visitor stays and more spending at Canyon View Information Plaza would be the same as under alternative B, with an additional increase in housing demand of 25 units. The combined increase in housing demand would be 67 additional units to house all new employees. This would represent an increase over current housing unit levels of 21.4% in Tusayan, 5.6% in the park, 5.2% in Williams, 0.26% in Flagstaff, and 0.115% in Coconino County. As described for alternative B, some portion of this housing might be supplied by the National Park Service by providing new trailer pad sites; however, some new employees would likely be required to find housing outside the park and Tusayan. Overall, given the magnitude of housing impacts and the geographic dispersion of the housing demand

increase, the impact to housing would be regional, long-term, minor, and adverse.

Economic Output — Total economic output resulting from increased employment would be approximately \$2.44 million, representing an increase in economic output of approximately 6.3% for Tusayan and 0.035% for Coconino County (see Table 54). The direct impact of \$1.58 million would represent the total value of the services provided by all new transportation employees, of which \$1.17 million would constitute the income paid to transportation staff. The secondary impact of \$860,200 would be additional economic output.

An estimated increase in visitor spending of \$1.21 million would result in the creation of \$626,400 in additional economic output in the region, for a total increase in output of \$1.84 million. The total change due to increased visitor spending would represent an increase of 4.8% in Tusayan, or 0.027% in the county (see Table 55).

Table 56 indicates that total economic output would increase by approximately \$4.27 million (\$2.44 million from operations impacts plus \$1.84 million from visitor spending impacts) under alternative C. This total represents an 11.1% increase over baseline for Tusayan output or a 0.062% increase over county output. The impact to economic output would be local and regional, long-term, minor, and beneficial.

As explained in alternative B, increased parking away from Grand Canyon Village would not adversely impact concessioner lodging operations. Some spending on merchandise and food might be expected to shift from Grand Canyon Village to Tusayan, as some visitors might shop in Tusayan rather than in the park. However, this effect would be balanced by increased overall spending from higher visitation. Additionally, in this alternative no long-term parking would be provided at Canyon View Information Plaza. This would tend to increase the number of visitors parking in the village area, where most

concession food and retail shopping is located, thus increasing spending.

More importantly, expanded parking in Tusayan and shuttle bus service to the park would tend to allow more visitors into the park at any given time. Therefore visitor spending patterns might be expected to increase in the park, which would translate into greater concession sales. If 15% of total visitor spending (\$1.84 million) shifted to concession food and retail purchases, this would result in an increase of \$275,440 in economic output in the park. The total increase in economic output in Tusayan, or 85% of the total \$1.84 million increase associated with visitor spending, would be approximately \$1.56 million.

Impacts from longer visitor stays in the park, specifically at Canyon View Information Plaza, would be the same as alternative B or an increase in economic output of \$2.85 million. The impact would be local, long-term, minor, and beneficial.

The total combined impact to economic output associated with the transportation improvements under alternative C and longer visitor stays would be \$7.13 million in additional economic output, an increase in Coconino County output of 0.103%.

Impacts to the community of Cameron from redirecting approximately 2% of visitor parties from the South Entrance Station to the East Entrance would be the same as alternative B.

Cumulative Impacts

Cumulative impacts would be the same as alternative B. The impacts of past, present, and reasonably foreseeable projects in combination with the local and regional, minor, beneficial impacts of alternative C would result in local and regional, short- and long-term, minor to moderate, beneficial cumulative impacts to economic output, employment, labor income, and housing within the park, Tusayan, and Coconino County. The contribution of alternative C to

overall cumulative impacts would vary depending on the projects implemented. Generally, the contribution would be moderate to sizable, except if the uranium mine was implemented or Tusayan was incorporated. In this case, the contribution of alternative C would be small.

Conclusion

For Tusayan and Coconino County construction activities would result in local and regional, short-term, negligible, beneficial impacts to tourism; no impacts to housing; and local and regional, short-term, minor, beneficial impacts for employment and economic output. Transportation improvements would result in local and regional, long-term, beneficial impacts that would be minor for tourism and economic output; minor to moderate for employment; but long-term, minor, and adverse on housing. Providing new services at Canyon View Information Plaza would result in local, long-term, minor, beneficial impacts to employment and economic output within the park, while impacts to housing would be regional, long-term, minor, and adverse. Local, long-term impacts to Cameron could be minor and beneficial. Cumulative impacts would be local and regional, short- and long-term, minor to moderate, and beneficial.

Alternative D: Canyon View Information Plaza Parking Emphasis

Direct / Indirect Impacts

Construction Impacts. *Tourism* — The impacts would be the same as alternatives B and C; there would be local and regional, short-term, negligible, beneficial impacts to hotel occupancy in Tusayan and Coconino County.

Employment — As shown in Table 57, an estimated 125 jobs that would generate total labor

income of \$5.31 million would be created as a result of direct project capital expenditures under alternative D. An additional 60 jobs, generating a total of \$1.91 million in labor income annually, would also be created. A total of 185 jobs would be created, representing an increase of 0.259% in Coconino County employment. The total annual labor income earned would be \$7.22 million, an increase of 0.277% in Coconino County.

Table 58 displays potential impacts to employment and output from the presence of construction workers in Tusayan and the park. Approximately 44 workers would be employed under alternative D. Impacts to Tusayan employment would depend on the number of construction jobs filled by the Tusayan labor force and the effects of construction worker spending on secondary employment. These impacts to employment in Tusayan and the county would be local and regional, short-term, minor, and beneficial.

Housing — As in alternatives B and C, no impacts to housing within Tusayan or Coconino County would occur as a result of short-term capital expenditures.

Economic Output — Table 57 indicates that total annual average capital expenditures during project construction and development of \$10.50 million would generate an additional \$5.67 million in economic output, for a total increase of \$16.17 million. Table 58 shows that the estimated daily spending by construction employees would be a \$104,720 increase in the food and beverage sectors in Tusayan and the park. This spending would be distributed between the Tusayan and park concessioner operations, depending on the location of the construction work, the same as alternatives B and C. Local, short-term, minor, beneficial impacts to economic output in the county and in Tusayan would accrue during construction

TABLE 57. ALTERNATIVE D: ANNUAL CONSTRUCTION IMPACTS — COCONINO COUNTY

	Direct Change	Secondary Change	Total Change	County Percentage Change
Employees	125	60	185	0.259%
Labor Income	\$5,310,600	\$1,906,000	\$7,216,600	0.277%
Output	\$10,502,400	\$5,671,900	\$16,174,300	0.234%

TABLE 58. ALTERNATIVE D: ANNUAL CONSTRUCTION IMPACTS — TUSAYAN AND THE PARK

Construction Impact	Cost
Estimated annual per worker spending in Tusayan and the park	\$2,380
Total estimated annual worker spending in Tusayan and the park	\$104,720
Total estimated worker spending in Tusayan and the park during the project	\$314,160

and cease at completion.

Operations Impacts. *Tourism* — Increased parking availability in the park at Canyon View Information Plaza and the expansion of the South Entrance Station from five to six lanes would result in 6% of current lodging guests staying one additional night in Tusayan (see Table 59). This additional lodging night would increase the average length of visitor stay approximately 3% (from 2.00 nights to 2.06 nights). It would also increase stabilized hotel occupancy rates from 86.0% to 88.6% in Tusayan and from 79.2% to 79.4% in Coconino County from June to August. Similar to the other alternatives, greater hotel occupancy rates would result in increased room revenues and a local, long-term, minor, beneficial impact.

Employment — As shown in Table 60, an estimated 17 new transportation employees would earn a total of approximately \$683,700 in annual wages. Secondary impacts would generate 5 additional jobs within the region and annual wages of approximately \$169,000. A total of 22 new employees would represent an increase over baseline county levels of 0.031% in employment and 0.033% in wages.

Table 61 shows the employment impacts associated with increased visitor spending in

TABLE 59. ALTERNATIVE D: CHANGES IN LENGTH OF STAY AND STABILIZED OCCUPANCY

	Absolute Change	Percentage Change
Tusayan: Average Length of Stay	0.06 night increase	3.00%
Tusayan: Occupancy	2.6 percentage point increase	3.00%
Coconino County: Occupancy	0.2 percentage point increase	0.32%

Tusayan. Increased visitor spending would generate a total of 16 new jobs paying approximately \$426,800 annually. These new jobs would represent an increase over baseline employment levels of 3.97% in Tusayan and 0.0221% in Coconino County.

As discussed in alternative B, a portion of increased visitor spending might occur in the park at concession food and retail operations. Thus, 2 of the 16 new employees would be in the park and would earn approximately \$64,000 annually (park figures are not displayed in the tables). The remaining 14 employees would be employed by Tusayan businesses.

Table 62 shows that a combined total of approximately 38 additional jobs would be generated under alternative D. Of these, approximately 17 would be related to improved South Rim shuttle bus operations. The remaining 21 jobs would result from transportation employee spending in the region plus increased visitor spending. The total employment impact would be an increase of 9.59% for Tusayan and 0.053% for Coconino County over current employment levels. Labor income associated with the expansion of employment would represent a total increase of approximately \$1.52 million or a 0.049% increase Coconino County labor income.

Employment impacts associated with longer visitor stays in the park and associated spending would be the same as under alternatives B and C, with an additional 37 jobs paying \$945,600 in labor income. Combining the employment impacts associated with the transportation improvements under alternative D with those resulting from longer park stays would represent a total increase of 75 jobs, generating a combined labor income of \$2.47 million. The total increase in jobs would represent increases to employment of 0.105% and to labor income of 0.095% in Coconino County.

Similar to alternatives B and C, the impact to Coconino County employment would be regional, long-term, negligible, and beneficial.

TABLE 60. ALTERNATIVE D: ANNUAL OPERATIONS IMPACTS

	Direct Change	Secondary Change	Total Change	Tusayan Percentage Change	County Percentage Change
Employees	17	5	22	5.62%	0.031%
Labor Income	\$683,700	\$169,000	\$852,700	5.87%	0.033%
Output	\$925,100	\$504,300	\$1,429,400	3.7%	0.021%
Housing	11	3	14	4.47%	0.024%

TABLE 61. ALTERNATIVE D: ANNUAL VISITOR SPENDING IMPACTS

	Direct Change	Secondary Change	Total Change	Tusayan Percentage Change	County Percentage Change
Employees	12	4	16	3.97%	0.022%
Labor Income	\$304,600	\$122,200	\$426,800	2.94%	0.016%
Output	\$725,900	\$375,800	\$1,101,800	2.86%	0.016%
Housing	8	3	11	3.51%	0.019%

TABLE 62. ALTERNATIVE D: ANNUAL COMBINED SPENDING IMPACTS

	Direct Change	Secondary Change	Total Change	Tusayan Percentage Change	County Percentage Change
Employees	29	9	38	9.59%	0.053%
Labor Income	\$1,229,700	\$291,200	\$1,520,900	10.46%	0.049%
Output	\$1,651,000	\$880,100	\$2,531,100	6.56%	0.037%
Housing	19	6	25	7.98%	0.043%

Employment impacts to the park and Tusayan would be local, long-term, minor to moderate, and beneficial at full build-out.

Housing — Approximately 25 new housing units would be needed for new employees under alternative D, resulting in a 7.98% increase in the number of existing housing units in Tusayan and 0.043% in the county (see Table 62). The impacts arising from longer visitor stays and greater spending at Canyon View Information Plaza would be the same as under alternatives B and C, with an additional increase in housing demand of 25 units. The combined increase in housing demand would be 50 additional units to house all new employees. This increase would represent an increase over current housing unit levels of 16.0% in the park, 4.2% in Tusayan, 3.9% in Williams, 0.19% in Flagstaff, and 0.086% in Coconino County. As described for alternatives B and C, this need could result in more rental housing, but increased rental rates. Despite NPS plans to provide 40 additional trailer pads, which

could house new employees, other new employees would likely have to find housing outside the park and Tusayan. Given the magnitude and geographic dispersion of the change in housing demand, the impact to housing would be regional, long-term, minor, and adverse.

Economic Output — As shown in Table 60, the services provided by the 17 transportation employees would represent \$925,100 in economic output. The secondary impact would generate \$504,300 in additional economic output. This change would represent increases economic output by 3.70% in Tusayan and 0.021% in Coconino County.

Table 61 indicates that a total increase in economic output of approximately \$1.10 million would result from additional visitor spending of \$725,900 in the region, representing an increase in economic output in Tusayan of 2.86% and in Coconino County of 0.016%. However, the increase in visitor spending would potentially be distributed

between park concession operations and Tusayan businesses. If 15% of the total increase in visitor spending was spent on park concession food and retail items, the increase in economic output in the park would be approximately \$165,200. The remaining 85% of visitor spending in Tusayan would generate \$936,500 in additional economic output (park figures are not displayed in tables).

The combined increases in economic output resulting from increased spending by both employees and visitors are shown in Table 62. Total economic output would increase by approximately \$2.53 million (\$1.43 million from operations impacts plus \$1.10 million from visitor spending impacts) under alternative D. This total represents a 6.56% increase for Tusayan and a 0.037% increase for Coconino County. As a result, long-term, minor beneficial impacts would occur to local and regional economic output.

Impacts to the park from longer visitor stays, specifically at Canyon View Information Plaza, would be the same as under alternatives B and C, representing an increase in economic output of \$2.85 million. Again, the majority of this impact would be expected to occur in the park, representing a local, long-term, minor, beneficial impact to economic output.

The total combined impact to economic output associated with transportation improvements under alternative D and longer visitor stays would be \$5.38 million in additional economic output, an increase in Coconino County output of 0.078%.

Alternative D would provide the most extensive expansion of in-park vehicle parking of any of the action alternatives. This substantial increase could shift some spending from other areas in Grand Canyon Village to Canyon View Information Plaza, depending on how much parking was actually constructed, based on adaptive management. New services at the plaza would also enhance spending opportunities and revenue generation potential at the plaza in light of the potentially greater concentration of visitors at this location. How-

ever, visitors would still be able to drive to or take a shuttle bus to concession locations in Grand Canyon Village. Because higher visitation and spending levels would occur within the park during the peak season, the net spending impact would not appreciably reduce sales at other concession operations.

Impacts to the community of Cameron from redirecting approximately 2% of visitor parties from the South Entrance Station to the East Entrance would be the same as alternative B.

Cumulative Impacts

Cumulative impacts would be the same as alternative B. The impacts of past, present, and reasonably foreseeable projects in combination with the minor, beneficial impacts of alternative D would result in both local and regional, short- and long-term, minor to moderate, beneficial cumulative impacts to economic output, employment, labor income, and housing in the park, Tusayan, and Coconino County. The contribution of alternative D to overall cumulative impacts would vary depending on the projects implemented. Generally, the contribution would be moderate to sizable, except if a uranium mine was opened or Tusayan was incorporated. In this case, the contribution of alternative D would be small.

Conclusion

For Tusayan and Coconino County, construction activities would result in local and regional, short-term, negligible, beneficial impacts on tourism, no impacts to housing, and local and regional, short-term, minor, beneficial impacts for employment and economic output. Operation of transportation improvements would result in local and regional, long-term, beneficial impacts that would be minor for tourism and economic output, and minor to moderate for employment. Impacts to housing would be local and regional, long-term, minor, and adverse. Provision of new services at Canyon View Information Plaza would result in local, long-term, minor, beneficial impacts to

employment and economic output in the park, and regional, long-term, minor, adverse impacts to housing. Local, long-term impacts to Cameron could be beneficial and minor. Cumulative impacts would be local and regional, short- and long-term, minor to moderate, and beneficial.

GATEWAY COMMUNITIES AND ADJACENT LAND USES

Affected Environment

Gateway Communities

The NPS *Management Policies 2006* define a gateway community as

a community that exists in close proximity to a unit of the national park system whose residents and elected officials are often affected by the decisions made in the course of managing the park, and whose decisions may affect the resources of the park. Because of this, there are shared interests and concerns regarding decisions. Gateway communities usually offer food, lodging, and other services to park visitors. They also provide opportunities for employee housing, and convenient location to purchase goods and services essential to park administration (NPS 2006d).

Visitors accessing the South Rim come to the park by way of Cameron, Williams, and Flagstaff, and they pass through the communities of Tusayan and Valle. As shown on the Project Vicinity map (Figure 1), Flagstaff and Williams are south of the park along I-40. From Flagstaff the South Rim is approximately 85 miles northwest and may be accessed by US 180, which intersects SR 64 in Valle. From Williams the South Rim is approximately 60 miles north along SR 64. Cameron is east of the South Rim and the East Entrance at the intersection of SR 64 and US 89. Williams, Flagstaff, Valle, and Tusayan also provide housing for NPS and USFS employees and park concessioners, particularly for those staff who work in satellite offices not located within the park. Because these communities

provide food and services to park visitors, as well as park staff, they can all be considered gateway communities for Grand Canyon National Park.

All of the gateway communities associated with Grand Canyon National Park are located within Coconino County. Flagstaff is the official county seat of this area. With 18,608 square miles, Coconino is the second largest county in the United States, but it is one of the most sparsely populated. Indian reservations comprise 38.1% of the land and many of the residents of Valle, Cameron, and Tusayan are of Native American descent (Arizona Department of Commerce 2006).

Tusayan

Located about 1 mile south of Grand Canyon National Park boundary, the unincorporated community of Tusayan is the closest gateway community to the park and the one most likely to be impacted by any future changes at the South Rim. Tusayan covers only 144 acres and is surrounded by national forest system lands (Coconino County 1997). Tusayan businesses provide services such as employee housing, lodging, and other goods and services to park visitors. Present growth and planned uses are directed by the 2003 *Coconino County Comprehensive Plan*. This plan provides direction for land use, transportation, public safety, environmental quality, housing, and public facilities. Any proposed zoning change or change in land use must conform to the goals and policies in the *Comprehensive Plan* (USFS 1999).

The *Comprehensive Plan* provides more detailed goals and objectives, including a plan for Tusayan. The *Tusayan Area Plan and Design Review Overlay* identifies the community as the principal gateway to the Grand Canyon (Coconino County 1997). This plan envisions Tusayan as a major orientation and staging center for visitors to the park, and it strives to ensure that the community is a place where people can live and raise a family. Goals included in the *Tusayan Area Plan* that relate

to the South Rim visitor transportation plan include the following:

- The sense of community in Tusayan shall be retained, with a mix of uses in addition to commercial to include residential neighborhoods, school, library, churches, community center, and parks.
- If and when the land base expands, lands shall be identified and set aside for future community uses.
- Development of a sense of community between Tusayan and Grand Canyon Village shall be encouraged.
- To promote a safe, environmentally sensitive, and efficient circulation system that gives convenient access to existing and future residential areas, employment centers, commercial areas, public facilities, recreation areas, and public lands. Planning should be such as to minimize the impact to surrounding forest.
- To promote a transportation system that reduces energy consumption, and noise and air pollution.
- To promote multi-modal transportation options.
- Tusayan shall work to provide a high level of service to accommodate the visitors to Grand Canyon National Park, while retaining an emphasis on preserving the natural resources of the area.
- Local businesses and governmental agencies should work together to achieve a cooperative approach toward meeting the tourists' needs.
- The community shall make every attempt to protect and improve the aesthetic and audio quality of the environment and to prevent negative impacts on property values and quality of life.
- To allow and provide for growth and development which has positive bene-

fits to community residents and land owners, to the national park, and to the county as a whole, and which is compatible with the protection of the natural environment.

In addition to these goals, the *Tusayan Area Plan* also contains policies that are designed to support statements of intent to accomplish the goals. Policies that apply to this plan include the following:

- In order to help alleviate traffic congestion in Tusayan and Grand Canyon National Park, staging areas for public transit systems shall be developed at convenient and accessible locations in Tusayan and within the national park and other appropriate locations.
- Development of tourist-related uses shall be limited to support services for park and national forest visitors. No new developments which would become tourist destinations themselves shall be permitted; e.g., amusement parks, casinos, convention centers, regional mall.
- Tusayan businesses shall work with the Grand Canyon National Park, Forest Service, and Grand Canyon National Park Airport in coordinating the development of tourist support service.
- The county and the community shall actively seek participation in the land use planning and management processes of the National Park Service, U.S. Forest Service, Arizona Department of Transportation, and Arizona State Land Department concerning administration of public lands.

The ability of Tusayan to meet these goals is, in part, influenced by activities on the federal lands that surround the community. During informational interviews that were conducted as part of this planning process, business owners in Tusayan were asked to provide their opinions about the park and their relationship with the park. All of the respondents indicated a positive relationship, noting cooperative ef-

forts, such as park rangers patrolling in Tusayan as an example of the relationship between the park and the community (Ramey, pers. comm. 2007).

As a gateway community, the main concerns identified during these interviews were the availability of housing in Tusayan and the lack of developable land, with traffic congestion not being a concern (Ramey, pers. comm. 2007). Business owners in Tusayan indicate that during peak summer months traffic has historically backed up into the community three to four times a week and that visitors staying in Tusayan can wait up to an hour to get into the park (Dornbusch Associates 2007). However, based on NPS experience during the 2007 summer season, improvements at the South Entrance Station have reduced the duration and frequency of any backups. Visitors were experiencing waits of no more than 15 minutes during peak holiday weekends in 2007. The addition of a bypass lane and an additional northbound lane at the park boundary in 2008 should further improve this situation.

As noted in the “Socioeconomic Environment” section, a lack of housing has also occurred in Tusayan for several reasons — the available land is owned by a few individuals or families; the area is landlocked by national forest system land; and there is a general lack of available utilities. Although housing opportunities are present in other gateway communities (such as Flagstaff and Williams), these communities are over 60 miles from the park and during the summer the vacancy rates in these areas are low, resulting in higher rents (Dornbusch Associates 2007). (See the “Socioeconomic Environment” section for a detailed discussion of housing issues.)

State facilities and services in the Tusayan area include the Grand Canyon National Park Airport and SR 64, which is maintained by the Arizona Department of Transportation (USFS 1999). The Coconino County Sheriff’s Office is responsible for law enforcement services and protection in all unincorporated areas of

the county, which includes Tusayan. The Arizona Department of Public Safety is primarily responsible for SR 64, accidents, and the flow of traffic. The designated officer also assists the National Park Service and the sheriff’s office on investigations and tactical and air rescue operations as needed. The Emergency Service Facility in Tusayan houses the fire department as well as the Guardian Medical Transportation ambulance and a Coconino Sheriff substation. All emergency medical technicians work under medical control provided by Flagstaff Medical Center.

Tusayan and the park have their own sewage and wastewater treatment facilities. Treatment is currently handled by the South Grand Canyon Sanitary District. Coconino County operates a transfer facility at Tusayan that services the Tusayan area. There are two privately owned water systems in Tusayan — one owned by the Red Feather Inn and the other by the Best Western Grand Canyon Squire Inn. The two water systems are interconnected to ensure water service to all customers in the event of a shutdown of either system. The Best Western Grand Canyon Squire system services the National Geographic Visitor Center. Electric service is provided by Arizona Public Service Company, and there is a Grand Canyon substation and a Tusayan substation. The line into Tusayan is currently at 80% capacity. Solid waste generated by Tusayan is hauled to a transfer station approximately 3 miles southeast of town, on national forest system land and operated under a special use permit.

Because there are few community services within Tusayan proper, residents rely on the limited community services and facilities in the park. These include a bank, post office, medical clinic with pharmacy items, a grocery store, church services, community library, day care center, and an elementary, middle, and high school complex with playing fields, recreational facilities, and buildings that are also used for continuing educational classes (USFS 1999).

Cameron

The unincorporated community of Cameron is on Navajo Nation land and had a population of about 1,000 permanent residents in 2005 (City-data.com 2005). Cameron serves not only as a common stopping place for tourists on their way to or from the Grand Canyon, but also as a place where park workers reside. This community is home to the Cameron Trading Post, which was first established in the early 1900s as a commerce center for Native American traders. Today the trading post consists of a hotel, RV park, convenience store, gas station, and restaurant, as well as a retail store (Grand Canyon Hotels and Tours 2006). The majority of residents live in single-family homes (unlike Tusayan, which features a number of apartment and dormitory buildings for employees).

Valle

The unincorporated community of Valle is 25 miles south of the South Rim of Grand Canyon National Park off of SR 64. Two main attractions draw visitors to Valle — the Planes of Fame Museum, which houses antique planes, and the Flintstones Bedrock City. These tourist attractions generally cater to people passing through the town on their way to Grand Canyon National Park. The town also features Valle airport and the Grand Canyon Inn. Valle also provides housing for some park workers. These workers pass through Tusayan to reach the South Rim of the Grand Canyon. Valle also has two gas stations, gift shops, and provides limited food items.

Other Adjacent Land Uses

In addition to private land uses, Grand Canyon National Park is surrounded by other federal land interests, including the national forest system and tribal lands. Adjacent land uses are influenced by the park, as well as any development pressure from the surrounding communities, such as Tusayan.

Federal agencies control over 33% of the land in Coconino County, which makes the

management of public land a large factor in these communities. The U.S. Forest Service, National Park Service, Bureau of Land Management, and Arizona State Land Department all manage lands within the county. Virtually all of these lands are open space. Most are heavily used by recreationists, especially national park system and national forest system lands (Coconino County 2003).

U.S. Forest Service

The U.S. Forest Service manages Kaibab National Forest, which surrounds the eastern portion of the park and includes approximately 1.6 million acres, divided between three ranger districts — the Williams, North Kaibab, and the Tusayan ranger districts. The Tusayan Ranger District is adjacent to the park's South Rim and the community of Tusayan. Kaibab National Forest is managed in accordance with the *Kaibab National Forest Land and Resource Management Plan* (USFS 2004). The plan's goals and objectives are to manage the available resources on a multiple-use and sustainable yield basis, while protecting nonrenewable resources and the environment. Specific land management objectives for the Tusayan Ranger District relate to livestock use, soil and water resources, and special land uses. Management of national forest system land adjacent to Tusayan emphasizes potential use of this land for community expansion.

A main objective of the *Kaibab National Forest Land and Resource Management Plan* is to identify particular tracts of land that are suitable for exchange to meet needs for community expansion in the vicinity of Tusayan, Parks, Ash Fork, and Williams. Potential future NPS use of national forest system lands would most likely take the form of a special use permit rather than a land exchange.

In 1999 the U.S. Forest Service and the National Park Service prepared the *Final Environmental Impact Statement for Tusayan Growth* (USFS 1999) to address the role of Tusayan as a gateway community and the development pressures faced by the community because the area is surrounded by

national forest system land and any further growth is restricted by these boundaries. The plan further analyzed these development pressures to determine if national forest system land, through a special use permit or through a land exchange, could be used to accommodate Tusayan's development needs. This plan was eventually set aside by the courts, but demonstrates the agencies' awareness of constraints in surrounding communities. The U.S. Forest Service is currently revising the *Kaibab National Forest Land and Resource Management Plan* and will likely address the role of these communities, as well as the growth pressures they face (Higgins, pers. comm. 2007).

Tribal Interests

Grand Canyon National Park is adjacent to reservations of three Native American tribes — the Hualapai, Havasupai, and Navajo. The Hualapai reservation contains approximately 992,463 acres and is on the park's southwestern boundary. The reservation is mainly composed of rugged land with few facilities (American Southwest 2007).

The Havasupai reservation contains approximately 188,077 acres and is on the southern boundary of the park and west of Grand Canyon Village. The reservation consists of plateau country, dissected by deep scenic canyons. The territory has only one village, Supai. Although only 30 miles west of the populous South Rim, the trailhead for Supai is 200 miles away by road (American Southwest 2007).

The Navajo reservation contains about 16,224,896 acres of land and borders the park on the east. This reservation is the largest of any Southwestern tribe. SR 64 comes from the east through the reservation and the town of Cameron to the East Entrance of Grand Canyon National Park. The reservation also features Cameron Trading Post, as discussed above. Lodging is also provided for park visitors (USFS 1999).

Environmental Consequences

Methodology and Assumptions

The analysis of gateway communities and adjacent lands considered the effects of implementing the South Rim visitor transportation plan under each of the proposed alternatives in relation to the impact that these changes would have on the ability of local communities members to access the surrounding areas (as measured by changes in traffic-related congestion), changes in perception of park tourists by community members, and potential conflicts with adjacent land use plans. The alternatives were also analyzed for compatibility or conflict with NPS and park guidance related to gateway communities, adjacent lands, and local areas residents. These impacts were analyzed qualitatively.

NPS *Management Policies 2006* provide guidance related to gateway communities, adjacent lands, and local area residents. The "Cooperative Conservation" section (sec. 3.4) directs that superintendents will "be aware of and monitor land use proposals and changes to adjacent land uses and their potential impacts." Park managers are also directed to encourage compatible adjacent land uses to avoid or mitigate potential adverse effects.

With regard to tourism, the NPS *Management Policies 2006* direct the park managers to support and promote appropriate visitor use through cooperation and coordination with the tourism industry (sec. 8.2.7).

For the purposes of this analysis, Tusayan is considered the main gateway community for the South Rim where the majority of services are provided for visitors. While park employees may use services in Tusayan, the main providers for services to park staff are in Grand Canyon Village, Flagstaff, and Williams. Park employees may also reside in Valle, Cameron, and other gateway communities, and these areas also provide services to park visitors; therefore, these communities are also considered in the analysis.

At the national level, park interaction with gateway communities is also influenced by *Director's Order #75A, Civic Engagement and Public Involvement* (NPS 2007b). The analysis of gateway communities takes into consideration the directives of this order to reach out to these communities during planning and to involve them in programs and activities that contribute to community vitality and the park mission.

The impact analysis for gateway communities and adjacent lands also considers park planning guidance, including the park's *General Management Plan*. The *General Management Plan* is the main planning document of the park, and it sets a vision for the South Rim area that the park

should work cooperatively with the community of Tusayan, Kaibab National Forest, and all other affected entities near the park to encourage compatible, aesthetic, and well-planned development and recreational opportunities and to provide high-quality visitor information and services (NPS 1995b).

The *General Management Plan* also includes management objectives to “understand, assess, and consider the effects of park decisions outside the park as well as inside” (NPS 1995b). Each alternative was evaluated for consistency with the park's *General Management Plan*.

In addition to park planning guidance, consideration of gateway communities and adjacent land uses also took into consideration the documents guiding land use decisions in these areas. As detailed in the “Affected Environment” above, land use in Tusayan is directed by the *Tusayan Area Plan and Design Review* (Coconino County 1997) and actions on national forest system land are guided by the *Kaibab National Forest Land and Resource Management Plan* (USFS 2004) and the *Final Environmental Impact Statement for Tusayan Growth* (USFS 1999).

Study Area

The geographic study area for gateway communities and adjacent lands is the park; the gateway communities of Tusayan, Cameron, and Valle; adjacent lands to these gateway communities; and transportation routes to and around the South Rim. The communities of Flagstaff and Williams were also included in the study area.

Impact Thresholds

The following impact thresholds were defined:

- *Negligible* — There would not be a perceptible change in the overall relationship with local communities or businesses. Change noticed by adjacent landowners would be barely perceptible, and any changes in land use would be consistent with adjacent land use plans. Effects would be barely detectable for traveling convenience or for travel time for local residents traveling to, from, and within the South Rim area.
- *Minor* — Effects would be easily detectable, but localized in geographic extent or size of population affected and would not be expected to alter the overall relationship with local communities or businesses or alter the access or travel times for gateway communities and local residents. Changes noticed by adjacent landowners would be noticed by some users, but the majority would not vocally express satisfaction or dissatisfaction with the change. Any changes in land use would be consistent with adjacent land use plans.
- *Moderate* — Effects would be readily detectable across a broad geographic area or segment of the community and could have an appreciable effect on the overall relationship with local communities or businesses, as well as the convenience of access or travel times for gateway communities and local residents. Changes noticed by adjacent

landowners would be noticed by most users, and some would vocally express satisfaction or dissatisfaction with the changes. Changes in land use may not be consistent with adjacent land use plans, but there would not be an unavoidable conflict in land uses.

- *Major* — Effects would be readily apparent, affect a substantial segment of the population, extend across the entire community, and would likely have a noticeable influence on relationships with local communities or businesses, as well as the convenience of access or travel times for gateway communities and local residents. Changes noticed by adjacent landowners would be noticed by most users, and opinions would be strongly expressed. Changes in land use would not be consistent with adjacent land use plans, and there would be an unavoidable conflict in land uses.

Nature of Impact

Adverse Impact. An adverse impact would diminish the established social and economic environment due to decreased economic conditions and traffic movement or would not be consistent with planned land uses.

Beneficial Impact. A beneficial impact would result in improved relations with local residents, business owners, and local governments due to improved economic conditions and traffic movement or would be consistent with planned land uses.

Duration

Short-term Impact. Impacts would occur only during construction.

Long-term Impact: Impacts would continue after project implementation.

Alternative A: No Action

Direct / Indirect Impacts

Quality of Life in Gateway Communities.
Traffic — This alternative would retain the existing five service lanes at the South En-

trance Station. These service lanes would continue to be served by existing infrastructure, including a temporary, pre-assembled kiosk on one lane and two lanes with stacked-booth operations.

Under alternative A park visitation is expected to increase approximately 23% over the life of the plan and 20% during peak visitation times between 2005 and 2020. Even with recent improvements at the South Entrance Station, this increase could result in more frequent traffic backups, potentially impacting residents in Tusayan by deterring or interfering with their ability to reach their destinations. Further, this traffic could deter visitation to this community because those planning to visit the park through the South Entrance might hear about the traffic and decide not to visit or to enter elsewhere during peak times. This change would be noticed by landowners, and they would be expected to voice dissatisfaction with the traffic situation. Because no additional modifications would be made to the South Entrance Station, there would be long-term, minor, and adverse impacts from traffic on the local communities under alternative A.

Park staff obtains goods and services in the communities of Flagstaff, Williams, Cameron, and Valle. Additionally, some staff may live in these communities. These personnel could also experience long-term, minor, adverse impacts from increased traffic and related time delays, particularly at the South Entrance Station, as they pass through Tusayan on the way to and from work and to get various goods and services in other communities.

Traffic conditions under the no-action alternative would be further influenced by the continued lack of parking at Canyon View Information Plaza, as well as the lack of a shuttle bus or other travel options between the park and Tusayan. This lack of parking and transit options in Tusayan deters visitors to the Grand Canyon from stopping in the city of Tusayan. The gateway communities to the park benefit from interaction with tourists and

by limiting the opportunities for this interaction, any potential benefits to these communities from tourism are not fully realized.

Housing — In addition to traffic, a quality of life concern in these gateway communities is the availability of housing. Under alternative A current housing limitations, as discussed in the “Socioeconomic Environment” section, would still persist. However, this alternative would not add measurable amounts of employment, and would not add more demand to an already tight housing market. Thus, community dissatisfaction with the availability of housing would still persist, resulting in long-term, minor, adverse impacts to this quality of life factor in gateway communities.

Adjacent Land Uses. *Tusayan Area Plan and Design Review Overlay* — Under alternative A actions taken by Grand Canyon National Park would continue to support some of the objectives identified in the *Tusayan Area Plan and Design Review Overlay* and not meet others. This transportation plan calls for developing a sense of community between Tusayan and Grand Canyon Village that would be emphasized through several objectives related to transportation and relationships with the park and visitors, including:

- Promoting a safe, environmentally sensitive, and efficient circulation system which gives convenient access to existing and future residential areas, employment centers, commercial areas, public facilities, recreation areas, and public lands. Planning should be such as to minimize the impact to surrounding forest.
- Promoting a transportation system that reduces energy consumption, and noise and air pollution.
- Promoting multi-modal transportation options.
- Tusayan shall work to provide a high level of service to accommodate the visitors to Grand Canyon National Park, while retaining an emphasis on

preserving the natural resources of the area.

- Local businesses and governmental agencies should work together to achieve a cooperative approach toward meeting tourists’ needs.

As noted in the alternative description, Canyon View Information Plaza is the primary location for in-depth park orientation, although many visitors do not go to this facility because of limited access. Park information is currently provided at the National Geographic Visitor Center in Tusayan, and at select locations in Flagstaff, Williams, and Valle. The current availability of visitor information at some locations in Tusayan demonstrates a cooperative relationship with the park and the desire to meet visitor needs that are mutually beneficial to all parties, as well as meeting some plan objectives. However, retaining the current five-lane configuration at the South Entrance Station could result in traffic back-ups during peak visitation periods extending into Tusayan, particularly as visitation increases. These traffic issues could affect a visitor’s ability or desire to obtain park information in Tusayan, and would not promote a reduction in energy consumption, noise pollution, or air pollution. Traffic and related issues in the community of Tusayan would result in local residents and businesses not being able to provide the highest level of service because of the inconvenience from traffic. Because alternative A would be only partially consistent with the objectives of the *Tusayan Area Plan*, impacts would be long-term, minor, and adverse, particularly as visitation increases.

Kaibab National Forest Land and Resource Management Plan — As alternative A would not include any proposed actions that would impact national forest system lands, there would be no impacts to consistency with the *Forest Land and Resource Management Plan*.

Cumulative Impacts

Under the no-action alternative cumulative impacts would include those projects in gateway communities or on adjacent lands

that could affect the quality of life in gateway communities, or change planned land uses on lands adjacent to the park. Recently completed, in-progress, or reasonably foreseeable projects that would have cumulative impacts under the no-action alternative include trail projects in and around the park that would be on national forest system land as well as roadway improvement in the park and on adjacent lands. Trail projects include the Greenway Trail Phases III and V, Tusayan bike trail, Trail of Time, and the Tusayan multi-use path enhancement. All of these projects would increase visitor opportunities at the park, potentially encouraging visitors to stay longer. Some of these trail projects, such as the Greenway Trail and the Tusayan multi-use path enhancement, would provide visitors with an alternative method of reaching the park, resulting in long-term, negligible, beneficial impacts to traffic. Any activities that encourage visitors to stay longer would increase the time they also spend in gateway communities, resulting in long-term, negligible, beneficial impacts to the economy of those communities and therefore the quality of life.

In-progress or reasonably foreseeable roadway projects both inside and outside the park that would have cumulative impacts include in the Desert View improvements and roadway rehabilitation, Hermit Road rehabilitation, South Entrance Road improvements, and Tusayan road improvements. During the construction phase of these projects, gateway communities could experience short-term, minor, adverse impacts as certain roads might be closed or detours created, creating an increase in local traffic. For the duration of construction, traffic would be expected to get worse, but as a result of these projects traffic conditions would be expected to improve. The widened and improved roads, as well as improvements to the entrance stations, would be expected to have long-term, moderate, beneficial impacts to gateway communities as traffic pressures would be relieved and residents living in or traveling through these communities would have better access on area roads.

Other projects that would be expected to influence the quality of life in gateway communities include rehabilitation of the historic railway depot in the park, construction of employee housing in the park, land conveyance for the Grand Canyon Unified School District, and a potential uranium mine. Rehabilitating the railroad depot would be most applicable to the community of Williams from which the railway system brings in visitors to the park. These enhancements would be expected to improve visitor experience and could possibly bring more visitors to Williams. Constructing employee housing in the park would help reduce some of the pressure on the housing market in gateway communities, freeing up more housing for residents of these communities. The Grand Canyon United School District would improve the schools in the area of these gateway communities, thus improving the quality of life for residents. Changes in land use in the vicinity of the uranium mine site could influence the residents of Tusayan if reopening the mine brought more employment to the area and further affected the already tight housing market. These projects would likely improve the quality of life for residents of gateway communities, with the mine project having potential adverse impacts on the quality of life from increased pressure on the housing market. Together, these projects would be expected to have long-term, minor, beneficial impacts to the quality of life for gateway community residents.

Cumulative impacts would also occur from changes in planned land uses, or the creation of new planning documents for adjacent lands. Plans or studies influencing land uses include the Tusayan District travel analysis process, revision of the *Kaibab National Forest Land and Resource Management Plan*, the *Grand Canyon National Park Airport Master Plan Update*, and the Tusayan incorporation study. Actions taken by Grand Canyon National Park would need to consider consistency with these plans when actions could affect land uses. Specifically, plans for the incorporation of Tusayan would be expected

to increase the quality of life for residents of that community as new community services would be added, such as police protection, street maintenance, and administration, with long-term, moderate, beneficial impacts to community residents.

Overall, the long-term, negligible to moderate, beneficial impacts of the above projects in combination with the long-term, minor to moderate, adverse impacts of alternative A would have long-term, negligible, adverse cumulative impacts to the quality of life in gateway communities and on adjacent lands. This alternative would be expected to contribute appreciably to impacts to local communities due to the expected traffic and congestion that these communities would experience.

Conclusion

Impacts to gateway communities would be local, long-term, minor to moderate, and adverse because the quality of life would be affected by traffic, lack of housing, and NPS actions that would be inconsistent with adjacent land use plans. Cumulative impacts would be local, long-term, negligible, and adverse.

Alternative B: Preferred Alternative

Direct / Indirect Impacts

Quality of Life in Gateway Communities.

Traffic — As outlined in the “Transportation” section, alternative B would involve changes at the South Entrance Station, including adding an inbound service lane. New parking and associated access to SR 64 would also be constructed on national forest system land north of Tusayan. These construction activities would cause temporary disruptions to traffic flow due to construction equipment and building activities, particularly at the South Entrance Station. These disruptions would result in short-term, minor, adverse impacts to local residents driving between Tusayan and the park.

Following construction and during operation, this alternative would expand the number of service lanes at the South Entrance Station from five to six. As detailed under the “Transportation” section, in addition to recent service improvements, the addition of a sixth service lane, along with a new parking area and shuttle bus services from Tusayan to Canyon View Information Plaza, would further reduce wait times and congestion for both visitors and local residents at the South Entrance Station because of fewer vehicles and increased efficiency. The initial pilot shuttle bus program, which would occur before any construction in Tusayan, would reduce traffic at the South Entrance Station by picking visitors up at or near their lodging. Due to these multiple improvements, traffic backups into Tusayan would be unlikely, even with increased visitation. The park’s desire to improve visitor outreach and to encourage some access through the East Entrance and Cameron, as well as encouraging visits during off-peak times, would further reduce traffic and potential congestion at the South Entrance Station and within Tusayan. For people residing in or using services in Tusayan, reduced traffic would result in long-term, minor to moderate, beneficial impacts to the quality of life. Further beneficial impacts would be realized by park staff and Tusayan residents who use services in the park who do not own automobiles and who would be able to take advantage of the new shuttle bus service.

Under alternative B, the park would take efforts to promote visitors to use the East Entrance Station. It is estimated that these efforts would result in an increase of approximately 10% of visitors entering through the East Entrance. In order to reach the East Entrance, these visitors would pass through the gateway community of Cameron. As described under socioeconomics, this shift in visitation would result in revenue of approximately \$534,200 to the community of Cameron, a direct result of more tourism to that community. This increase in tourism would impact the quality of life in this community in both beneficial and adverse

ways. Beneficial impacts would include providing additional revenue to the community that would allow the community to put these new resources into updating and maintaining infrastructure and would promote the growth of the community in general. This increase in revenue would also be felt by the residents and would create an increase in income for those related to the tourism industry. The additional demands placed on the community from an increase in tourism could also create adverse impacts such as creating traffic congestion and stress on community infrastructure. For some residents, this growth may be viewed as an adverse impact as more tourism in Cameron could change the small town atmosphere that currently exists. Overall, increased visitation would cause some long-term, negligible, adverse impacts related to additional traffic.

The potential long-term construction of a new 400-vehicle parking area at the north end of Tusayan could cause some intermittent localized congestion in the community as visitors entered and left the facility. A roundabout proposed by the Arizona Department of Transportation would minimize the traffic congestion associated with this new parking facility. New paths to connect the parking area to existing pedestrian sidewalks along SR 64 and the proposed extension of the Greenway Trail on the east side of SR 64 would also promote pedestrian use within the community and encourage visitors to leave their cars, further reducing traffic and safety issues associated with street crossings. Any congestion created by the new parking area would most likely cause some long-term, minor, adverse impacts to traffic and ease of access as some visitors passing through Tusayan would decide to park here. Overall, the beneficial impacts from an additional entrance lane and park outreach efforts would outweigh any congestion issues related to parking, resulting in long-term, minor, beneficial impacts to the quality of life for local residents.

Many park staff and concessioners obtain services from and may live in Flagstaff,

Williams, Cameron, and Valle. These staff would also experience long-term, minor, beneficial impacts as they passed through the South Entrance Station and Tusayan on the way to and from work and to acquire various goods and services. Any reduction in traffic delays in reaching their destination, residences, or desired services would improve their quality of life. The availability of a new shuttle bus service between Tusayan and the park would be an added convenience for Tusayan residents who use services within the park. This would be a beneficial impact on the quality of life for nearby residents.

The quality of life in gateway communities would be further influenced by locating a park fee collection and visitor information station at the Tusayan visitor parking area, by providing other offsite stations to purchase park passes, and by providing access to park information in other communities. These park pass stations would serve to increase the time that visitors spend in these communities, increasing the possibility that visitors would use local goods and services. Increased tourism and other business in these communities would result in long-term, minor to moderate, beneficial impacts to the quality of life.

Housing — A quality of life concern in these gateway communities is the availability of housing. As detailed in the “Socioeconomic Environment” section, alternative B would generate new employment during the construction and operation of transportation system improvements, which would require additional local housing. Although new housing opportunities could be generated in the park, Tusayan, or other areas in the county, rents could also increase, resulting in long-term, minor, adverse impacts. In addition, if no housing is available in the park or gateway communities, some workers may need to commute from communities further away.

Adjacent Land Uses. *Tusayan Area Plan and Design Review Overlay* — Under alternative B actions taken by Grand Canyon National Park would, in part, be consistent with the objec-

tives in the *Tusayan Area Plan*. As described in the “Affected Environment” section, several objectives in the *Tusayan Area Plan* related to transportation and the relationship with the park and visitors would be met by this alternative. More specifically, the *Tusayan Area Plan* calls for developing a sense of community between Tusayan and Grand Canyon Village, which would be furthered by the addition of a shuttle bus system between Tusayan and the park. This system would further reinforce the connection between these two areas, thereby enhancing a sense of community.

The transportation improvements at the South Entrance Station and in Tusayan outlined above would meet a specific goal in the plan to alleviate traffic congestion in Tusayan and the park by staging areas for public transit at convenient and accessible locations in Tusayan, within the national park, and other appropriate locations. These improvements would also promote a safe and efficient circulation system to provide convenient access to various areas of the community.

Providing a vehicle parking area in Tusayan and shuttle bus service into the park under alternative B would meet the objectives of reducing energy consumption, noise pollution, air pollution, and of promoting multimodal transportation. The shuttle bus service would also accommodate park visitors, while retaining an emphasis on preserving the natural resources of the area as required by the local plan. Further, additional parking in both the park and Tusayan, along with promoting visitor and community outreach activities, would encourage an ongoing working relationship between the National Park Service and the community to achieve a cooperative approach toward meeting tourists’ needs.

Conversely, a parking facility and shuttle staging area in Tusayan could increase noise levels and alter visual characteristics in the northern area of Tusayan and might not fully meet the objectives to protect and improve the

aesthetic and audio quality of the environment. However, the design of the new facilities would be consistent with the 1995 *Tusayan Area Plan Design Review Overlay Zone’s* guidelines for new construction. Additionally, national forest system land would be used for parking near Tusayan, which would not be consistent with the objective to minimize impacts to the surrounding forest.

Overall, actions under alternative B would be consistent to a large degree with the objectives of the *Tusayan Area Plan* and would result in impacts from adjacent land use that would be long-term, moderate, and beneficial.

Kaibab National Forest Land and Resource Management Plan — If through the adaptive management process it was decided to construct the parking area in Tusayan and institute a shuttle bus system, the parking facility would be on national forest system lands near Tusayan and would need to be consistent with the objectives of the *Kaibab National Forest Land and Resource Management Plan*. An agreement (such as a special use permit) between the U.S. Forest Service and the National Park Service would detail the conveyance and management responsibilities for this new land use.

The Greenway Trail between the park and Tusayan would also be on national forest system land and would also need to be consistent with USFS objectives. The National Park Service would continue to coordinate closely with the Forest Service; efforts related to this plan are described in Chapter 4. USFS involvement and support would continue to meet the objective of considering state and NPS management objectives for Grand Canyon National Park. As discussed above, placing transportation improvements in Tusayan would help that community meet its plan objectives and would therefore meet USFS objectives for coordination with communities and consideration of social and economic impacts on communities that are dependent on Grand Canyon National Park

tourism. The Greenway Trail would also promote this goal. As the USFS objectives would be met to a large degree, long-term, moderate, beneficial impacts would occur related to this adjacent land use.

Cumulative Impacts

Under alternative B impacts related to past, in-progress, or reasonably foreseeable projects would be the same as those described for alternative A. The long-term, negligible to moderate, beneficial impacts of these projects in combination with the short- and long-term, minor, adverse and the long-term, minor to moderate, beneficial impacts of alternative B would result in long-term, moderate, beneficial cumulative impacts to the quality of life in gateway communities and to planned uses on adjacent lands. This alternative would be expected to contribute appreciably to impacts to local communities because of expected reductions in traffic and congestion that these communities would experience, along with the accomplishment of multiple plan goals.

Conclusion

Impacts to gateway communities would be local, long-term, minor to moderate, and beneficial because quality of life would be improved and NPS actions would be consistent with adjacent land use plans. Local, short- and long-term, negligible to minor, adverse impacts would also occur from some limited traffic congestion and potential increases in rental housing rates. Cumulative impacts would be local, long-term, moderate, and beneficial.

Alternative C: Tusayan Parking Emphasis

Direct / Indirect Impacts

Quality of Life in Gateway Communities.

Traffic — Under alternative C the current five entrance lanes at the South Entrance Station would be maintained; however, a new parking area in Tusayan (up to 920 vehicles) would be constructed in multiple stages based on an adaptive management process. These construction activities could temporarily disrupt

traffic flow and interfere in local access to some facilities, such as the National Geographic Visitor Center in north Tusayan, resulting in short-term, minor, adverse impacts to local residents.

Although no new traffic lanes would be added at the South Entrance Station, the new visitor parking area in Tusayan and the related shuttle bus system into the park would substantially reduce visitor traffic through the South Entrance Station. Because of these improvements, visitation could increase while maintaining less traffic-related congestion at the entrance station and on SR 64 between Tusayan and the park. As described for alternative B, NPS efforts to enhance visitor outreach and encourage some visitor access through the East Entrance and Cameron, as well as encouraging visits during off-peak times, would further reduce traffic and potential congestion at the South Entrance Station and within Tusayan. For people residing in or using services in Tusayan, less traffic congestion would result in long-term, moderate, beneficial impacts to the quality of life.

Parking for up to 920 vehicles in Tusayan could cause some intermittent localized traffic congestion as visitors entered and left the facility. However, as noted in alternative B, design features such as the roundabout proposed by the Arizona Department of Transportation would minimize this congestion. New paths would promote pedestrian use within the community, and along with the shuttle buses, encourage visitors to park their cars, further reducing traffic.

As noted under alternative B, increased visitation through Cameron could beneficially affect the quality of life in Cameron by improving economic opportunities, but it would also cause some long-term, negligible, adverse impacts related to additional traffic.

Overall, the beneficial impacts from the reduced traffic through the South Entrance Station and NPS outreach efforts would outweigh any congestion issues related to

parking, resulting in long-term, moderate, beneficial impacts to the local community.

Similar to alternative B, some park staff live in communities like Valle or obtain services in other gateway communities, such as Flagstaff and Williams. These staff would also experience long-term, minor, beneficial impacts as they pass through the South Entrance Station and Tusayan on the way to and from work and to acquire various goods and services. The new shuttle bus service would also benefit those employees who do not own automobiles. Any reductions in traffic delays for staff in reaching destination or services would improve their quality of life.

Similar to alternative B, the availability of a new shuttle bus service between Tusayan and the park would benefit the quality of life for Tusayan residents who use park services by improving ease of access into the park. The quality of life in gateway communities would be further influenced by allowing park visitors to buy entrance passes in gateway communities, as well as providing park information at these locations, as described under alternative B. This would result in beneficial impacts to the community.

Housing — As described for alternative B, greater employment could result in increased housing opportunities (due to demand), but higher rental rates in the park, Tusayan, or other communities would result in long-term, minor, adverse impacts. In addition, if no housing is available in the park or gateway communities, some workers may need to commute from communities further away.

Adjacent Land Uses. *Tusayan Area Plan and Design Review Overlay* — Actions proposed in alternative C are very similar to alternative B, although the amount of parking would vary between Tusayan and Canyon View Information Plaza. Therefore, this alternative would meet the objectives of the *Tusayan Area Plan*, similar to alternative B, with the following additions or exceptions:

- Encouraging more visitors to park in Tusayan and take shuttle buses into the park would further meet objectives of reducing energy consumption and promoting multimodal transportation options.
- The larger parking area and increased shuttle bus service in Tusayan would raise noise levels and visual disturbances more than under alternative B, possibly not meeting the objectives to protect and improve the aesthetic and audio quality of the environment. Additionally, a larger acreage of national forest system land would be required for parking and would not be consistent with the objective to minimize impacts to the surrounding forest.

Because the proposed actions under alternative B would be consistent to a large degree with the objectives of the *Tusayan Area Plan*, impacts to this adjacent land use would be long-term, moderate, and beneficial.

Kaibab National Forest Land and Resource Management Plan — This alternative would require the use of national forest system land, and as described in alternative B, this would be consistent with the objectives of the *Kaibab National Forest Land and Resource Management Plan* and the NPS objective to coordinate closely with federal partners. Therefore, long-term, moderate, beneficial impacts would occur related to this adjacent land use.

Cumulative Impacts

Past, in-progress, and reasonably foreseeable projects would result in the same impacts as those described in alternative A. The long-term, negligible to moderate, beneficial impacts of the above projects in combination with the long-term, minor to moderate, beneficial, and the short- and long-term, negligible to minor, adverse impacts of alternative C would have long-term, minor, beneficial cumulative impacts to the quality of life in gateway communities and planned uses on adjacent lands. When considered with the above projects, this alternative would be

expected to contribute appreciably to impacts to local communities due to the reduced traffic and congestion that these communities would experience.

Conclusion

Impacts to gateway communities would be local, long-term, minor, and beneficial because the quality of life would be improved. Local, long-term, moderate, beneficial impacts would also occur as NPS actions would be consistent with adjacent land use plans. Local, short- and long-term, negligible to minor, adverse impacts would occur from some limited traffic congestion and potential increases in rental housing rates. Cumulative impacts would be local, long-term, minor, and beneficial.

Alternative D: Canyon View Information Plaza Parking Emphasis

Direct / Indirect Impacts

Quality of Life in Gateway Communities.

Construction Impacts — Alternative D would involve the construction of parking in phases at Canyon View Information Plaza and the addition of a service lane if needed at the South Entrance Station. These activities could result in short-term, minor, adverse impacts due to potential traffic disruptions for local residents, particularly at the South Entrance Station. These short-term impacts could occur multiple times, corresponding to the phased implementation of the improvements in alternative D.

Locating all private vehicle parking at Canyon View Information Plaza under alternative D would result in the highest traffic volumes through the South Entrance Station because more private vehicles would enter the park as visitation increases. However, the addition of a service lane would reduce wait times for visitors and minimize traffic congestion, similar to alternative B. Additionally, the bypass lane could be used as a service lane during peak periods, further reducing congestion or the potential for traffic backups into Tusayan. Similar to alternative B, enhanced visitor

outreach and encouraging access through the East Entrance and Cameron, as well as during off-peak times, would further reduce traffic and potential congestion at the South Entrance Station and in Tusayan. Despite the anticipated increases in traffic as visitation increases, these improvements would have long-term, moderate, beneficial impacts for those local residents residing in or using services in Tusayan and the park.

Since no parking would be provided in Tusayan, there would be no-parking related congestion as discussed in alternatives B and C. As in the other action alternatives, increased visitation through Cameron could beneficially impact quality of life in Cameron by improving economic opportunities, but it would also cause some long-term, negligible, adverse impacts related to additional traffic.

Similar to the other action alternatives, many park staff live in and obtain services in Flagstaff, Williams, and Valle. These individuals would also experience long-term, minor, beneficial impacts as they passed through the South Entrance Station and Tusayan on the way to and from work or to acquire various goods and services.

The quality of life in gateway communities would be further influenced by allowing the purchase of park entrance passes in gateway communities, along with providing park information. As a result, visitors might stay longer these communities, increasing the possibility of buying goods and services. Increased tourism and other business in these communities would further contribute to the beneficial impacts to quality of life. However, some potential benefits would not be realized because the lack of visitor parking, especially in Tusayan, could reduce the potential interaction between visitors and local businesses.

Housing — Potential impacts to housing would be less than under alternatives B and C because there would be less need for new housing without a new shuttle bus operation between Tusayan and the park. Increased employment could create additional oppor-

tunities for housing, but also raise rents. Impacts would be long-term, negligible, and adverse.

Adjacent Land Uses. *Tusayan Area Plan and Design Review Overlay* — Alternative D would not be consistent with the objectives in the *Tusayan Area Plan*, which calls for the development of a sense of community between Tusayan and Grand Canyon Village. Providing all parking at Canyon View Information Plaza and none within Tusayan with an associated visitor shuttle bus system would not further this overall goal to the same degree as would alternatives B and C.

Improvements at the South Entrance Station would help promote a safer and more efficient circulation system by providing more convenient access to various areas of the community. However, alternative D would not be consistent with the objectives of reducing energy consumption, noise pollution, and air pollution, and promoting multimodal transportation. Similar to alternative A, there would be no shuttle bus system, and all visitors would enter the park by private vehicle or tour bus or by trail along the new Greenway Trail.

Further, the *Tusayan Area Plan* directs the community of Tusayan to provide a high level of service to accommodate park visitors, while retaining an emphasis on preserving the natural resources of the area. The plan also encourages local businesses and governmental agencies to work together to achieve a cooperative approach toward meeting visitors' needs. While the lack of parking in Tusayan would help preserve undeveloped national forest system land, the opportunity to provide a higher level of service to visitors, as well as for the community and the National Park Service to work together as partners in addressing the park's transportation issues, would be missed. More specifically, the shuttle bus system outlined in the plan would not be achieved.

Because alternative D would not be consistent with all the objectives of the *Tusayan Area*

Plan, impacts to adjacent land use would be long-term, minor, and adverse.

Kaibab National Forest Land and Resource Management Plan — Alternative D would not require the use of national forest system lands for a parking and shuttle staging facility. However, the Greenway Trail would be developed and would be consistent with *Kaibab National Forest Land and Resource Management Plan*. This would result in long-term, minor, beneficial impacts.

Cumulative Impacts

Impacts related to past, in-progress, or reasonably foreseeable project are the same as those described under alternative A. The long-term, negligible to moderate, beneficial impacts of these projects in combination with the long-term, minor to moderate, beneficial and the short- and long-term, negligible to minor, adverse impacts of alternative D would have long-term, negligible, beneficial cumulative impacts to the quality of life in gateway communities and other planned uses on adjacent lands. When considered with the above projects, this alternative would be expected to contribute appreciably to impacts to local communities due to some reduced traffic and congestion that these communities would experience because of more efficient operations.

Conclusion

Impacts to gateway communities would be local, long-term, minor to moderate, and beneficial because quality of life would be improved. Impacts would also be local, long-term, negligible to minor, and adverse due to NPS plans that would be inconsistent with local land use plans. Local, short- and long-term, negligible to minor, adverse impacts would also result from some limited traffic congestion and potential increases in rental housing rates. Cumulative impacts would be local, long-term, negligible, and beneficial.

PARK OPERATIONS AND MANAGEMENT

Affected Environment

Park operations and management refer to the adequacy of staffing levels and the quality and effectiveness of park infrastructure in protecting and preserving vital resources and providing for an effective visitor experience. Park infrastructure facilities include roads that provide access to and within the park (for administrative, visitor, and emergency use), housing for staff required to work and live in the park, visitor orientation facilities (visitor centers, developed and interpreted sites, and other interpretive features), visitor amenities (including lodging and food service), administrative buildings (park staff offices and workspace), management-support facilities (garages, shops, storage buildings and yards used to house and store equipment, tools, and materials), and utilities (phones, sewer, water, and electricity). As relates to this plan, specific features within the project area that the National Park Service is responsible for and could be affected by proposed actions include:

- park roads and turnouts, including the South Entrance Station, entrance pullout, and South Entrance Road
- the Canyon View Information Plaza area, and the Mather Point overlook and parking area
- Grand Canyon Village parking areas, such as Bright Angel Lodge and lot D
- Yaki Point and Yavapai Observation Station overlooks
- Grand Canyon Railroad depot, tracks and loading platforms
- bus shelters and wayside exhibits
- the maintenance area
- trails

Outside the park's designated boundaries, specific areas and features within the project area but on national forest system land that the National Park Service could be responsible

for include the proposed Greenway Trail connection to Tusayan and a potential shuttle bus staging area near Tusayan.

The park superintendent is ultimately responsible for park operations and management. In 2006 the park employed 415 full-time equivalent (FTE) employees to manage operations, including visitor services and facilities, resource management and preservation, planning and environmental compliance, emergency medical services, law enforcement, search-and-rescue operations, fire center operations, air operations, facility management and maintenance, and administrative duties (NPS 2007e). Park divisions with responsibility over facilities and related operations addressed in the project area are described below.

Maintenance

The Maintenance Division is responsible for the upkeep of the park's roads, trails, parking, utilities, and buildings. Within the park are 1,142 structures, of which 553 are assigned to concessioners, numerous campsites and RV sites, 51 miles of maintained trails and 228 miles of roads, and numerous parking lots and landscaped areas. The National Park Service currently operates its own landfill and its own sewage treatment plants. The park has a 14-million-gallon water storage capacity at the South Rim and uses 600,000 gallons per day during mid-summer. Historically the park has supplied a limited amount of water to the community of Tusayan; the park also supplies water year-round to the USFS Tusayan Ranger Station (Coconino County 1997).

Visitor and Resource Protection

The Visitor and Resource Protection Division provides for the overall safety of park visitors. The division includes law enforcement rangers, emergency medical services, search-and-rescue crews who respond to public safety and emergency visitor needs, and structural and wildland fire. This division also encompasses responsibility for the park's fee management program. For this plan, this would

include entry fee collection, which is currently run from an office in Grand Canyon Village.

All park operations, especially maintenance, law enforcement, and firefighting operations, are affected by the state of the roadways. NPS law enforcement officers, on average, go into Tusayan 85 times a year to assist and provide aid to the county sheriff (Nash, pers. comm. 2007). The National Park Service provides mutual aid to the Tusayan Fire District for emergency medical and firefighting needs. The park's Grand Canyon Clinic provides primary medical care for the area, treating minor cases and stabilizing more serious cases for transport to another center (USFS 1999). There is also a first-aid station at Canyon View Information Plaza. The park's emergency medical services and search-and-rescue teams often respond to emergencies, including performing technical recoveries at Canyon View Information Plaza and Mather Point. Emergency response can often include technical recoveries at the canyon overlook areas (Phillips, pers. comm. 2007).

The National Park Service has a mutual aid agreement with the U.S. Forest Service and the Bureau of Land Management for law enforcement. This means that when NPS rangers respond to incidents on national forest system lands, they enforce USFS regulations on those lands. The Forest Service also provides law enforcement and has cooperative agreements with both Coconino County and the National Park Service. The Forest Service has its own firefighting crew, which is primarily responsible for wildland fires and operates out of the Tusayan Ranger Station. The National Park Service also has a mutual aid agreement with the county sheriff's office for law enforcement and search and rescue. The Tusayan Fire Department provides coverage in the immediate Tusayan area (5 square miles) as well as coverage from the park's south entrance on SR 64 south to milepost 219 (Tusayan Fire Department 2007). The Tusayan Fire Department provides mutual aid to the national park by request and also works with NPS and USFS wildland

crews during the fire season (Tusayan Fire Department 2007).

Visitor Education and Interpretation

The Division of Interpretation and Resource Education is responsible for the park's overall interpretive programs, visitor orientation, and wayfinding systems. Interpretive rangers provide an array of services to enhance visitor experiences, such as ranger-guided programs, visitor information and services, and educational opportunities; they also oversee the development and production of park brochures, maps, and wayside exhibits. At Canyon View Information Plaza, interpretive rangers rove throughout the area to provide visitor information and assistance.

Science and Resource Management

The park's Science and Resource Management staff is charged with monitoring, protecting, and preserving those resources that contribute to the park's significance and world heritage status. Natural resource specialists conduct research and monitor ecosystems and the physical environment in order to preserve and restore healthy ecosystems and populations. Cultural resource specialists monitor projects and perform research to ensure the stabilization, preservation, and restoration of historic structures, landscapes, and archeological and ethnographic resources.

Administration and Concessions

The Administration and Concessions divisions are responsible for park procurement and concessions contracts. The park has over 22 concessioners that provide an array of services (NPS 2007e). Xanterra Parks & Resorts, LLC, is the current operator for the Grand Canyon Railway and related tour bus operations, as well as many of the visitor amenities, such as food service and lodging. Paul Revere Transportation is under contract with the park to operate the shuttle bus system. The park also oversees the permitting program for approximately 400 tour operators

who visit the park. The Grand Canyon Association operates under an agreement with the park to manage and operate six bookstores within the park, including one at Canyon View Information Plaza, which is also the largest in the park.

In 2006 the park's overall operating budget was a little over \$19 million. The park also received just over \$15 million in project and special program funding and locally generated reimbursements, utilities, concessions, and donations. In fiscal year 2006 the park also received \$9.79 million from the recreation fee demonstration program (now referred to as the Federal Recreation Enhancement Act). Twenty-four percent of the single-vehicle entry fee at park entrances and the National Geographic Visitor Center is retained by the park to directly support transportation programs.

Environmental Consequences

Methodology and Assumptions

Discussions with park managers were held to establish an understanding of existing staffing levels and an assessment of current park operations that would be affected through implementation of the various transportation alternatives. Impacts to park operations and management were assessed in the following areas:

- *Facilities and operational efficiency* — Impacts on park facilities and related operations were assessed for each alternative by determining changes that would be needed for park staff to conduct day-to-day business, respond to emergencies, and conduct routine maintenance and law enforcement activities at current levels of service. This includes an assessment of changes to the built environment (e.g., buildings and infrastructure), and subsequent effects on emergency response times, increased enforcement needs, and the overall maintenance program.



Interpretive rangers provide an array of services to enhance the park visitors' experiences, such as ranger-guided programs, visitor information and services, and educational opportunities.

- *Staffing* — Elements of each alternative could change existing staff requirements. This evaluation considers whether additional workload would be added or contracted services (including concessions) would be required to accomplish a larger workload on an ongoing basis. This includes changes that could occur in all park divisions, including resource management, business office, and interpretation.
- *Capital and annual operating costs, and funding sources* — Impacts on the park's annual operating budget and funding sources are evaluated for each alternative. Impacts are evaluated by assessing changes that would be required to meet one-time capital improvements (building and infrastructure costs), as well as operational requirements (including transportation services, annual maintenance, and operations) under each alternative. Discussions with park staff yielded input into anticipating operational changes that would be needed under each alternative. Estimates of operational changes were compared to existing staffing levels and are estimates only to provide a general description of potential effects, considering the variability within the range of possible

operational scenarios. The evaluation also considers the financial requirements for each alternative and the availability of existing and/or new funding sources to meet additional operating and capital costs. The assessment also looks at potential cost-sharing opportunities. These effects were then compared to existing operations, staffing and funding at the park.

- *Interagency relations* — Under some alternatives there would be a need for new agreements with other governmental agencies, such as the U.S. Forest Service, to address topics such as land management, a special use permit, jurisdictional responsibilities, staffing needs, and cost-sharing. Impacts related to the establishment of these agreements and their overall management are considered for each alternative.

Study Area

The study area for park management and operations would be the South Rim of Grand Canyon National Park and Kaibab National Forest.

Impact Thresholds

The following impact thresholds were defined:

- *Negligible* — A change in operations would be localized and barely perceptible or measurable. There would be no measurable difference in operating costs from existing levels, and no change in financial balance between revenue sources and operating costs.
- *Minor* — A change in operations would be slight and localized, with few measurable consequences within existing park facilities. Additions or reductions in operating costs would be less than 15% of existing levels. Slight changes in current staffing arrangements or operations would be required to reach a balance with the funding stream.

- *Moderate* — A change would be readily apparent, with measurable consequences and would occur inside and outside park boundaries. Additions or reductions in operating costs would be between 16% and 30% of existing levels. Changes would be required in park operations or would result in a financial imbalance between available funding streams and annual operating costs.
- *Major* — A change would be readily apparent, with measurable consequences over a regional area. Additions or reductions in operating costs would be more than 30% of existing levels. Changes would require new administrative structures and/or would result in a significant financial imbalance between available funding streams and annual operating costs.

Nature of Impact

Adverse Impact. An adverse impact would degrade park operations or the ability to provide services, or would result in an increase in operating costs.

Beneficial Impact. A beneficial impact would improve park operations or enhance the ability to provide services, or would result in a decrease in operating costs and operational efficiency.

Duration

Short-term Impact. The impact would occur only during the construction period and the post-construction period (up to 5 years after construction), when revegetation and monitoring are first underway.

Long-term Impact. The impact would occur or continue after construction was completed.

Alternative A: No Action

Direct / Indirect Impacts

Under alternative A the park would continue its current transportation management program, and there would be no physical improvements to the park's infrastructure to

address current transportation and circulation issues. There would be no improvement or change to the South Rim facilities other than those projects that are completed or underway, such as improvements to the South Entrance Station. These improvements would be monitored to track changes in traffic flow and congestion at the South Entrance Station.

Maintenance of all park roads, overlooks, and transportation facilities would continue. The shuttle bus operation would continue, with modifications to the Hermits Rest route, which would result in three additional vehicles being put into service during peak visitation periods. Modifications to the existing shuttle bus system would result in an estimated increase of 10 employees for the shuttle contractor and 2 park staff positions during June, July, and August; the existing shuttle fleet would also increase by four vehicles, for a total count of 30 shuttle buses (see Table 63).

There would be no change to the park's current operations beyond ongoing programs, which include providing trip information to park visitors through the park website, highway advisory radio, outreach to other providers, and personal contact with visitors at the park entrance stations and contact locations outside the park. The park would expand coordination with partners and gateway communities to encourage pre-payment of entry fees and to provide trip planning information. There would be minimal changes to the park's current staffing and there would be no new impacts on park operations and management. Total annual operating and maintenance costs for alternative A would be

approximately \$759,000 higher than existing costs because of the upcoming changes in service frequencies on Hermits Rest shuttle bus route. This would result in a long-term, minor, adverse impact.

Cumulative Impacts

Other past, in-progress, and reasonably foreseeable actions within and around Grand Canyon National Park could impact park operations and management. Several projects that are either scheduled or proposed for construction work in or adjacent to the project area could have short-term, negligible to minor, adverse impacts on park operations because of increased workload for park staff for visitor management and law enforcement. These projects include the Bright Angel trailhead design plan, Hermit Road rehabilitation, Desert View improvements and road rehabilitation, parkwide restroom improvements, and the South Entrance Road improvements. Impacts on park operations would be local, long-term, minor, and beneficial because of greater efficiency. These impacts in combination with the local, long-term, minor, impacts of alternative A would result in long-term, minor, beneficial cumulative impacts to park operations and management. Alternative A would contribute marginally to cumulative impacts.

Conclusion

Alternative A would result in a local, long-term, minor, adverse impact to park operations and management. There would be local, short-term negligible to minor, adverse cumulative impacts and a local, long-term, minor, beneficial cumulative impact.

TABLE 63. SHUTTLE STAFFING AND VEHICLE PROJECTIONS

	South Rim Shuttle Bus			Tusayan-Canyon View Information Plaza Shuttle Bus			Total		
	Contractor Shuttle Employees	NPS Staff	Fleet Vehicles	Contractor Shuttle Employees	NPS Staff	Fleet Vehicles	Contractor Shuttle Employees	NPS Staff	Fleet Vehicles
Existing Conditions	57	11	26	NA	NA	NA	57	11	26
Alternative A	67	13	30	NA	NA	NA	67	13	30
Alternative B	78	13	35	13	5	5	91	18	40
Alternative C	78	13	35	28	5	12	106	18	47
Alternative D	78	13	35	NA	5	NA	78	18	35

Alternative B: Preferred Alternative

Direct / Indirect Impacts

Under alternative B substantial changes to the park's current transportation program would affect park operations and management. Various improvements would be made in and outside the park to support a more effective transportation program. Under this alternative operational efficiency would be improved by providing physical enhancements in needed locations, such as parking at Canyon View Information Plaza, and through a slight increase in staffing to directly support the transportation program.

Construction Impacts. Some day-to-day operations would be disrupted as a result of actions such as temporary road and overlook closures, traffic rerouting, and increased truck traffic. There would also be an increased demand on staff time for managing construction contracts and associated activities, including post-construction monitoring by resource specialists. Construction would take place in different phases and would be spread over several years. Mitigation measures such as developing a temporary shuttle bus service routing plan during construction, limiting the transport of debris and equipment to off-peak traffic periods, and defining a construction management program for each construction phase would help minimize disruption to park operations and management. Employee and worker safety would be a high priority at all times, and appropriate actions, such as fencing construction sites and using regulatory signs, would be taken to ensure safe construction zones. However, the resulting short-term impacts to park operations during construction would remain moderate and adverse regardless of when and where a specific construction activity took place.

Operations Impacts. Facilities — Proposed improvements at Canyon View Information Plaza include rerouting the South Entrance Road; constructing a new parking area, shuttle bus stops, a tour bus drop-off, and tour bus parking; rehabilitating the Mather Point

overlook; and providing a theater and bike rental facility. Maintenance operations and responsibilities would increase for these new facilities. However, new facilities would be designed to minimize maintenance needs and reduce the current burden on park staff to address ongoing traffic congestion problems at Mather Point and Canyon View Information Plaza. Consistent with NPS *Management Policies 2006*, park facilities and operations would demonstrate environmental leadership by incorporating sustainable practices to the maximum extent practicable in design, construction, and maintenance. Principles of sustainable design and energy efficiency demonstrated in existing facilities at Canyon View Information Plaza would be used with any new construction. New structures and facilities would use existing utility lines and infrastructure so as to minimize any increased demand. Emergency access would be retained. Removing the Mather Point parking lot and South Entrance Road segment, in conjunction with the new parking area at Canyon View Information Plaza, would reduce safety hazards caused by vehicular and pedestrian use conflicts and congestion in this area. In addition, park staff would be required to be onsite less often to manage traffic at peak visitation times. Park staff would still have to enforce no off-road parking, but the need should decrease from current conditions because sufficient parking would be available.

The Grand Canyon Railway staging area would be modified by removing parking at lot D and constructing a new access drive, with limited tour bus loading areas and parking, on the south side of the tracks. These modifications would improve the railway passenger tour bus loading operations.

A new building at the South Entrance Station for fee administration staff would improve operations by moving the fee program staff closer to the park's busiest entrance. Relocating these staff positions would reduce the amount of travel time currently spent between the two sites.

The new shuttle bus service between Canyon View Information Plaza and Tusayan would initially be run as a pilot program, with the National Park Service working directly with businesses in Tusayan to determine the level of interest and demand for such a service. No new parking facilities would be developed in Tusayan under the pilot program. Under later phases the National Park Service could construct a new shuttle bus staging and parking area in Tusayan on national forest system land. The staging and parking area would also include a fee collection and visitor information station, covered shelters, restrooms, and wayside exhibits. This new staging area, as well as the Greenway Trail extension from the park's south boundary into Tusayan, would add responsibilities for the park protection.

Overall, proposed changes at Canyon View Information Plaza, Mather Point, the Grand Canyon Railway staging area at lot D, the South Entrance Station, and Tusayan would add to the number of facilities that the park maintains. However, the increase in operations, as described below, would be outweighed by the expected benefit to park resources that would be achieved.

Staffing — Under alternative B, as well as all of the action alternatives, the park would implement a set of transportation operational strategies intended to positively influence visitation patterns, provide higher capacity at existing facilities, and improve transportation system integration. The effect of these strategies on park operations and management would be to reduce, postpone, or potentially eliminate the need for capital infrastructure improvements within the park to meet projected visitation and transportation demands. If effective, these strategies would improve the park's overall operational efficiency in handling visitor traffic and transportation-related concerns. These programs would be closely monitored and used to inform subsequent investments and management decisions.

Over the long term, with proper monitoring and program adjustments along the way, the

result should be a beneficial impact on park operations as programs were established and desired objectives met. Under alternative B and all of the action alternatives there would be an initial investment in capital costs and operational expenses associated with implementing these measures. The following are key strategies for the transportation operations program:

- *Transportation Operations Coordination and Monitoring* — The National Park Service would designate a park staff person to coordinate and monitor transportation operations. A monitoring program would be tailored specifically to the early improvements. The National Park Service would collect data to gain an understanding of transportation conditions, related visitor satisfaction, and suggestions for improvements. Park staff would coordinate with transit staff on potential changes to shuttle bus service; apply for transportation grants for capital improvements and programs; and actively explore collaborative opportunities with regional partners.
- *Parking Management* — The National Park Service would actively manage parking in Grand Canyon Village to achieve maximum utilization of existing and proposed parking areas. The focus would be on parking management for major activity areas and during special events, such as on peak-visitation days. The park would employ a roving staff person to facilitate parking management. The National Park Service could also enforce the prohibition against unauthorized off-road parking with measures such as posting signs and placing boulders or other barriers along roadsides.
- *Tour Bus and Train Loading/Unloading and Parking* — The National Park Service would actively manage tour bus and train passenger loading/unloading operations and would prepare a man-

agement plan for tour bus and train operations in cooperation with the park concessioner. The park would notify permit holders of any changes. Tour bus management strategies would include an increase in tour bus access to some South Rim sites, and parking modifications to ease current congestion problems.

- *Traveler Information System and Visitor Outreach* — The National Park Service would develop new trip-planning information and services for visitors before they arrived in the park. As part of this initiative, the park's shuttle bus operator would provide individuals to meet and greet visitors at major shuttle bus stops and to assist with visitor orientation to the shuttle bus service. Intermodal connections between shuttle bus routes, parking areas, and trails would be improved and promoted by the park.
- *Offsite Pass Sales* — The National Park Service would strive to increase offsite sales of park entrance passes and would work closely with businesses in gateway communities to achieve this.
- *Orientation and Wayfinding* — The National Park Service would update and implement the "Sign Plan for the South Rim" in an effort to improve orientation and wayfinding for park visitors.
- *Intelligent Transportation Systems* — The National Park Service would offer additional dynamic visitor information about congestion and shuttle bus service choices en route to the park and would work with the Arizona Department of Transportation on some of these projects.

Under alternative B the major increase to staffing would be the result of modifications to the existing South Rim shuttle bus service, plus operational requirements for the proposed shuttle bus service to Tusayan. To effectively implement the transportation

operation strategies described, an annual increase of 1.5 FTE employees to park staff would be needed for a transportation coordinator function, and an increase of 4.5 FTE employees to transit operator staff to provide greeters and parking management assistance from March to October, with additional temporary staff of up to 11 persons on peak-visitation days (approximately 10 per year).

The proposed shuttle bus service would require an increase of 5 employees to NPS staff at full build-out to assist with transit operations from June through August, and an increase of 24 employees to the shuttle contractor staff, as compared to alternative A. The staffing estimates include adjustments to improve the South Rim shuttle bus service as well as to implement the proposed Tusayan service. These improvements would require an increase of 5 buses in the shuttle fleet (from 30 to 35 vehicles). All of these estimates are for the peak summer months only (see Table 63).

Alternative B would also result in a short-term increase in workload to park divisions such as contracting (for administration of construction contracts, modifications to tour bus permits, shuttle transit operations agreements, etc.); natural and cultural resource staff for construction and post-construction resource monitoring; the project management office for design and construction work; visitor and resource protection for expanded or enhanced fee collection programs; and visitor education and interpretation to implement transportation strategies such as enhanced visitor outreach and education.

Some long-term increases to park workload would occur for maintenance because there would be more facilities to maintain. Some of this work could be contracted out, and costs have been provided for ongoing maintenance of the proposed improvements. At full build-out an increase to the Visitor Education and Interpretation Division would be needed to operate the Canyon View Information Plaza theater and associated programs, to serve as "interpretive ambassadors" for arriving

visitors during the summer months, and to support the Tusayan shuttle staging area for fee collection and visitor information. For the Visitor and Resource Protection Division, there would be added responsibilities for protection and emergency services at the Tusayan shuttle staging area at full build-out.

Implementation Costs and Funding. Under alternative B the park would take an adaptive management approach to implementing proposed actions. Such a program would ensure that the park exercised fiscal resourcefulness in undertaking priority projects when most needed and when funds were available. Those physical improvements inside the park that would meet the most pressing transportation-related needs would be implemented first, while concurrently investing in operational strategies that support the plan, in cooperation with the gateway communities (mostly Tusayan). An example of this effort would be the implementation of the pilot shuttle bus service from Tusayan to Canyon View Information Plaza and encouraging overnight guests in Tusayan to leave their vehicles at their lodging. Based on the results of the initial efforts outside the park, and also based on visitation increases and changes in visitor use patterns (induced by the new transportation system and other factors), park managers could pursue the development of facilities outside the park (such as parking and a transit staging area), as well as expanded operational and management strategies (more shuttle bus service). For purposes of this analysis, this document assumes that full implementation of proposed improvements would be achieved but that the schedule would be contingent on the adaptive management process established by the park to assess the effectiveness of the transportation program and to determine when additional phases of implementation were needed.

The capital costs for construction of transportation-related improvements under alternative B would be up to approximately \$32.4 million. The gross construction cost estimate for other site improvements (including the theater and

other visitor facilities) would be an additional \$4.1 million. In addition there would be up to \$6.1 million to purchase transit vehicles. The estimated annual operating costs associated with implementation of alternative B would total \$706,000 for transportation management (which includes transportation operating strategies), up to \$2.6 million for shuttle bus operations, and up to \$570,000 for facility maintenance. These estimates are all in 2007 dollars.

This alternative would result in substantial capital improvements to the park's transportation infrastructure. Capital improvements associated with transit services would be financed through various sources. The primary funding source would be the fee demonstration program, as described in the "Affected Environment" section. However, other sources of funds could become available to supplement specific projects.

The National Park Service would implement priority projects as funding became available. Therefore, the amount and availability of funding, both for capital expenditures and operational expenses, would influence when the park would implement specific projects. If a funding opportunity arose, such as cost-sharing with a partner, philanthropic funds, or access to grant monies, the National Park Service could decide to accelerate specific projects proposed in this plan.

This alternative would not impact the balance between the park's annual operating budget and existing funding sources. There would be no increase to the park's base funding for operations to implement this alternative; rather, funding for additional staff would come from the fee demonstration program.

Interagency Relations. The National Park Service and the U.S. Forest Service would enter into an intergovernmental agreement for the park's use of national forest system land in Kaibab National Forest near Tusayan for a shuttle staging and parking area and for extending the Greenway Trail into Tusayan. The agreement would address the details for

public safety, maintenance, utilities, capital improvements to the assigned parcel, and cost recovery. In addition, in the spirit of collaboration and cooperation with adjacent gateway communities, the Park Service would actively pursue partnering and cost-sharing opportunities to assist in managing and perhaps building transportation components outside the park. Close coordination with commercial businesses in Tusayan would occur during the pilot phase of the Tusayan to Canyon View Information Plaza shuttle bus system. The park might need to update existing agreements with the county sheriff and the Tusayan Fire Department for emergency services associated with the new shuttle bus staging area in Tusayan. The park would also continue working collaboratively with the Arizona Department of Transportation and enter into an agreement to utilize messaging time on the state's regional dynamic signs to target visitors en route to the park.

Cumulative Impacts

Other past, in-progress, and reasonably foreseeable projects within and around Grand Canyon National Park that could impact park operations and management were summarized in alternative A. The short-term impacts of these projects in combination with the moderate, adverse impacts of alternative B would result in local, moderate, adverse cumulative impacts to park operations and management. The long-term impacts of these projects in combination with the moderate, adverse and moderate, beneficial impacts of alternative B would result in local, moderate, beneficial cumulative impact to park operations and management. The benefits of improved park facilities that have resulted from past and current actions as well as those being planned, in combination with improvements under this alternative, would improve the overall effectiveness of park operations. Changes to park operations and management under alternative B would contribute appreciably to the cumulative impact for park operations.

Conclusion

Under alternative B short-term impacts on park operations and management during construction activities would be local, moderate, and adverse. Long-term impacts on park operations would be local, moderate, and both adverse and beneficial. Adverse impacts would result from an increase in capital and operating costs. Beneficial impacts would result from operational efficiencies, improved transportation programs, and resulting enhanced visitor services and programs. An increase of staff in certain divisions would ensure delivery of a smooth and effective program and services for visitors, particularly during the peak visitation months, which would be beneficial. Short-term cumulative impacts to park operations and management under alternative B would be local, moderate, and adverse; long-term cumulative impacts would be local, moderate, and beneficial.

Alternative C: Tusayan Parking Emphasis

Direct / Indirect Impacts

Alternative C would result in substantial changes to the park's current transportation program, which would affect park operations and management, similar to alternative B. Various improvements would be made in and outside the park to support a more effective transportation program. Operational efficiency would be increased by providing physical enhancements in needed locations, such as parking at Canyon View Information Plaza and at Tusayan, and through a slight increase in staffing to directly support the transportation program.

Construction Impacts. Similar to alternative B, construction activities under alternative C would disrupt some day-to-day operations, temporarily close roads and reroute traffic, and increase truck traffic. There would be a greater demand on staff time to manage construction contracts and associated activities, including post-construction monitoring. Mitigation measures as described for alternative B would help minimize disruption to

park operations and management. Construction would take place in phases spread over several years. However, the resulting short-term impacts to park operations during construction would be the same — moderate and adverse — regardless of when and where a specific construction activity took place. Employee and worker safety would be a high priority at all times during construction, and appropriate actions would be taken to ensure safe construction zones.

Operations Impacts. *Facilities* — Proposed improvements at Canyon View Information Plaza include rerouting the South Entrance Road, constructing a new parking area and shuttle bus stops, rehabilitating Mather Point, and adding a theater and bike rental facility. These improvements would be designed to minimize maintenance needs and reduce the current burden of park staff to address ongoing traffic congestion problems in this area. Similar to alternative B, new facilities would incorporate sustainable practices and demonstrate environmental leadership. New structures and facilities would use existing infrastructure so as to minimize any new demand on existing capacity. Emergency access to Canyon View Information Plaza would not be altered, and emergency access to Mather Point would be retained through the Mather Point parking lot. Rerouting the South Entrance Road, in conjunction with a new parking area at Canyon View Information Plaza, would reduce safety hazards caused by vehicular and pedestrian use conflicts and congestion in this area. Similar to alternative B, park staff would be required to manage traffic less often at peak visitation times, and off-road parking would not be allowed.

Modifications to the Grand Canyon Railway staging area and lot D would be the same as in alternative B. Adding a new building at the South Entrance Station for fee administration staff would improve operations by moving staff closer to the park's busiest entrance.

Constructing a new shuttle staging area in Tusayan on national forest system land, as

well as extending the Greenway Trail from the park's south boundary into Tusayan, would add protection responsibilities for park staff.

The proposed changes under alternative C, including construction of new facilities, at Canyon View Information Plaza, Mather Point, the South Entrance Station, and Tusayan, would add to the number of facilities in the park that require maintenance and upkeep. However, the increase in operations, as described below, would be outweighed by the expected benefit to park resources this would achieve.

Staffing — Similar to alternative B, the park would implement a set of transportation operational strategies to positively influence visitation patterns, provide higher capacity in existing facilities, and improve transportation system integration. The effect of these strategies on park operations and management would be the same as alternative B and would reduce, postpone, or potentially eliminate the need for capital infrastructure improvements in the park to meet projected transportation demands. Over the long term, with proper monitoring and program adjustments as needed, the impact on park operations would be beneficial as programs were established and desired objectives met. The key strategies for the transportation operations program would be the same as those described for alternative B. Under alternative C, however, there would be a need for more staff monitoring and enforcement of short-term parking at Canyon View Information Plaza than under alternative B. This is because Canyon View Information Plaza would have less parking for private vehicles than alternative B, and parking would be for short-term use only. In addition, the park would have to conduct more outreach to visitors to encourage them to park in Tusayan and ride a shuttle bus into the park. The park would also have to engage in more monitoring and active management of the Tusayan shuttle bus program to achieve the goals of this alternative.

The major increase to staffing under alternative C would be the result of changes to the existing and proposed park shuttle bus service. To effectively implement the proposed transportation operation strategies, an annual increase of 1.5 FTEs to park staff would be needed for a transportation coordinator function, and an increase of 4.5 FTEs to the transit operator staff to provide individual to meet and greet visitors and to provide parking management assistance from March to October, with additional temporary staff of up to 11 persons for peak visitation days (approximately 10 per year). These changes would be the same as alternative B.

To implement the proposed transit service improvements from June through August at full build-out, an increase of 5 FTEs to NPS staff would be needed, plus an increase of 39 employees to the shuttle contractor staff, compared to alternative A. The shuttle bus operations estimates include adjustments to improve the South Rim service as well as to implement the proposed Tusayan shuttle bus service. All of these estimates are only for the peak summer months. To provide more frequent service, the fleet of shuttle vehicles would have to be increased by 17 buses compared to alternative A. Most of this vehicle increase would be because of the Tusayan shuttle bus service (see Table 63).

Similar to alternative B, alternative C would result in a short-term increase in workload to some park divisions, such as contracting, natural and cultural resource staff, the project management office, visitor and resource protection, and visitor education and interpretation. Long-term increases to park staff would be similar to alternative B. Some long-term increases to park workload would occur for maintenance with more facilities to take care of, including those in Tusayan. At full build-out an increase to the Visitor Education and Interpretation Division would be required to operate Canyon View Information Plaza, shuttle programs, and the Tusayan staging area. For the Visitor and Resource Protection Division, there would be added responsibilities

for providing protection and emergency services to the Tusayan shuttle staging area at full build out. Under alternative C the staging area at Tusayan would be larger than under alternative B, so the need for public safety services might be greater.

Implementation Costs and Funding. Similar to alternative B, the park would take an adaptive management approach to implementing the proposed actions. The park would initially implement those physical improvements both in the park and near Tusayan to meet the most pressing transportation-related needs. For the purposes of this analysis, it is assumed that alternative C would be fully implemented, but the schedule for implementation would actually be contingent on the results of the adaptive management program, which would be closely monitored by the park. Constructing the shuttle bus staging area and some parking at Tusayan would occur in the initial phase of implementation, along with the full construction of proposed parking at Canyon View Information Plaza.

The estimated capital costs of transportation improvements under alternative C would be up to \$28.5 million. The gross construction cost estimate for other site improvements would be approximately \$4.1 million. In addition, there would be up to \$8.8 million in transit vehicle costs. The estimated annual operating costs, in 2007 dollars, would total \$746,000 for transportation management (which includes the transportation management operational strategies), up to \$3.5 million for shuttle bus operations, and \$504,000 for facility maintenance.

Alternative C would result in substantial capital improvements to the park's transportation infrastructure. Similar to alternative B, capital improvements associated with transportation services would be financed through a variety of sources, largely from the park's fee program. Priority projects would be implemented as funding became available. This alternative would not impact the balance between the park's annual operating budget

and existing funding sources. The park would pursue funding opportunities through partnerships, grants, and other opportunities. There would be no increase to the park's base funding for operations to implement this alternative; rather, funding for additional staff would come from the fee demonstration program.

Interagency Relations. Under alternative C the need for interagency agreements would be the same as described under alternative B. The National Park Service and the U.S. Forest Service would enter into an intergovernmental agreement for the Tusayan shuttle staging and parking area. The park would actively pursue partnering and cost-sharing opportunities to assist in managing and perhaps building transportation components outside the park in support of this plan's goals. The park would also continue working collaboratively with the Arizona Department of Transportation on projects that would relate to improvements to park visitation.

Cumulative Impacts

Past, in-progress, and reasonably foreseeable planned actions within and around Grand Canyon National Park that would have the potential to impact park operations and management are the same as listed for alternative A and would result in the same local, short-term, moderate, adverse and local, long-term, moderate, beneficial cumulative impact as described for alternative B. The benefits of improved park facilities from past and current actions, as well as those being planned, in combination with the proposed actions under this alternative would improve the overall effectiveness of park operations. Changes to park operations and management under alternative C would contribute appreciably to the cumulative impact for park operations.

Conclusion

Under alternative C the impact on park operations and management during construction would be local, short-term, moderate, and adverse. Similar to alternative B, the ongoing effect on park operations would be local,

long-term, moderate, and both adverse and beneficial. There would be an adverse impact from increased operating costs, but a beneficial impact from improvements in park operations and the ability to deliver an effective transportation management program and a successful visitor experience. Alternative C would result in local, short-term, moderate, adverse and in local, long-term, moderate, beneficial cumulative impacts to park operations and management.

Alternative D: Canyon View Information Plaza Parking Emphasis

Direct / Indirect Impacts

Alternative D would result in substantial changes to the park's current transportation program, similar to alternative B, which would affect park operations and management. Under this alternative operational efficiency would be enhanced by providing physical enhancements in needed locations, such as parking at Canyon View Information Plaza, and by slightly increasing staffing to directly support the transportation program.

Construction Impacts. Alternative D would result in disruptions to some day-to-day operations, temporary road closures and traffic rerouting, and increased truck traffic. These impacts would be similar to alternative B and would be short-term, moderate, and adverse.

Operations Impacts. Facilities — Proposed improvements at Canyon View Information Plaza and at the south Entrance Station for fee collection operations would be similar to alternative B. Improvements at Canyon View Information Plaza would include rerouting the South Entrance Road, constructing a parking lot, removing the Mather Point parking lot, rehabilitating the Mather Point overlook, and adding shuttle stops, a theater, and a bike rental facility. Unlike alternatives B and C, there would be no shuttle staging area in Tusayan under alternative D. Compared to alternative B, more parking spaces would be provided at Canyon View Information Plaza,

resulting in a larger area for maintenance. Overall, under this alternative, the proposed changes at Canyon View Information Plaza, Mather Point, Grand Canyon Railway staging area and lot D, and the South Entrance Station would add to the number of facilities in the park that require maintenance and upkeep. However, the increase in operations required for alternative D, as described below, would be outweighed by the expected benefit to park resources.

Staffing — Under alternative D the park would implement transportation strategies intended to positively influence visitation patterns, provide higher capacity in existing facilities, and improve transportation system integration. The effect of these strategies on park operations and management would be the same as alternative B. However, unlike alternatives B and C, all new private vehicle parking for day visitors would be provided in the park. Therefore, park staff would not need to actively enforce any short-term parking restrictions at Canyon View Information Plaza, and there would be no need to monitor and actively manage a shuttle bus route to Tusayan or to encourage visitors to park their cars in Tusayan and ride the shuttle bus.

The proposed transportation service improvements described under alternative D at full build-out would require 5 employees to be added to NPS staff and 11 employees to the shuttle contractor's staff, compared to alternative A. The number of shuttle buses would increase by five compared to alternative A (see Table 63).

Alternative D would result in a short-term increase in workload to some park divisions as described for alternative B. Some long-term increases to park workload would occur for maintenance and education / interpretation, similar to those described for alternative B. However, the main difference under alternative D is no park development near Tusayan; therefore, there would be no long-term park responsibility (maintenance, visitor services, public safety) in that area. Instead, all

improvements would primarily occur at Canyon View Information Plaza.

Implementation Costs and Funding — Similar to alternative B, the park would take an adaptive management approach to implementing the proposed actions. For purposes of this analysis, it is assumed that alternative D would be fully implemented, but that the schedule would be contingent on the effectiveness of an adaptive management process that would be closely monitored by the park.

The estimated capital costs for construction of the transportation improvements under alternative D would be up to \$25.4 million. The gross construction cost estimate for other site improvements would be \$4.1 million. In addition, there would be up to \$3.5 million in transit vehicle costs. The estimated annual operating costs, in 2007 dollars, associated with alternative D would total of \$521,000 for transportation management (which includes transportation operational strategies), \$1.8 million for shuttle bus operations, and \$440,000 for facility maintenance.

This alternative would result in substantial capital improvements to the park's transportation infrastructure. Capital improvements associated with transit services would be financed through various sources, largely from the park's fee program. Improvements would be made on priority projects as funding became available. This alternative would not impact the balance between the park's annual operating budget and existing funding sources. The park would pursue other funding opportunities. There would be no increase to the park's base funding for operations to implement this alternative; rather, funding for additional staff would come from the fee demonstration program.

Interagency Relations — The National Park Service would actively pursue partnering and cost-sharing opportunities to assist in managing and perhaps building transportation components outside the park in support of this plan's goals. The park would also continue working collaboratively with the

Arizona Department of Transportation on transportation projects that relate to park visitation.

Cumulative Impacts

The past, in-progress, and reasonably foreseeable planned actions within and around Grand Canyon National Park that could impact park operations and management are the same as those listed in alternative A and would result in the same local, short-term, moderate, adverse and the same local, long-term, moderate, beneficial cumulative impact as described for alternative B. The benefits of improved park facilities from past and current actions, as well as those being planned, in combination with improvements under this alternative, would improve the overall effectiveness of park operations. Changes to park operations and management under alternative

D would contribute appreciably to the cumulative impact for park operations.

Conclusion

Under alternative D the impact on park operations and management during construction activities would be local, short-term, moderate, and adverse. The ongoing effect on park operations would be local, long-term, moderate, and both adverse and beneficial. An adverse impact would result from increased operating costs, but a beneficial impact would result from improvements in park operations and the ability to deliver an effective transportation management program and a successful visitor experience. Cumulative impacts to park operations and management under alternative D would be local, moderate, and adverse in the short term, and local, moderate, and beneficial in the long term.